Long-Term Carbon Injection Field Test for > 90% Mercury Removal for a PRB Unit with a Spray Dryer and Fabric Filter

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1. EXECUTIVE SUMMARY

The power industry in the U.S. is faced with meeting regulations to reduce the emissions of mercury compounds from coal-fired plants. Injecting a sorbent such as powdered activated carbon (PAC) into the flue gas represents one of the simplest and most mature approaches to controlling mercury emissions from coal-fired boilers. The purpose of this test program was to evaluate the long-term mercury removal capability, long-term mercury emissions variability, and operating and maintenance (O&M) costs associated with sorbent injection on a configuration being considered for many new plants. Testing was conducted by ADA Environmental Solutions (ADA) at Rocky Mountain Power's (RMP) Hardin Station through funding provided by DOE/NETL, RMP, and other industry partners. The Hardin Station is a new plant rated at 121 MW gross that was first brought online in April of 2006. Hardin fires a Powder River Basin (PRB) coal and is configured with selective catalytic reduction (SCR) for NO_x control, a spray dryer absorber (SDA) for SO_2 control, and a fabric filter (FF) for particulate control. Based upon previous testing at PRB sites with SCRs, very little additional mercury oxidation from the SCR was expected at Hardin. In addition, based upon results from DOE/NETL Phase II Round I testing at Holcomb Station and results from similarly configured sites, low native mercury removal was expected across the SDA and FF.

The main goal of this project was met—sorbent injection was used to economically and effectively achieve 90% mercury control as measured from the air heater (AH) outlet to the stack for a period of ten months. This goal was achieved with DARCO® Hg-LH, Calgon FLUEPAC®-MC PLUS and ADA Power PAC *PREMIUM* brominated activated carbons at nominal loadings of 1.5–2.5 lb/MMacf. An economic analysis determined the twenty-year levelized cost to be 0.87 mills/kW-hr, or $15,000/lb Hg removed. No detrimental effects on other equipment or plant operations were observed. The results of this project also filled a data gap for plants firing PRB coal and configured with an SCR, SDA, and FF, as many new plants are being designed today.

Another goal of the project was to evaluate, on a short-term basis, the mercury removal associated with coal additives and coal blending with western bituminous coal. The additive test showed that, at this site, the coal additive known as KNX was affective at increasing mercury removal while decreasing sorbent usage. Coal blending was conducted with two different western bituminous coals, and West Elk coal increased native capture from nominally 10% to 50%.

Two additional co-benefits were discovered at this site. First, it was found that native capture increased from nominally 10% at full load to 50% at low load. The effect is believed to be due to an increase in mercury oxidation across the SCR caused by a corresponding decrease in ammonia injection when the plant reduces load. Less ammonia means more active oxidation sites in the SCR for the mercury. The second co-benefit was the finding that high ammonia concentrations can have a negative impact on mercury removal by powdered activated carbon. For a period of time, the plant operated with a high excess of ammonia injection necessitated by the plugging of one-third of the SCR. Under these conditions and at high load, the mercury control system could not maintain 90% removal even at the maximum feed rate of 3.5 lb/MMacf (pounds of mercury per million actual cubic feet). The plant was able to demonstrate that mercury removal was directly related to the ammonia injection rate

in a series of tests where the ammonia rate was decreased, causing a corresponding increase in mercury removal. Also, after the SCR was refurbished and ammonia injection levels returned to normal, the mercury removal performance also returned to normal.

Another goal of the project was to install a commercial-grade activated carbon injection (ACI) system and integrate it with new-generation continuous emissions monitors for mercury (Hg-CEMs) to allow automatic feedback control on outlet mercury emissions. This was accomplished and the plant can now be operated to control carbon injection based on either the overall mercury removal or an outlet mercury emission rate. By integrating these systems, it was determined that the plant could reduce powdered activated carbon consumption, especially at low load, because, at Hardin, native mercury capture increases from less than 20% to about 50% at low load and the carbon injection rate can be decreased accordingly. Currently, the plant is operating to automatically control emissions to below 0.9 lb/TBtu (pounds of mercury per million British thermal units) at carbon loadings of 0.5 to 1.5 lb/MMacf. During the final phase of the Long-Term test, the ACI system was operated by plant personnel. The estimated O&M cost for a single Hg-CEM system is $15,500/yr.

The Hg-CEMs performed well throughout the project. This project began shortly after Thermo Fisher first offered the Mercury Freedom System™ on a commercial basis and progressed though several iterations, improvements, and upgrades to the hardware and software. Indeed, there was a ten-fold increase in the precision and accuracy of the units during the course of the project due to several successful upgrades. In their present condition, the Hg-CEMs measure mercury to a precision of about ± 0.05 µg/wscm (micrograms of mercury per wet standard cubic meter of gas), and only require occasional fine-tuning of the calibration coefficients. The quality assurance/quality control (QA/QC) protocol required to keep the units operating at their optimal performance was also developed and perfected during the course of the project. ADA Environmental Solutions (ADA) developed a daily calibration procedure that surpasses the requirements specified in the Clean Air Mercury Rule (CAMR), and a weekly diagnostic program that ensures that the systems are operating properly and receive the necessary maintenance. For the most part, the systems passed the daily, weekly, and quarterly QA/QC requirements as well as four performance verification tests using the Ontario Hydro (O-H) and Sorbent Trap Methods (STM) for the first test and the EPA Method 30A (M30A) procedure for the remaining three. However, some improvements are still necessary before the system can meet all of the requirements. These involve tests that challenge the system with oxidized mercury (Hg+2). These tests could not be passed at Hardin in spite of trying several improvements suggested by ADA or Thermo Fisher.

2. INTRODUCTION AND BACKGROUND

Rocky Mountain Power, Inc. (RMP), a wholly owned subsidiary of Colorado Energy Management, brought a new plant on line in the spring of 2006 near Hardin, Montana. The plant, Hardin Generating Station, fires subbituminous Powder River Basin (PRB) coal and is configured with low-NO_x burners and selective catalytic reduction (SCR) for NO_x control, a spray dryer absorber (SDA) for SO_2 control, and a fabric filter (FF) for particulate control. RMP is working with the Montana Environmental Information Center (MEIC), the Montana Department of Environmental Quality (M-DEQ), and other interested parties to assess the costs and effectiveness of activated carbon injection (ACI) to optimize mercury emissions reduction. They partnered with the Department of Energy National Energy Technology Lab (DOE/NETL) and ADA Environmental Solutions (ADA) to determine whether 90% mercury control could be achieved for a 10-month period and to provide valuable long-term performance data on mercury control.

There was a twofold purpose to the program. First, this Phase III program provided the opportunity to assemble expertise from DOE, technology development companies, and power generators to assist in the transition from shorter-term, proof-of-concept tests conducted in DOE's Phase I and II programs to long-term performance testing of the most advanced mercury control technology for this configuration. Second, this program permitted the expansion of RMP's original scope of work for technology evaluation to include the evaluation of additional, promising, new technologies that have had limited field testing. This program provided the opportunity to:

1. Perform a co-benefit analysis to define the range of native mercury removal achievable by natural operational variations of the SCR and SDA.
2. Assess the extent to which native mercury removal can be increased using coal additives or coal blending.
3. Evaluate the effectiveness of enhanced or bromine-treated carbon injection for mercury control.
4. Evaluate the viability of automatic feedback control using a new generation of continuous emission monitors for mercury (Hg-CEMs) and a commercial ACI system to maintain mercury emissions at a set level and optimize activated carbon usage.
5. Provide DOE/NETL and industry with long-term operating and maintenance requirements for an ACI system for ten months of continuous operation. During the final months of the Long-Term test, the ACI system was operated by plant personnel.
6. Provide valuable information to RMP, DOE, and industry on the operating and maintenance requirements for Hg-CEMs using the QA/QC procedures outlined in the Clean Air Mercury Rule and compliance monitoring requirements included in 40 CFR Part 60.49a and Part 75.
7. Provide the necessary data for RMP, MEIC, and M-DEQ to make well-informed decisions on the level of mercury control economically possible with ACI.

On March 15, 2005, the U.S. Environmental Protection Agency (EPA) issued a final regulation to control mercury from coal-fired power plants known as the Clean Air Mercury

Rule (CAMR). Although this regulation was vacated by the courts in 2008, it was the guiding document throughout this program and many of the performance requirements for mercury measurement are still followed by the industry in lieu of new a new regulation. Congress is currently working on a maximum achievable control technology (MACT) regulation for mercury. Any new regulation will affect the existing fleet of nearly 1,100 boilers. These plants are relatively old with an average age of more than 40 years. Although most of these units are capable of operating for many additional years, there is a desire to minimize large capital expenditures because of the reduced (and unknown) remaining life of the plant to amortize the project. Therefore, the industry needs environmental control technologies that:

- Take advantage of existing equipment and minimize the need for installing new major capital equipment
- Effectively meet regulations on units firing coal with a wide range of characteristics
- Will not require additional manpower or specialized technical expertise
- Can be installed and operated without jeopardizing the reliability of the generating facility

The injection of powdered activated carbon (PAC) into the flue gas represents one of the simplest and most extensively tested technologies for controlling mercury emissions from coal-fired boilers. NETL sponsored full-scale field tests conducted by ADA and others have proven the effectiveness of ACI for reducing mercury emissions on a variety of coals and unit configurations. These tests have also shown that mercury removal across the particulate collection devices can vary significantly depending on coal type and flue gas properties.

Evaluating the most advanced mercury control technology for the configuration at Hardin, SCR-SDA-FF, was important to the industry because it is favored by the industry for the majority of new plants firing PRB coal. Testing at Hardin provided an opportunity to evaluate 90% mercury control with enhanced technologies and the associated operating and maintenance (O&M). Specifically, this program advanced the knowledge base in seven areas.

1. <u>90% Mercury Control on a PRB-SCR-SDA-FF Configuration</u> – This program provided the opportunity to evaluate several advanced mercury control technologies such as coal additives and treated PAC.
2. <u>Effect of SCRs on Mercury Control</u> – As more SCRs are put into service it is important to gather information on how mercury control is affected by an SCR. At the beginning of this project, no ACI tests had been conducted on a unit firing PRB and configured with an SCR, SDA, and FF.
3. <u>Commercial-Grade Equipment</u> – The ACI system and Hg-CEMs installed at Hardin were commercial-grade systems that were integrated to achieve continuous mercury control with minimal operator interface.
4. Long-Term Testing (10 months) – Long-term performance testing was the critical next step in the commercialization process for mercury control technologies. The Long-Term test period of this program lasted ten months and progressed through all seasons and through several major operational issues at the plant.

5. Coal Blending – High mercury removal was achieved at Holcomb Station (PRB coal, SDA-FF) by blending West Elk western bituminous coal with PRB coal. Short-term blending tests with two western bituminous coals were conducted at Hardin.
6. Economic Analysis – This determined the costs of 90% mercury control for a site configured with PRB-SCR-SDA-FF.
7. Systems Integration – This project evaluated the integration of ACI systems with Hg-CEMs to simplify operation and reduce PAC usage. Long-term data were obtained on the operability, maintainability, and reliability of ACI systems and compliance Hg-CEMs. Plant personnel were trained in the operations and maintenance of the systems.

3. APPROACH

Sorbent injection was used to effectively achieve and maintain mercury control at 90% as measured from the air heater (AH) outlet to the stack for a period of ten months. A short-term evaluation included tests with coal additives, and coal blending with western bituminous coal. A commercial-grade ACI system was installed and integrated with Hg-CEMs to allow automatic feedback control based on mercury removal. The project test plan that includes a detailed description of the site and test equipment is reproduced in Appendix A. Figure 1 is a schematic of the Hardin Station showing the various sampling locations for ash, coal, slurry, and flue gas. The key parameters of Hardin are listed in Table 1.

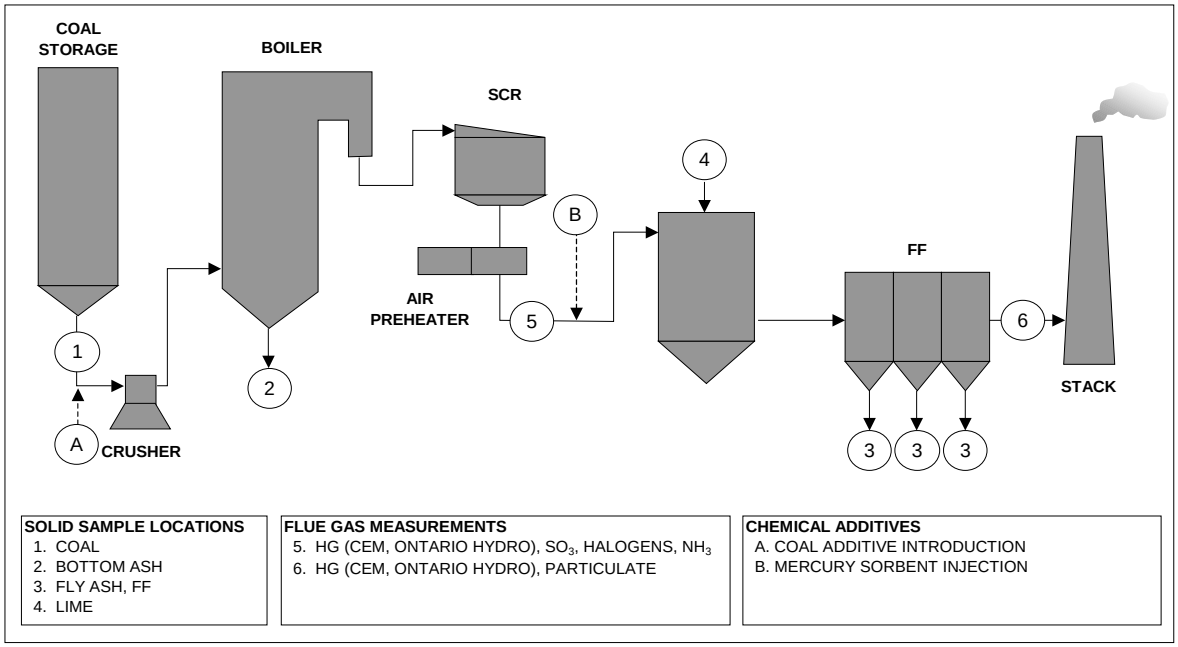

Figure 1. Schematic of the Hardin Station with Sample Locations.

Table 1. Key Parameters of the Hardin Station.

Test Period	August 2006–November 2008
Unit	1
Unit Size	121 MW
Coal	PRB, Absaloka Mine
Particulate Control	Fabric Filter
Gas Flow Rate, full load (acfm)	550,000
Sulfur Dioxide (SO_2) Control	Spray Dryer with Recycle
Nitrogen Oxides (NO_x) Control	Low-NO_x Burners and SCR
Ash Reuse	Disposal
Test Portion of Unit	121 MW
Typical Inlet Mercury Range (µg/wscm)	2–12
Typical Native Mercury Removal	< 20%

Table 2 is a project timeline to provide the reader with a better sense of the important events of a project that spanned nearly three years. Notably, three events are so important to the general understanding of the project that they are listed and discussed separately at this point.

1. **Hg-CEM Nitrogen Generators (NG)** – On September 5, 2007, nitrogen generators were installed on the Hg-CEMs as an upgrade offered by Thermo Fisher. The purpose of the NGs is to create an oxygen-free gas for use as a carrier gas for calibrations and as a sample dilution and carrier gas. This event is important because it significantly increased the reliability and precision of the Hg-CEM measurements. Up to this time, signal variation was on the order of ± 0.5 µg/wscm. This made it difficult to perform accurate calibrations and to interpret results when the mercury concentration at the stack fell below 0.5 µg/wscm, which was often the case during coal additive and parametric testing. The NGs reduced signal variation to nominally ± 0.05 µg/wscm.
2. **Step-Up Transformer Failure** – The Long-Term test began on September 26, 2007. On December 15, 2007, the plant's step-up transformer failed. On February 5, 2008, this transformer was replaced with a temporary, smaller unit that limited operation to 106 MW out of 121 MW. This is important because at low load the native mercury capture and, therefore, overall mercury capture increases at Hardin. This was discussed with the project team and it was decided to continue the Long-Term test in spite of the consequence to the interpretation of results. The original transformer was repaired and reinstalled on July 22, 2008.
3. **SCR Deposition** – On March 13, 2008, shortly after the Long-Term test resumed with the temporary transformer, a tube leak caused > 25% of the SCR to be plugged with ash. To compensate for the reduced available SCR surface area, the plant increased ammonia flow to maintain NO_x emission levels. However, the ammonia flow meter was not functioning properly and this significant operational change went unnoticed by ADA until the original transformer was reinstalled on July 22, 2008. At this time, mercury capture performance decreased significantly and it was discovered that excess ammonia negatively affects capture at full load (121 MW). The SCR was refurbished and the unit returned to "normal" operation on October 26, 2008. The Long-Term test ended on November 17, 2008.

Taken in combination, these events reduced the time the unit was operating normally during the 12-month (total duration) Long-Term test to about two months. However, valuable information was gained about the effect of the SCR and excess ammonia on mercury capture.

Table 2. Hardin Project Timeline.

1 Q 06	Project awarded
2 Q 06	Site kickoff meeting at Hardin Signed Cooperative Agreement with DOE/NETL Signed Host Site Agreement
3 Q 06	DOE kickoff at DOE NETL (July 2006) Completed the Cost Share Agreement with RMP Platform installed at the SDA inlet Test Trailer installed SDA Inlet and Stack Hg-CEM installed
4 Q 06	Quality Assurance Project Plan completed Sample and Data Management Plan completed Site Safety Plan completed Poster presented at the DOE/NETL conference in Pittsburgh (December 2006) **Baseline Source Test completed (December 2006)** **Coal Blending Tests completed (December 2006)**
1 Q 07	KNX Licensing Agreement obtained to test KNX - B&W declined test of their additive Trained RMP personnel on Hg-CEM ops Gave tour to utility personnel interested in Thermo Hg-CEMs First quarterly Hg-CEM linearity check failed - Hg-CEMs repaired
2 Q 07	**Baseline Ontario Hydro (O-H) and STM Tests repeated (April 2007)** **Coal additive test with ALSTOM's KNX (April 2007)** Carbon silo, transport piping, and injection lance installed **Parametric Test with DARCO® Hg-LH, Calgon FLUEPAC™-MC PLUS, and PAC+KNX (May, June 2007)** Smaller screws installed on ACI system to facilitate lower feed rates
3 Q 07	**Optimization Tests with Calgon FLUEPAC™-MC PLUS and NORIT DARCO® Hg-LH (August 2007)** **Baseline Stack Test for PM2.5, PM10, and Controlled Condensate (SO_3) (September 2007)** **9/5/07: Nitrogen Generators installed on Hg-CEMs - performance significantly improved** **9/26/07: Began Long Term Test with DARCO® Hg-LH** Trained RMP operators on ACI system operation
4 Q 07	Presentation given at the DOE/NETL Conference (December 2007) **12/15/07: Step-up transformer failed causing 2-mo outage** Upgraded ACI system logic for Hg-CEMs feedback control to automatically maintain 90% Hg removal Mercuric Chloride Generator installed on Stack Hg-CEM
1 Q 08	Presented paper at the EUEC Conference (January 2008) **2/5/08: Plant resumed operation at 106 MW of 121 MW** **2/25/08: Resumed Long Term Tests with Hg-LH** **3/13/08: Major tube leak plugged 25+% of SCR** Periods of poor performance may have been due to a batch of PAC with low bromine levels
2 Q 08	Trained plant personnel on Hg-CEM and ACI system operations. **4/21/08: First Method 30A RATA Test**
3 Q 08	Presented paper at the Mega Symposium (August 2008) Trained additional plant personnel in Hg-CEM operations **7/4/08-7/22/08: Outage to install refurbished step-up transformer.** Could not maintain 90% removal w/excess ammonia and 121 MW. **8/19/08: Long Term Test concluded with DARCO® Hg-LH** **DARCO® Hg-LH was tested for 167 days during which 208,731 lb was fed** **8/26/08: BeganCalgon FLUEPAC™-MC PLUS for 2-mo test** Could not maintain 90% removal at 2.75-3.0 lb/MMacf w/excess ammonia and 121 MW. **9/22/08: Long Term source sampling test and second M30A RATA.** ACI system operation assumed by plant
4 Q 08	**10/13/08: Final M30A RATA Test. Dynamic Spike Test.** **10/19/08-10/26/08: Outage to refurbish SCR.** **10/29/08: Resume test w/Calgon MC PLUS** **11/17/08: Long Term Test completed** **Calgon FLUEPAC™-MC PLUS was tested for 60 days during which 110,431 lb was fed** **Began Test with ADA Power PAC Premium (not part of DOE Project)**
1 Q 09	Presented paper at the EUEC Conference (February 2009) 1/14/08-…..: Running in auto with emissions control. Emissions under 0.9 lb/TBtu at 1.0-3.0 lb/MMacf **Final Report issued**

3.1. Objectives

The purpose of this test program was to evaluate the long-term mercury removal capability, long-term mercury emissions variability, and O&M costs associated with sorbent injection on a plant configuration being considered for many new plants. Hardin fires a PRB coal and is configured with an SCR and low-NO_x burners for NO_x control, an SDA for SO_2 control, and an FF for particulate control. Based upon previous tests at other PRB sites with SCRs, very little additional mercury oxidation was expected at Hardin. The primary objectives of this project were:

- Demonstrate that 90% mercury removal was sustainable with ACI.
- Integrate a commercial Hg-CEM with an ACI system to simplify operation and reduce carbon usage.
- Train plant personnel to operate the Hg-CEMs and ACI equipment.

Secondary objectives included:

- The evaluation of co-benefits (e.g., effect of the SCR).
- The evaluation of coal additives to enhance mercury removal.
- The evaluation of coal blending with western bituminous coal.
- The determination of the cost reduction potential of using automatic feedback control from the Hg-CEMs to control ACI rate and maintain a fixed mercury emission rate independent of plant operations and coal variations.
- The evaluation of the impact of enhanced carbons on ash disposal.
- Providing data to support RMP and M-DEQ in a BACT analysis of technology implementation.

3.2. Scope

To achieve the objectives stated above, ADA installed a mercury sorbent injection system and two Hg-CEM systems at the Hardin Generating Station. This equipment, described in Appendix A, provided the means to evaluate a series of co-benefit enhancements and to conduct baseline and parametric tests to assess the potential for reducing mercury emissions by 90%. The co-benefits analysis characterized the range of mercury removal achievable by studying the affects of the SCR, SDA, and FF under normal variations in operation. The effectiveness of coal additives to enhance mercury oxidation across the SCR and subsequent removal in the SDA-FF was also studied. During parametric testing, the effectiveness of sorbent injection for mercury control was evaluated with and without enhanced co-benefit mercury removal. Since sorbent injection demonstrated that 90% mercury control was feasible, DOE/NETL approved a 10-month, long-term test to establish steady-state operation and assess potential maintenance and operational problems.

3.3. Tasks

The program was accomplished by following a series of technical tasks.

- Task 1. Site Coordination, Kickoff Meetings, Develop Test Plan and QA/QC Plan
- Task 2. Design, Procure, and Install Equipment
- Task 3. Field Testing
  - Task 3.1. Hg-CEM and Silo Operations
  - Task 3.2. Baseline Tests
  - Task 3.3. Co-Benefits Analysis
    - Task 3.3.1. Effect of Low Load on Hg Removal
    - Task 3.3.2. Coal Blending Test
    - Task 3.3.3. Coal Additive Test
    - Task 3.3.4. Effect of Ammonia on Hg Removal
  - Task 3.4. Parametric Tests
  - Task 3.5. Optimization Test
  - Task 3.6. Long-Term Test
- Task 4. Coal, Ash, and By-Product Sample Evaluation
- Task 5. Technology Transfer
- Task 6. Management and Reporting/Economic Analysis

3.3.1. Test Coordination, QA/QC, and Test Plan Development

Efforts within this task included test planning with input from the host site, DOE/NETL, and other contributing team members. The planning process included meeting with plant, corporate, and environmental personnel to agree upon an overall scope of the program, the potential impact on plant equipment and operation, and to gather preliminary information necessary to develop a detailed test plan and scope of work. Efforts included developing a QA/QC plan, identifying potential mercury sorbents and coal additives, finalizing the scope for each of the team members, and putting subcontracts in place for manual measurement services. The list of accomplishments within this task is below.

- Signed Cooperative Agreement and Host Site Agreement (April 27, 2006)
- Kickoff meeting held at the Hardin Generating Station (June 26, 2006)
- Developed Site Sampling Plan and Installation Plan (June 26, 2006)
- Contract for Services Agreement with RMP
- DOE Kickoff meeting at DOE/NETL (July 18, 2006)
- Reaction Engineering completed a preliminary Modeling Study to determine potential mercury oxidation and removal at baseline conditions across the SCR, SDA, and FF, and the effects of coal additives and coal blending on mercury oxidation.
- Completed the Quality Assurance Project Plan including Hg-CEM operating procedures to follow CAMR requirements.

- Completed a Sample and Data Management Plan.
- Arranged to test two western bituminous coals during the coal blending tests.
- Obtained a Licensing Agreement to test KNX. B&W declined to participate in a test of their coal additive.

3.3.2. Equipment Installation

There were two main components to Task 2; the design, procurement, and installation of an ACI system as well as the procurement and installation of two Thermo Fisher Hg-CEMs. Figure 2 and Figure 3**Error! Reference source not found.** show the ACI system, and Hg-CEMs installed at Hardin. Upon completion of the project, the ACI system and stack Hg-CEM will remain at the site and be operated by the plant as a compliance mercury removal system.

The ACI system included a refurbished carbon storage and feed system, piping to transport the carbon to the injection location, and an injection lance. The piping was standard carbon steel pipe but the elbows used were long-radius, and ceramic lined. The single injection lance consisted of an open-ended, stainless steel pipe with the discharge located in the center of the duct after the AH and before the SDA. A new platform was also installed at the injection location to facilitate lance and Hg-CEM maintenance and manual flue gas measurements.

The Hg-CEMs were commercial Thermo Fisher Mercury Freedom Systems™. However, since this project began shortly after these systems became commercially available, several upgrades were made during the course of the project. These upgrades increased the reliability and accuracy of the Hg-CEMs and will be described more completely below.

An important component of Task 2 was to integrate the ACI and Hg-CEM systems to produce a system capable of automatically controlling mercury emissions to a specified set point. This was accomplished in the fall of 2007 and, afterwards, the integrated system was able to automatically achieve and maintain 90% mercury removal during normal operating conditions. Carbon injection concentrations ranging from of 1.5 to 3.5 lb/MMacf were used to maintain mercury removal between 89–91% during periods of constant full load.

Figure 2. The ACI System and Stack Hg-CEM Probe Installed at Hardin.

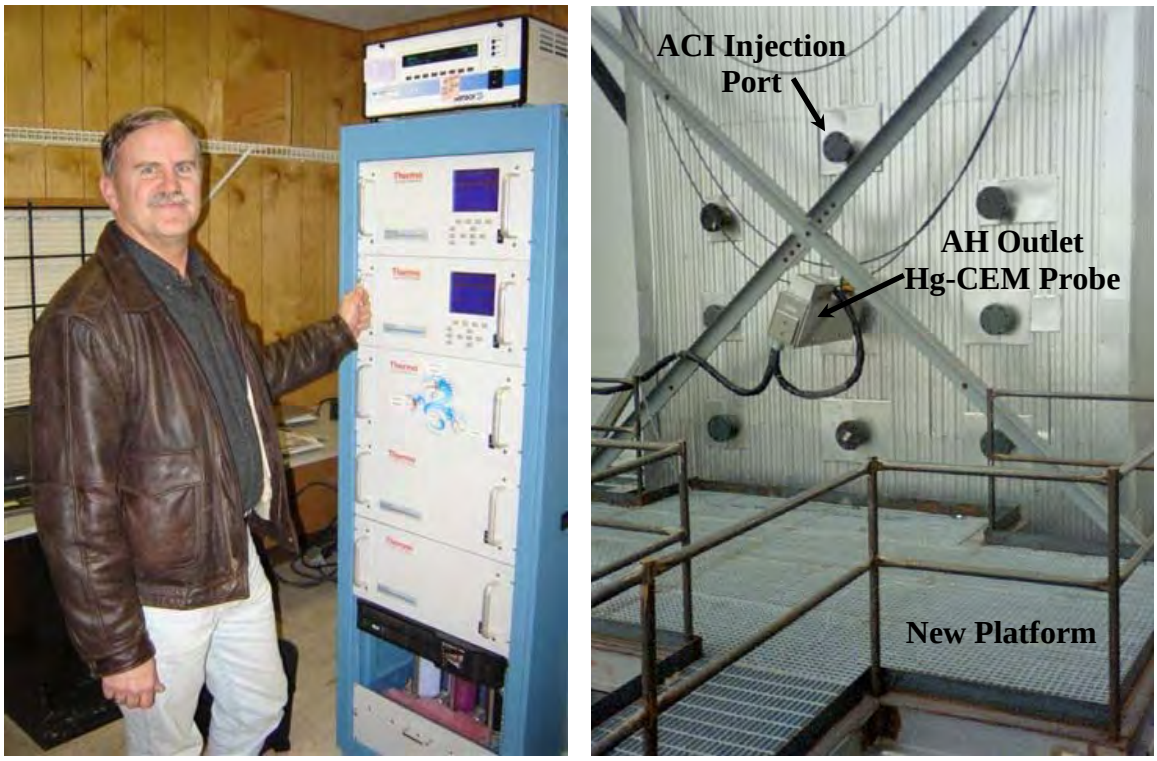

Figure 3. The Hg-CEM, Probe, Sample Ports and New Platform Installed at the AH Outlet/SDA Inlet Location.

3.3.3. Technology Transfer

Transferring the information and observation from the research completed under this project to coal-fired utility customers was an important part of the program. Presentations were given at selected conferences to increase exposure of the test results and receive comments on the applicability of mercury removal with ACI from industry. The ultimate goal of technology transfer was to make results available to the public as quickly, comprehensively and accurately as possible.

- Connie Senior of Reaction Engineering presented a paper at the Electric Power Conference held in May 2007 concerning a model to predict the speciation and removal at Hardin and associated actual emissions measurements.
- ADA presented a poster at the DOE/NETL Mercury Control Technology Meeting in December 2006.
- At the request of RMP, ADA gave a tour to utility personnel interested in Thermo Hg-CEMs.
- ADA met with the new president of Colorado Energy Management to present an overview of the Hardin project.
- ADA presented a paper at the DOE/NETL conference in December 2007.
- ADA presented a paper at the EUEC Conference in January 2008.
- ADA presented a paper at the Mega Symposium in August 2008.
- ADA presented a paper at the EUEC Conference in February 2009.

4. RESULTS AND DISCUSSION

4.1. Field Testing

Field testing was conducted from September 2006 to November 2008, and included baseline measurements, co-benefits analysis with coal additives and coal blending, parametric tests with different carbons, and Long-Term testing. Mercury removal performance and balance-of-plant impacts were quantified by analyzing plant operating data, Hg-CEM measurements, collection, and analysis of solid samples (i.e., coal and ash), and through independent flue gas measurements. Operating parameters included flow rates, temperatures, pressures, and the emission values of all measured gases. The following sections discuss the results of all testing.

Please note that the units used flue gas mercury concentration throughout this report are micrograms of mercury per wet standard (1 atm, 68 °F) cubic meter of flue gas (µg/wscm) at the oxygen concentration of the raw flue gas. This was necessary because there were no oxygen or carbon dioxide monitors at the inlet location to allow conversion to lb/MBtu. Also, most of the graphs in the following sections show mercury values for both the inlet and outlet locations and it would have been awkward to present them in different units. However, unit conversion calculations at the stack indicate that the difference between µg/wscm and lb/TBtu at this site is less than 0.1. Therefore, given the uncertainty in such measurements and the variability in coal composition and plant operations, the units can be considered to be interchangeable for the Hg-CEM mercury measurements at the stack. Examples of the standard calculations used in this section are included in Appendix B.

4.1.1. Silo and Hg-CEM Operation

Since the story of this project is closely connected with the story of the Hg-CEM and ACI systems, a separate section is included that discusses the successes, improvements, and maintenance issues that were gradually developed over the course of this project. The QA/QC protocol developed by ADA for the Hg-CEMs is included in Appendix C.

4.1.1.1. Hg-CEM Quarterly Linearity Checks

Linearity checks were performed to access the response of the system with the low-, mid-, and high-level reference gas injected ahead of the inertial filter in non-repetitive, triplicate runs. Part 75 states that the CEM is required to meet a performance specification of 10.0% of reference or a difference of ± 1.0 µg/m^3, whichever is less restrictive. Linearity checks are required each quarter and at least 30 days apart and must be completed within 24 unit operating hours. Linearity checks were performed manually by changing the span concentration of the calibrator.

Table 3 shows the results of all linearity checks performed during the project. The first linearity check performed at Hardin was in January 2007. This linearity check failed, but an investigation found problems with the configuration of the CEMs and performance of the calibrators; these problems were corrected and a subsequent linearity test passed. Some linearity checks were not performed in a quarter-year because there was uncertainty regarding specific federal QA/QC requirements (2007) and/or because of plant outages that

disrupted the test schedule (2008). The stack CEM failed a few linearity checks in the ten quarters spanned by the project. These can be attributed to the use equipment that was later upgraded (June 2007), the use of incorrect calibration concentrations (the test was initiated with incorrect settings in the calibrator and could not be stopped as per the rule), and calibrator maintenance activities (early in the project, the calibrators were found to be non-linear due to degradation of the mercury reservoir in the calibrator that was later corrected by use of nitrogen as the calibration carrier gas).

Table 3. Linearity Check Results.

HARDIN Hg-CEM LINEARITY CHECK – SDA INLET			
Quarter	**Data**	**High Error**	**Result**
1Q07	03/17/07	1.6 / 9.1%	PASS
2Q07	N/A	N/A	N/A
3Q07	09/19/07	0.50 / 4.1%	PASS
4Q07	N/A	N/A	N/A
1Q08	N/A	N/A	N/A
2Q08	04/04/08	0.31 / 3.8%	PASS
	04/28/08	0.31 / 4.0%	PASS
3Q08	07/25/08	0.45 / 7.2%	PASS
	09/17/08	0.39 / 4.7%	PASS
4Q08	11/18/08	0.15 / 2.0%	PASS

HARDIN Hg-CEM LINEARITY CHECK – STACK			
Quarter	**Data**	**High Error**	**Result**
1Q07	03/17/07	4.48 / 47.0%	FAIL *
	03/25/07	0.25 / 2.0%	PASS
2Q07	N/A	N/A	N/A
3Q07	07/20/07	1.48 / 24.0%	FAIL *
	09/19/07	1.71 / 9.3%	PASS
4Q07	N/A	N/A	N/A
1Q08	N/A	N/A	N/A
2Q08	04/04/08	4.81 / 35.4%	FAIL *
	04/28/08	0.32 / 10.7%	PASS
3Q08	07/25/08	0.77 / 8.5%	PASS
3Q08	09/18/08	0.38 / 8.7%	PASS
4Q08	11/18/08	0.40 / 5.0%	PASS

* Failed tests that were repeated after corrections were made.

4.1.1.2. Hg-CEM RATA Results (M30A)

ADA conducted three sets of Relative Accuracy Test Audit (RATA) tests on the Hg-CEMs using regulations outlined in 40 CFR Part 75.20. Method 30A was the instrumental reference method (IRM) employed to conduct the RATA on the stack Hg-CEM, and a modified Method 30A was used for the RATA on the AH outlet Hg-CEM. A full accounting of each RATA is presented in Appendix D.

The first RATA was conducted during the week of April 21, 2008. The stack Hg-CEMs passed the RATA and all performance tests conducted during this evaluation except the 3-Level System Integrity Check and the Bias Test. The AH outlet CEMs passed the RATA and all applicable performance tests except the Bias Test. The IRM analyzer passed all of the system checks except the Dynamic Spiking Test. A summary of these results is presented in Table 4. It should be noted that the results in Tables 4, 5, and 6 refer to both the IRM CEM (indented in the table) and the Hg-CEMs installed at Hardin (not indented).

Table 4. Results of the First M30A RATA.

Test	Stack Hg-CEMs (downstream of ACI)	Air Heater Outlet Hg-CEMs (upstream of ACI)
Linearity Check	PASS	PASS
7-Day Calibration Error Test	PASS	PASS
Cycle Time Test	PASS	PASS
3-Level System Integrity Check	FAIL	N/A
Relative Accuracy Test Audit	PASS	PASS
IRM System Performance Tests		
Interference Check (Optional)	-	-
3-Point System Calibration Error Test	PASS	-
System Integrity Check	PASS	-
Measurement System Response	PASS	-
Dynamic Spiking Test	FAIL	-
Bias Test	FAIL	FAIL

Note: The 3-Level System Integrity Check is not applicable to the AH outlet CEM because there is no mercuric chloride generator on this unit.

The failure of the 3-Level System Integrity Check on the stack Hg-CEM was attributed to improper insulation of the mercuric chloride generator. This unit was upgraded and tested before the second RATA but continued to fail the integrity check. The failure of the Bias Tests was attributed to a flaw in the design of the heating ventilation and air conditioning system on the IRM that made it difficult to maintain constant temperature within the housing. This flaw was repaired and the Bias Test was repeated during the next RATA test. No Bias Adjustment Factor was implemented at this time.

A Linearity Check performed on the Stack Hg-CEM prior to first M30A test failed due to calibrator non-linearity. As a result, the IRM calibrator was used to calibrate the stack Hg-CEM for the test period, and was later installed into the stack system after the RATA so the non-linear unit could be serviced.

The Dynamic Spiking Test failure was attributed to difficulties in maintaining vapor-phase oxidized mercury in the sample gas stream. Recovery of the oxidized mercury proved unsuccessful as evident in failure of both mean percentage recovery and absolute difference criteria. This test was further evaluated during the final RATA.

The second M30A RATA test was conducted during the week of September 24, 2008. Method 30A requires an Initial Measurement System Performance Test described in Section 8.2 [Method 30A] in order to ascertain proper function of the IRM analyzer. A summary of these tests (indented) and the RATA tests are presented in Table 5.

The Dynamic Spiking Test was not performed because it was not required until January 1, 2009. Also, the Dynamic Spiking Test failed during the previous test of April 20, 2008. Its merit will be reevaluated, with direction from the EPA, at a later date.

Both the stack and the AH outlet Hg-CEMs successfully met performance criteria for RATA testing. Bias was evaluated as out of specification; however, adjustment factors were not implemented because the bias was likely in the IRM unit. The Hg-CEMs installed at Hardin were subject to the scrutiny of a well-developed QA/QC program, described in Appendix C, which included daily calibration checks, and, as such, implementation of any correction from this Bias Test was deemed unnecessary.

Table 5. Results of the Second M30A RATA.

Test	Stack Hg-CEMs (downstream of ACI)	Air Heater Outlet Hg-CEMs (upstream of ACI)
Relative Accuracy Test Audit (RATA)	PASS	PASS
Interference Check (Optional)	-	-
3-Point System Calibration Error Test	PASS	PASS
System Integrity Check	PASS	PASS
Measurement System Response	PASS	PASS
Dynamic Spiking Test	Not Performed	Not Performed

Note: The System Integrity Check on the CEM installed at the AH outlet was performed with elemental mercury in lieu of oxidized because there is no mercuric chloride generator on this unit.

The Final M30A RATA Test was conducted on the Hg-CEMs during the week of October 15, 2008. Challenges with successful completion of oxidized calibrations during System Integrity Tests on the IRM analyzer necessitated substituting elemental mercury standards. Again, since the Dynamic Spiking Test was not required until January 1, 2009, it was not performed as part of this RATA. A summary of the tests performed is presented in Table 6.

Both the stack and the AH outlet Hg-CEMs successfully met performance criteria for RATA testing. Bias was evaluated as out of specification for the AH outlet CEM; however, bias adjustment factors were not implemented as stated before.

Table 6. Results of the Third M30A RATA.

Test	Stack Hg-CEMs (downstream of ACI)	Air Heater Outlet Hg-CEMs (upstream of ACI)
Relative Accuracy Test Audit (RATA)	PASS	PASS
Interference Check (Optional)	-	-
3-Point System Calibration Error Test	PASS	PASS
System Integrity Check	PASS	PASS
Measurement System Response	PASS	PASS
Dynamic Spiking Test	Not Performed	Not Performed

Note: The System Integrity Check on the CEMS installed at the AH outlet was performed with elemental mercury in lieu of oxidized because there is no mercuric chloride generator on this unit.

4.1.1.3. Hg-CEM Maintenance/Advancements

During the course of this project, several advancements were made to the Hg-CEM hardware and software that significantly improved their performance. Several issues also arose that required troubleshooting and/or on-site or factory maintenance. The following timeline discusses some of the more important issues and improvements.

1Q07

The first set of quarterly linearity checks performed on the Hg-CEMs failed. Upon further investigation and fine-tuning, the inlet system was repaired, but the calibrator on the stack CEM continued to be non-linear. A new calibrator was installed and was found to be linear at all ranges.

ADA was on site February 27–28, 2007, to investigate the cause of periodic spikes in the HgT value on the stack CEM. It was found that a unique combination of two, periodic, small leaks in the probe allowed undiluted flue gas into the system.

2Q07

In June 2007, a test was conducted using nitrogen, instead of air, for a calibration carrier gas and as the dilution gas on the stack Hg-CEM. This greatly improved measurement precision and calibration performance as compared to the AH outlet CEM. Figure 4 shows the mercury concentrations measured by the two Hg-CEMs. The two traces in the upper portion of the graph represent the AH outlet Hg-CEM values of HgT and Hg0. The traces fall on top of each other and are indistinguishable indicting that all mercury was in the elemental form. These concentrations were measured using air as the carrier and dilution gas and have a typical “noise” range of about ± 0.5 µg/wscm. The two traces below the inlet traces represent the stack Hg-CEM values of HgT and Hg0. Again, these traces fall on top of each other and are indistinguishable. These stack measurements were recorded using nitrogen as the carrier and dilution gas and show that the “noise” range was reduced to approximately ± 0.1 µg/wscm. A permanent nitrogen generation system was ordered for both units.

The dilution orifices in the sample probes were replaced to lower the dilution ratio from 60 to 40. This further decreased the noise at the low mercury concentrations (< 0.5 µg/wscm) measured during carbon injection.

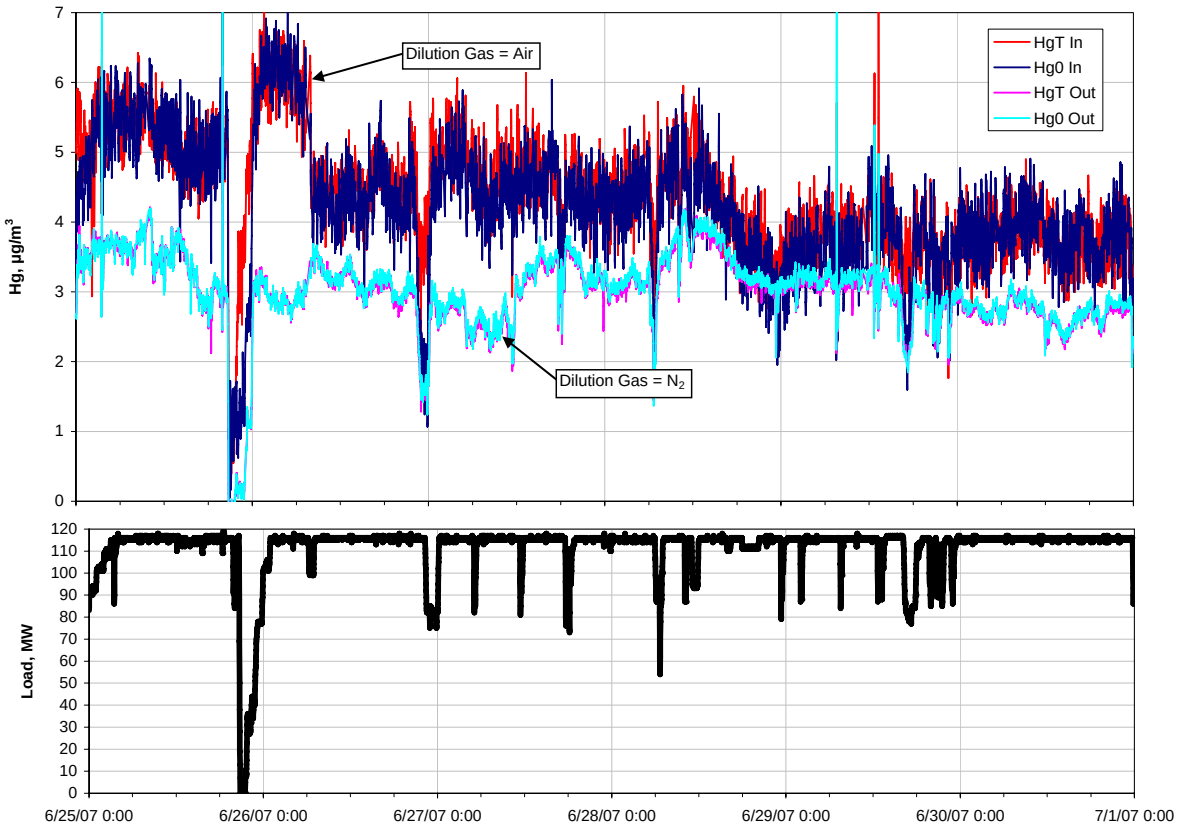

Figure 4. Effect of N_2 as a Dilution Gas on Hg-CEM Noise.

<u>3Q07</u>

The inlet and stack Hg-CEMs were fully upgraded with all of the latest innovations from Thermo Fisher, including:

- A nitrogen generator, shown in Figure 5, to supply the dilution and calibration gas.
- A lamp heater to maintain consistent mercury vapor bulb temperature. It was found that small changes in ambient temperature could affect mercury measurements. The lamp heater significantly reduced this effect.
- A humidifier to add moisture to the calibration gas to maintain a consistent humidity level across the inertial filter. In previous testing at other sites, it was found that performance could be affected when calibrating with a dry gas and then measuring a moist gas. This innovation maintained a consistent humidity from calibration to sampling.
- A new motherboard in the probe controller with a noise dampening circuit for the probe TCs and the programming required to operate a mercuric chloride generator (MCG).

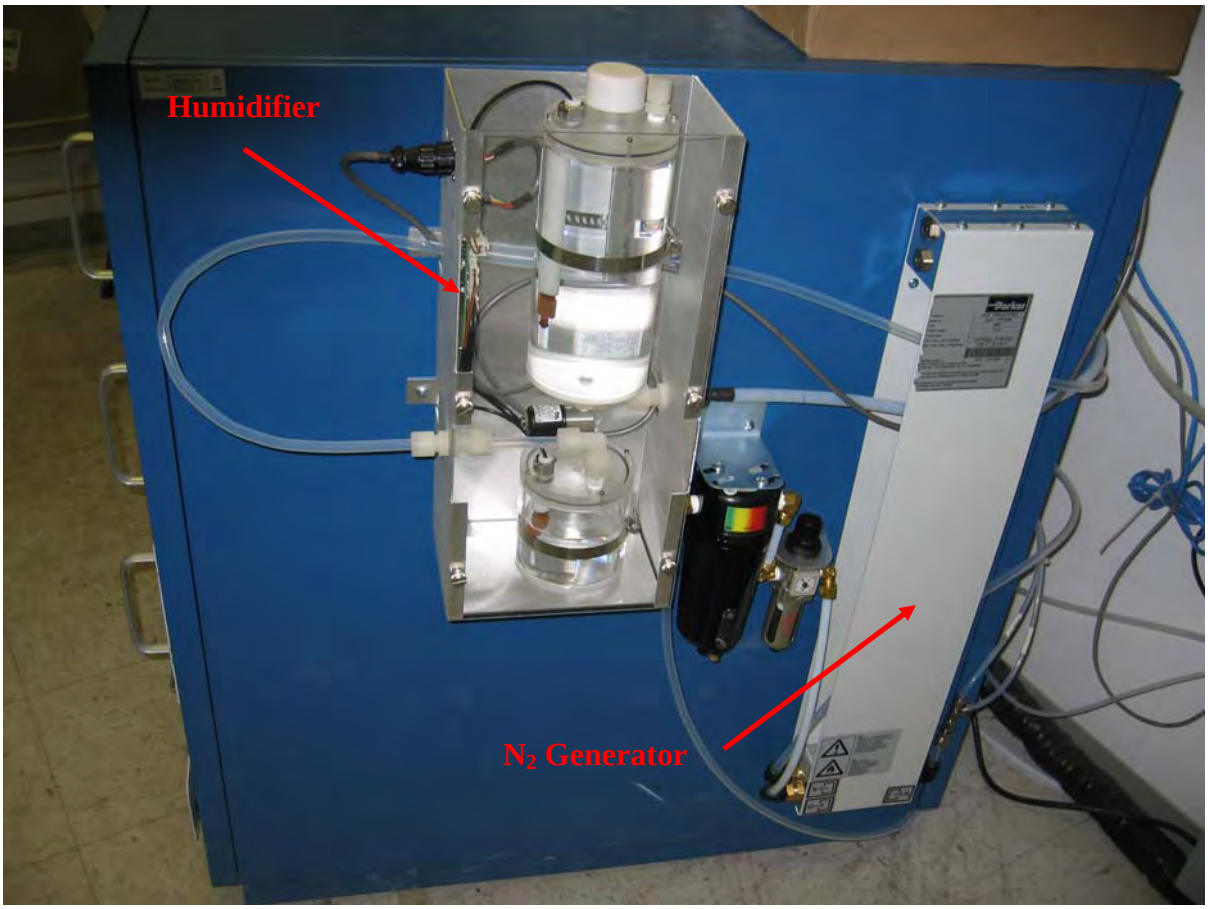

Figure 5. Humidifier and Nitrogen Generator Upgrades on the Stack Hg-CEM.

<u>4Q07</u>

The stack Hg-CEM was upgraded with the addition of a mercuric chloride generator so that the performance of the converter could be verified as required by the CAMR. The MCG was installed in December, but problems with the stack CEM and an unexpected outage prevented shakedown and testing of this system until April 2008. A photo of the MCG is included as Figure 6.

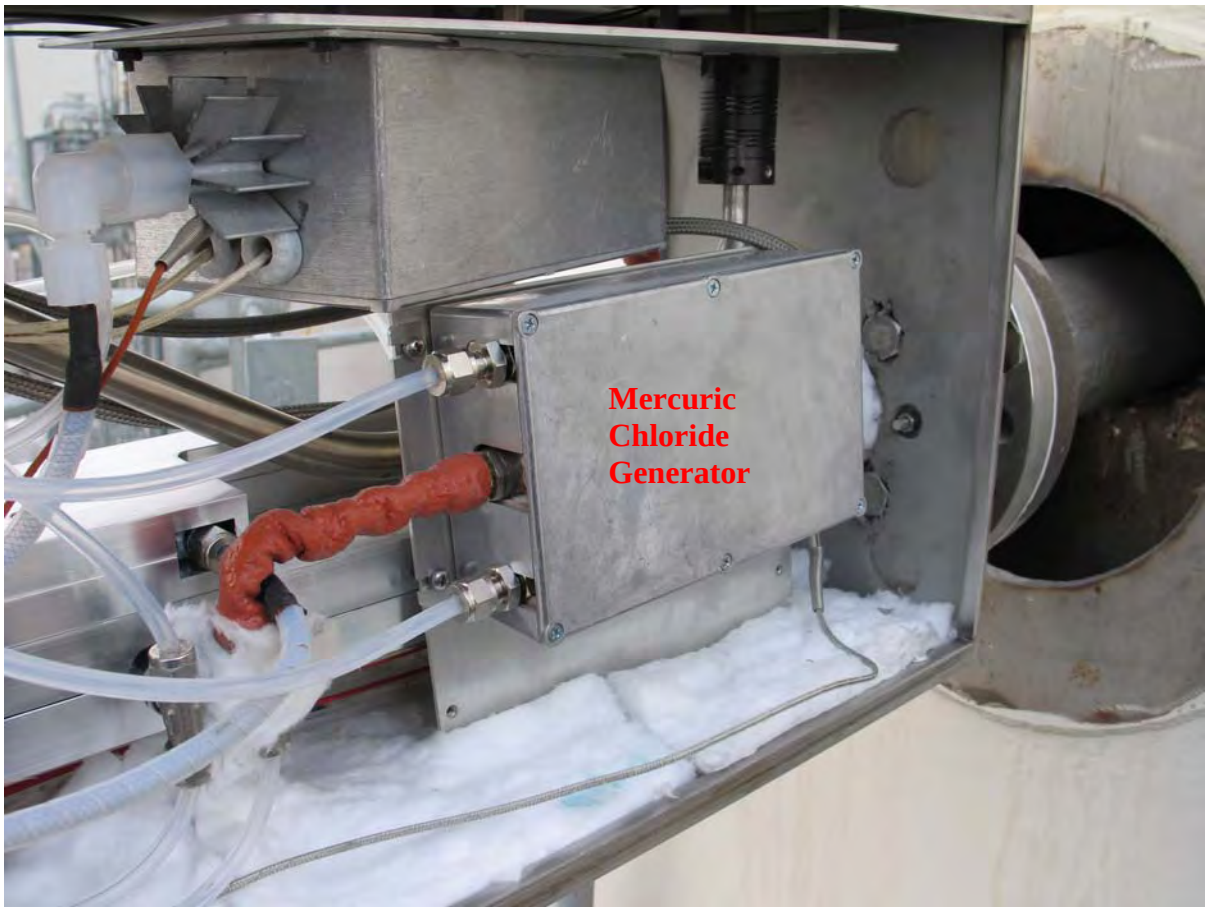

Figure 6. Photo of the Mercuric Chloride Generator in the Stack Probe at Hardin.

<u>1Q08</u>
Repairs and maintenance included:

- A new power distribution board for the probe controller in the inlet CEM that failed because of a short in the probe that was caused when a heater wire in the probe fused to, and shorted out on, a heating rod that had vibrated out of the heating block.
- A new thermostat in the inlet probe.
- Replacement of the inlet probe converter core.
- Replacement of the I/O board in the stack CEM that failed during an electrical overload.
- Replacement of the stack probe converter core.

<u>2Q08</u>
The MCG was tested and found to achieve only 82% recovery even though it showed 100% conversion of the oxidized mercury back to elemental mercury. This problem was investigated over several months with help from Thermo Fisher and, although improvements were made, 90% conversion was never achieved with the MCG.

4.1.1.4. ACI System Performance

The activated carbon injection system performed well throughout the project. Some routine maintenance was required as exemplified by issues such as a failed speed sensor, a blower motor that locked up, and debris that caused a false reading on a level sensor. Overall, the injection system performed as expected.

At the conclusion of the Long-Term test, the total actual operating time and amount of carbon fed were:

DARCO® Hg-LH	
a) Operating Time	167 days
b) Carbon Fed	208,731 lb
c) Average Feed Rate	52 lb/hr

Calgon FLUEPAC®-MC PLUS	
a) Operating Time	60 days
b) Carbon Fed	110,431 lb
c) Average Feed Rate	77 lb/hr

One of the goals of the project was to investigate the potential savings of using feedback control from the Hg-CEMs to control the carbon loading. In the fall of 2007, the feeder control system was integrated with feedback from the Hg-CEMs to automatically maintain mercury removal at 90%. Prior to this, the carbon feed rate was maintained at a constant value and only updated a few times a week. Figure 7 and Figure 8 show the performance of the mercury control system with and without feedback control, respectively. The top graph in each figure shows the data from the Hg-CEMs including the total gaseous mercury (HgT) and elemental gaseous mercury (Hg0) in micrograms per wet standard (at 68 ºF) cubic meters (µg/wscm) measured at the AH outlet and stack. The difference in the two values is the oxidized mercury (Hg+2). The graph in the middle shows the plant load in gross MW. The bottom graph shows the carbon loading in the gas stream in pounds per million actual cubic feet (lb/MMacf) and the percent mercury removal calculated as:

$$\% \text{ Hg Removal} = 100*(\text{HgT In} - \text{HgT Out})/\text{HgT In}$$

A comparison of Figure 7 and Figure 8 leads to the conclusion that linking the Hg-CEM readings to the carbon injection rate can help optimize mercury removal and reduce carbon usage. For example, Figure 7 shows that during periods when the inlet mercury changed significantly, and during low load operation, the carbon loading was not at the optimal rate to achieve 90% removal. At low load, removal increased to 95%, indicating that there was a potential to save carbon at these conditions. Figure 8 shows that under normal conditions mercury removal was maintained in a tight band around 90% removal. More importantly, it shows that at low load, carbon loading was reduced from 1.5 to 0.75 lb/MMacf, a 50% savings in carbon usage.

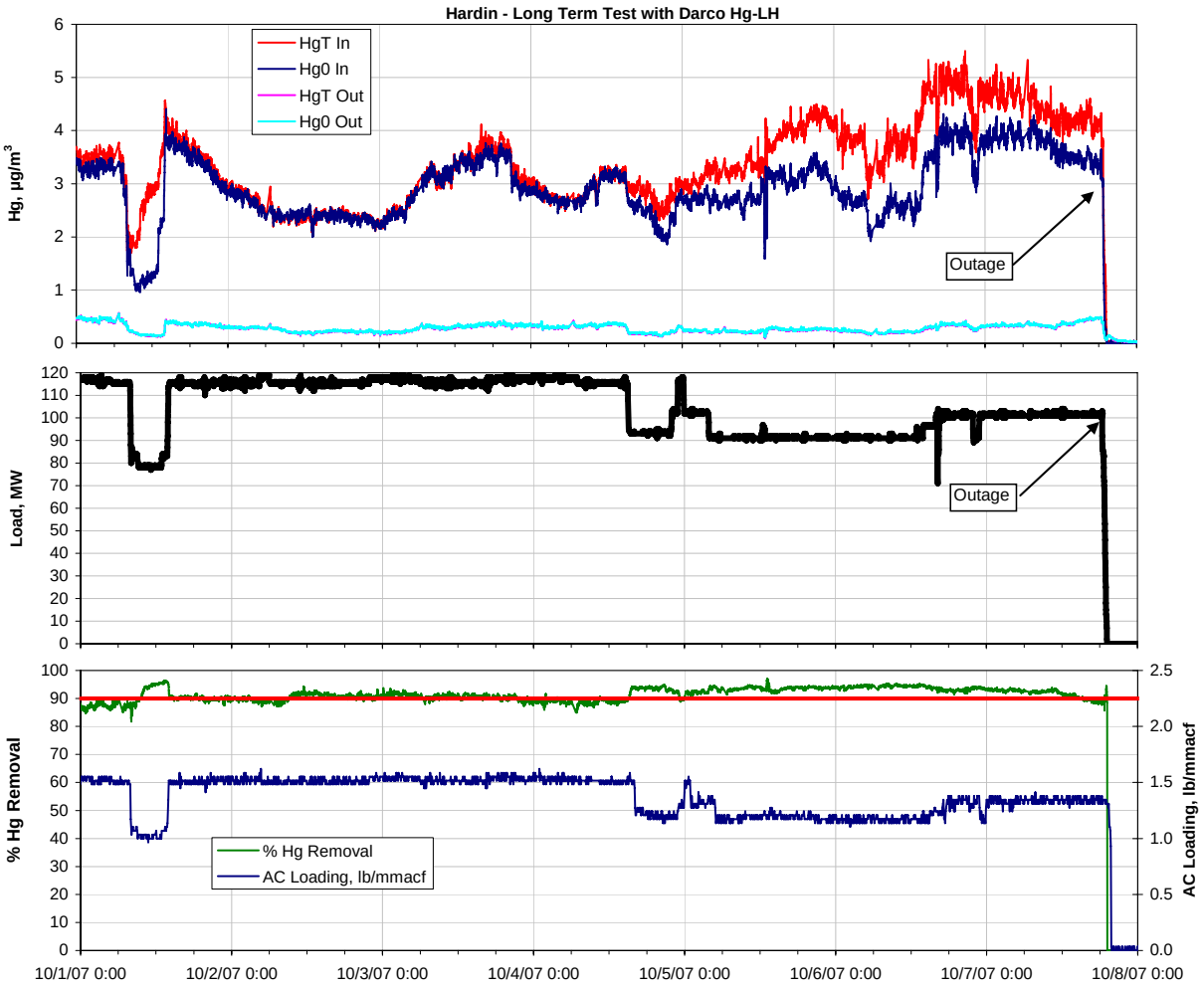

Figure 7. Mercury Control System Performance without Feedback Control.

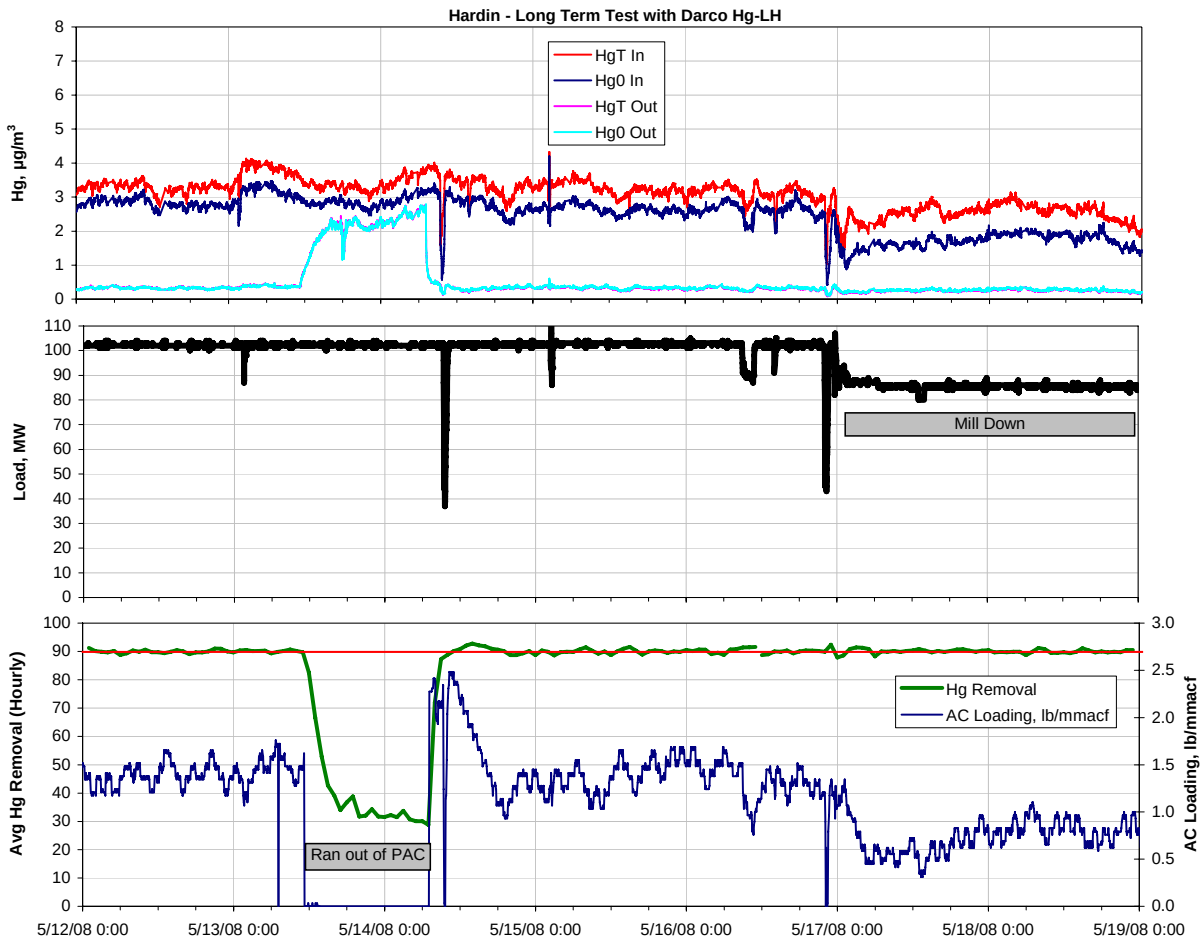

Figure 8. Mercury Control System Performance with Feedback Control.

4.1.2. Baseline Test

After installation of the Hg-CEMs, baseline measurements were made over the next several months to establish the native mercury removal during typical plant operating conditions. During this time, no sorbent injection or other chemical additives were used. Baseline testing also provided the opportunity to determine if there were any co-benefits that could be utilized during the normal and variable operation of the boiler and pollution control equipment.

Baseline testing also included one full set of manual flue gas measurements and solid sample collection. Flue gas measurements included AH outlet and stack Hg-CEM measurements and manual sampling by an independent contractor for particulate, mercury, halogens, condensables, and ammonia. Solid samples included coal, ash from all six of the FF hoppers, and slurry from the SDA. The accuracy of the Hg-CEMs was verified with the Ontario Hydro method (O-H) and the sorbent trap method (STM).

4.1.2.1. Baseline Hg-CEM Data

Figure 9 presents typical baseline Hg-CEM data for Hardin. It shows that native mercury capture at high load is less than 20% (lower trace in the bottom graph), and that most of the mercury is in the elemental form (i.e., HgT=Hg0). However, at low load, the native mercury

removal can be as high as 40%, with a corresponding amount of oxidized mercury at the AH outlet. This was one of the most significant co-benefit findings for the project. It is believed that, at low load, the plant reduces the amount of ammonia to the SCR and, consequently, the mercury is more able to successfully compete for active sites in the SCR and, therefore, a larger portion of the mercury is oxidized. The oxidized mercury is then adsorbed by unburned carbon in the fly ash.

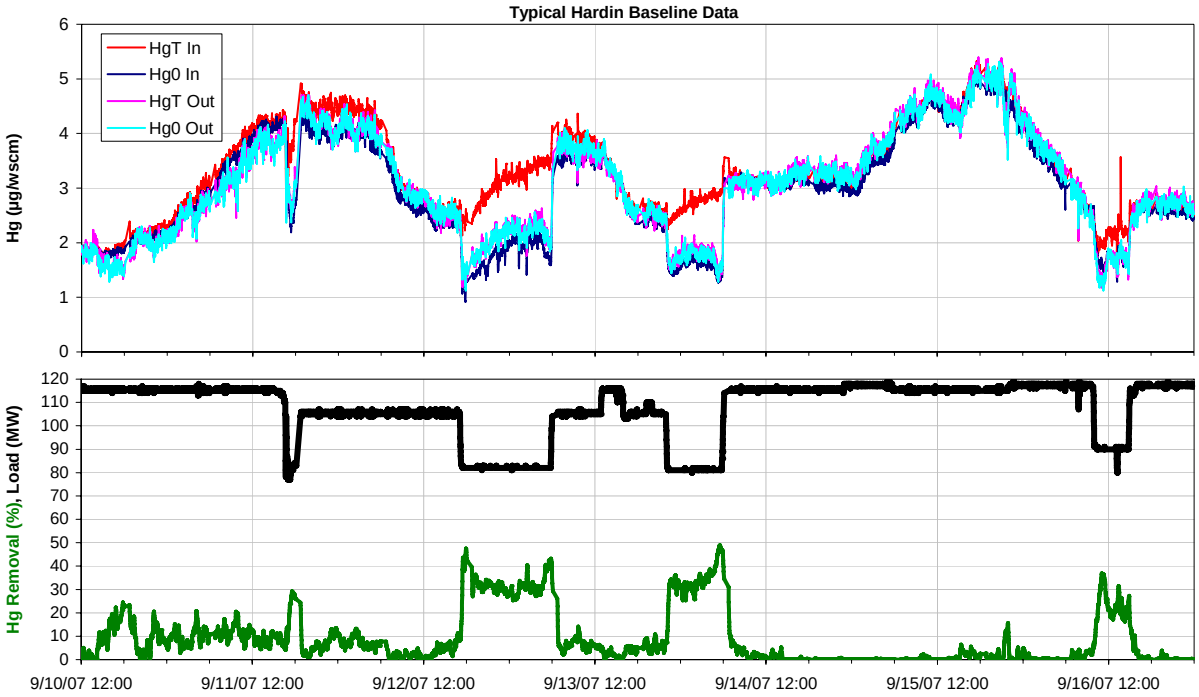

Figure 9. Baseline Mercury and Load Trends for Hardin Station, 2Q07.

4.1.2.2. Baseline Manual Source Testing

The first set of baseline flue gas measurements was collected from November 30 through December 2, 2007. Test methods are shown in Table 7. Some testing difficulties and delays were encountered due to inclement weather (-15 ºF) that impacted both plant operation and sampling efforts. Initial results from ASTM D6784 (Ontario Hydro) measurements suggest < 10% native mercury removal across the SDA-FF.

Table 7. Manual Measurements Conducted during Baseline Testing.

Method	Description	Location
EPA M5/17	Total Particulate	SDA Inlet, Stack
EPA M26A	Halogens and Halides	SDA Inlet, Stack
CTM027	Ammonia	SDA Inlet
ASTM D6784	Speciated Mercury	SDA Inlet, Stack
STM	Total Mercury	SDA Inlet, Stack
NCASI 8A	Sulfur Trioxide	SDA Inlet

Figure 10 is a comparison of the mercury data collected during the first baseline test. The O-H data are presented as stacked bars showing the various mercury species separately. The STM and CEM data are shown as single points representing total vapor-phase mercury. Several conclusions can be drawn from the data given in Figure 10. In general, the CEM data were higher than the STM and O-H data, although the stack CEM data agree much better than the inlet CEM data. This difference was investigated and found to be caused by problems in calibration routine and non-linear calibration modules. After correcting these issues, the inlet and stack CEM values agreed more closely. Because of the poor agreement `between the three test methods, this test was repeated in April 2007 (see section 4.3.2.3).

Notably, both the STM and O-H had data pairs that indicated that the stack mercury was higher than the inlet mercury, especially if discounting the contribution of the particulate-phase mercury that would have been removed in the FF. The inlet O-H also shows a higher concentration of Hg+2 that was not measured by the CEM. If this amount of oxidized mercury actually existed in the flue gas, it would likely be scrubbed in the SDA-FF (as is seen at low load), and the stack concentration would be correspondingly lower. It is more likely that both the particulate and oxidized fractions of the inlet O-H measurements are due to a sampling artifact of the O-H method. In the O-H method, the gas is sampled through a particulate filter and the filter cake that builds up can alter the speciation and particulate fraction of the mercury.

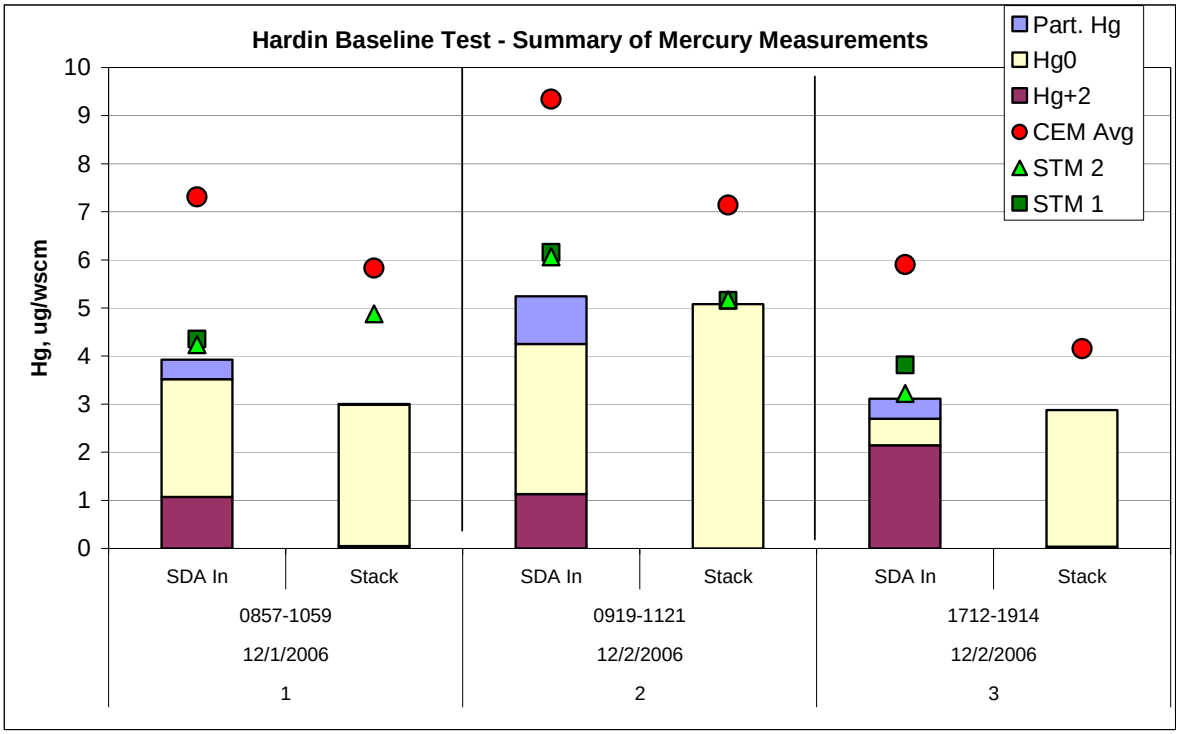

Figure 10. Results from the First Set of Baseline Gas Measurements.

Table 8 is a summary of the source testing results for the first set of baseline gas measurements. In general, good agreement was observed between the flow and moisture data measured by the different methods. Particulate measurements indicate that the baghouse is 99.8% efficient. The only halogen detected at either the SDA inlet or stack was chlorine (no HCl, HBr, HF, Br) and it was present in concentrations just above the detection limit. The ammonia concentration at the SDA inlet was 3.2 ppm. The sulfur trioxide reported at the stack was 3.5 ppm. However, the method used reports all sulphate species as sulfur trioxide and it is likely that the sulfur was in the form of an ammonia salt due to the ammonia introduced into the flue gas to control NO_x in the SCR.

Table 8. Summary of First Set of Baseline Gas Measurements.

	SDA Inlet	Stack
EPA 5B		
Moisture (%)		14.8
Flow Rate (DSCFM)		294,956
Particulate Matter (lbs/hr)		32.22
EPA 5/17/26A/CTM027		
Moisture (%)	10.69	15.07
Flow Rate (DSCFM)	292,800	293,809
Particulate Matter (lbs/hr – front half)	10,640.09	22.09
Chlorine (mg/dscm)	0.263	0.384
Ammonia (ppm)	3.2	
EPA 5/17/ASTM D6784-02		
Moisture (%)	10.18	14.72
Flow Rate (DSCFM)	291,987	295,482
Particulate Matter (lbs/hr – front half)	8,837.89	20.49
Total Mercury (lbs/TBtu)	3.965	3.745
NCASI 8A		
Moisture (%)	10.47	
Sulfur Trioxide (ppm)*	3.5	

*SO_3 was likely in the form of an ammonia salt

4.1.2.3. Repeat of Baseline Flue Gas Measurements

The Baseline Source Test was repeated in April 2007 and the results are shown in Figure 11. In general, there is much better agreement between the CEM, STM, and O-H data than during the first test. Curiously, although the CEMs and STM data showed that the SDA inlet and stack concentrations were nearly equal, the O-H data showed slightly higher concentrations at the stack for each run.

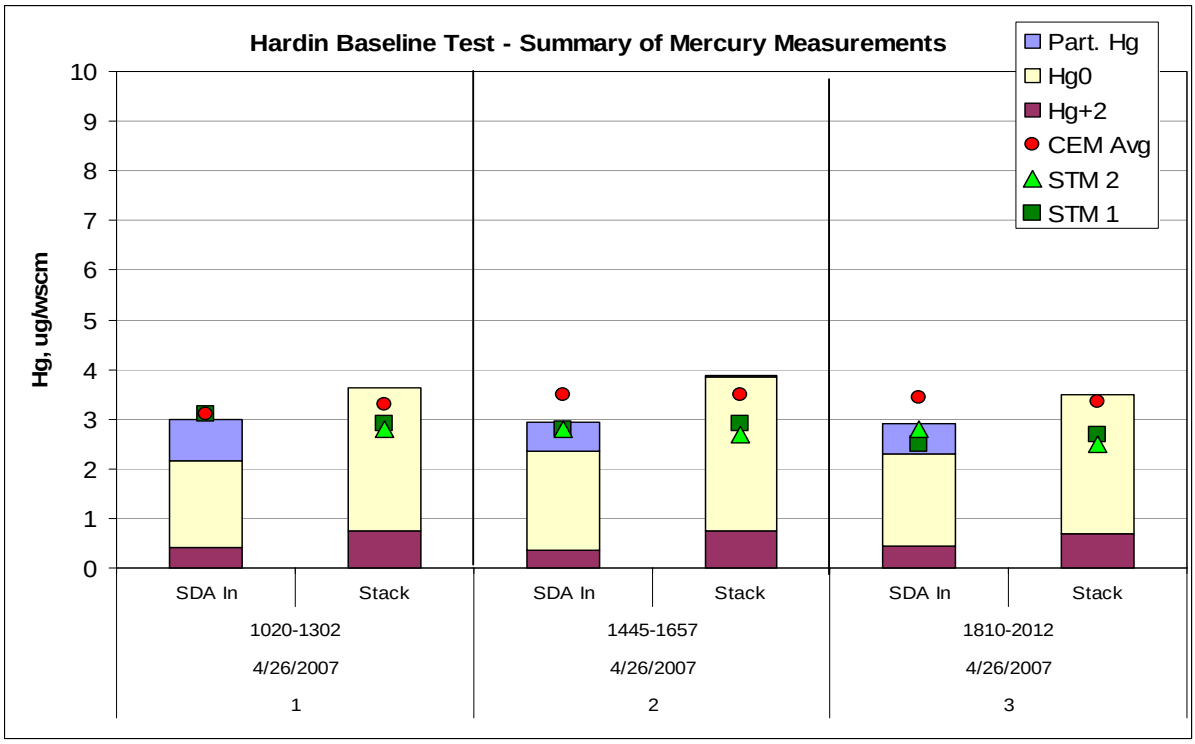

Figure 11. Results of the Second Baseline Mercury Test.

Table 9 is a compilation of both sets of baseline gas measurements. Again, good agreement was observed between different testing methods. The stack flue gas concentrations of halogens and SO3 were similar to the first test.

Table 9. Summary of the Second Set of Baseline Gas Measurements.

	November '06		April '07	
Sampling Trains - Parameters	**SDA Inlet Average**	**Stack Average**	**SDA Inlet Average**	**Stack Average**
EPA 5B				
- Moisture (%)		14.80		
- Flow Rate (DSCFM)		294956		
- Particulate Matter (lbs/hr–total)		32.22		
EPA 5 / 17 / 26A / CTM027				
- Moisture (%)	10.69	15.07		14.74
- Flow Rate (DSCFM)	292,800	293,809		295,494
- Particulate Matter (lbs/hr–front half)	10,640	22.09		18.34
- Chlorine (mg/dscm)	0.263	0.384		<0.393
- Ammonia (ppm)	3.2	NA		NA
EPA 5 / 17 / ASTM D6784-02				
- Moisture (%)	10.18	14.72	10.85	15.21
- Flow Rate (DSCFM)	291,987	295,482	305,317	310,113
- Particulate Matter (lbs/hr–front half)	8,837	20.49	9,184	28.29
- Total Mercury (lbs/TBtu)	3.965	3.745	2.944	3.926
NCASI 8A				
- Moisture (%)	10.47			
- Sulfur Trioxide (ppm)	3.5			

*SO_3 was likely in the form of an ammonia salt

*

4.1.2.4. Results of Additional Baseline Testing ($PM_{10}/PM_{2.5}$)

Additional gas measurements were made in September 2007 at the request of a new project partner. Triplicate measurements were made at the stack for PM_{10}, $PM_{2.5}$, and controlled condensate (SO_3). Table 10 is a summary of the results showing that the particulate and SO_3 concentrations were very low. These tests were repeated during the Long-Term test to determine the effect of carbon addition.

Table 10. Summary of Baseline $PM_{10}/PM_{2.5}$ Measurements.

Parameter	Results Average	Units
Particulate (> PM_{10})	0.0030	gr/dscf
	7.90	lbs/hr
Particulate (< PM_{10}, > $PM_{2.5}$)	0.0030	gr/dscf
	7.90	lbs/hr
Particulate ($PM_{2.5}$)	0.0023	gr/dscf
	6.31	lbs/hr
Particulate (Total Catch)	0.0494	gr/dscf
	131.10	lbs/hr
Sulfur Trioxide	1.10	ppm

4.1.3. Co-Benefits Analysis

The co-benefit analysis involved studying how mercury removal was affected by normal variations in plant operations or by the use of coal additives or different blends of coal. Normal variations in the plant operations provided an opportunity to investigate how native mercury capture was affected by changes to the SCR, SDA, and FF. Coal additives, to increase the oxidation across the SCR and, subsequently, the mercury capture in the SDA-FF, were also studied. A short test was also conducted to determine the potential of blending western bituminous coal with the PRB coal used by the plant for enhanced mercury removal.

4.1.3.1. Effect of Low Load on Hg Removal

One of the focus areas for these tests was to determine whether any co-benefits to mercury removal could be achieved by varying operation of the other air pollution control devices. Early in the project, data from periods at low boiler load showed that the fraction of oxidized mercury at the inlet to the SDA increased, and, correspondingly, higher mercury removal was achieved across the SDA-FF. This was one of the most significant co-benefit discoveries of the project since little oxidation was expected across the SCR given the low halogen content of PRB coal.

Native mercury removal trends (no carbon injection) for the week of September 11, 2007, are presented in Figure 12. The increased mercury removal at low load can be clearly seen during times when the plant reduced load. Native capture increased from less than 20% to near 50% during these periods. At low load, the fraction of oxidized mercury at the SDA inlet increases significantly and higher mercury removal is achieved across the SDA-FF. It is theorized that, at low load, the plant reduces ammonia flow to the SCR and, consequently, more active sites are available to oxidize mercury.

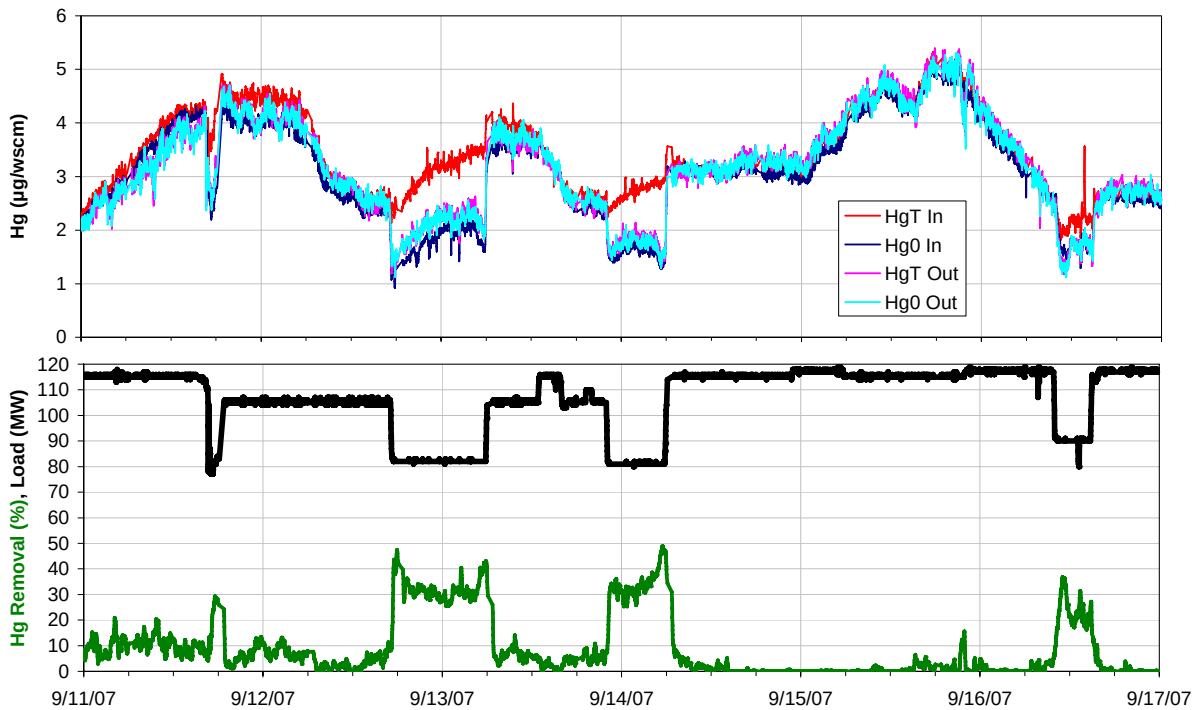

Figure 12. Effect of Load on Hg Speciation and Native Removal.

4.1.3.2. Coal Blending Tests

Coal blending tests were conducted from December 4 through December 7, 2007. Two companies provided approximately 250 tons of western bituminous coal. Arch Coal provided coal from their West Elk mine near Gunnison, Colorado, and Roundup Trading International provided coal from the Bull Mountain mine near Roundup, Montana. The test matrix included evaluating each coal at 7% and 14% western bituminous mixed with a balance of PRB from the Absaloka mine. Each blend test was scheduled for nominally 16 hours with 8 hours of system recovery time between tests.

Hardin receives all its coal by truck from the nearby Absaloka mine. Coal from the truck unloading station is conveyed into a large storage silo (there is no coal pile at Hardin). The storage silo feeds the main coal belt, which is directed to discharge into one of three bunkers at a time. Each bunker feeds one of three coal mills. For the coal blending tests, the bunkers were emptied until approximately 16 hours of storage was available for the blended coal. Since only one bunker can be filled at a time, it is difficult for the plant to maintain the same level in each bunker. Consequently, for the coal blending tests, it is likely that the blended coal from each bunker reached the boiler at different times and was depleted at different times. This made it difficult to clearly define the beginning and end of each test.

A portable belt conveyor, supplied by the plant, was operated to feed the blend coal onto the main coal belt. A photograph of the portable belt conveyor is shown in Figure 13. The portable conveyor included an adjustable gate at the bottom of the hopper to control coal flow, a weigh scale, and a panel with feed rate and totalizer readouts.

Figure 13. Portable Coal Conveying System at Hardin Station.

Table 11 shows the weights of the various coals blended for each test. The goal was to blend enough coal to test for 16 hours (~ 1200 tons) with an 8-hour period between tests to allow conditions to recover. The target blend percentages were 7% and 14%.

Table 11. Summary of Coal Blending Runs.

Test Date	Absaloka Ton	West Elk Ton	Bull Mtn. Ton	Blended Ton	Blend %	Est. Time in Unit, hr.
12/04/06	928	72		1000	7.2	13.9
12/05/06	1141	174		1315	13.2	18.3
12/06/06	1039		174	1213	14.3	16.8
12/07/06	1036		86	1122	7.7	15.6

Mercury removal during coal blending tests was calculated several ways using values from the Hg-CEMs, coal flow rate, ash mercury content, and estimated vapor-phase mercury concentration calculated from coal mercury values. In most cases, it was possible to determine when the blend coal was being fired based on a decrease in the coal feed rate (western bituminous has a higher Btu content). The mercury content in the coal was

calculated from coal samples taken from the two conveyors at the beginning of each blend run. However, no samples were taken during the first run, so the mercury value is based on samples from the blend coal pile and from the main conveyor several hours after the run was complete.

For the first blend test (West Elk at 7.2%), there was a significant decrease in both the SDA inlet and stack mercury concentrations at the beginning of the test. However, there was no increase in Hg+2, which would suggest that if this decrease was due solely to the coal blend, mercury removal occurred in the particulate phase before reaching the SDA inlet sampling location. Based on this assumption, the mercury removal for the first test was about 50%, calculated using the mercury concentration at the beginning of the test and at its lowest point during the test. If removal is calculated strictly based on inlet and outlet mercury concentrations (i.e., assuming that the drop in the SDA inlet and stack concentrations was due to a change in the coal mercury), then removal increased from 10% to 27% due to coal blending. This was considered the more likely of the two scenarios since between the first and second tests, the mercury concentration did not recover to pretest levels, but coal measurements indicated that there was a drop in coal mercury at this time.

During the second test (West Elk at 13.2%), the stack mercury levels gradually decreased, but the inlet did not. Also, a mill trip halfway through the test caused a large upset and made the results for the second half of the test difficult to interpret. Based on the inlet and outlet concentrations, the mercury removal for the second test increased from 15% to 51%. Figure 14 shows mercury removal as a function of blend percentage for the West Elk tests, calculated from the SDA inlet and stack mercury CEM values. The value of 0% blend percentage is an average of the mercury removal before the blended coal reached the boiler.

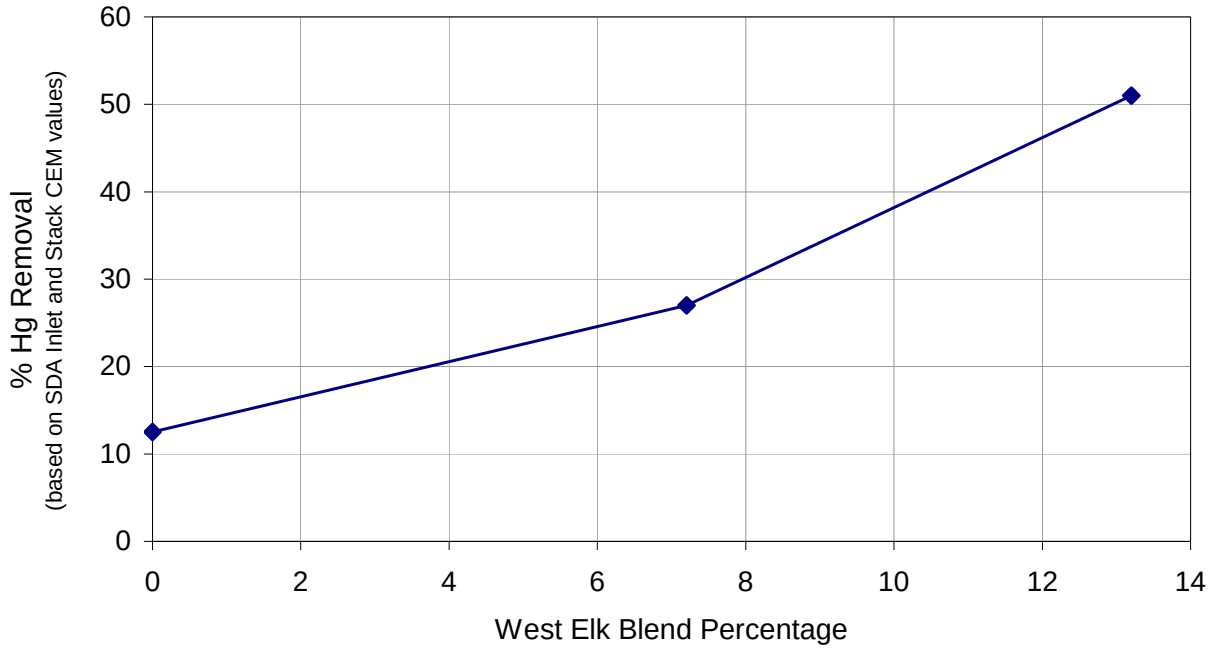

Figure 14. Mercury Removal for the West Elk Coal Blend Test.

During the third test (Bull Mountain at 14.3%), the mercury concentration rose steadily throughout the entire run (from 4 to 12 µg/wscm) so it is difficult to estimate removal based on a starting background mercury level. However, based on the inlet and outlet concentrations at the beginning and near the end of the run, the mercury removal for this test only changed from 19% to 22%. The carbon monoxide values during this test were also higher than the other tests, indicating a change in combustion characteristics.

During the final test (Bull Mountain at 7.7%), the mercury removal remained relatively constant throughout the test at about 17%. However, it was difficult to determine exactly when this blend was fired because the coal feed rate did not show the pronounced drop as with the other tests.

Another way in which the native mercury capture was determined for the coal blending was to analyze for mercury in baseline and blending test ash samples from the FF. It should be stressed, however, that it was very difficult to obtain a representative ash sample at Hardin because the FF ash system had difficultly keeping up with the ash loading from the SDA, so the hoppers were often full. And since ash samples were drawn from a port at the bottom of the hopper, it was not possible to judge how long a sample had been in the hopper, or to correlate it to any particular set of operating conditions.

Two sets of baseline hopper samples were collected prior to the blend tests and compared with samples from Hopper B collected during coal blending. A comparison of ash mercury indicates that the mercury removal increased from 5% to 58% during the West Elk tests, which compares well to the CEM data. Unfortunately, during the Bull Mountain tests, the native coal mercury content increased significantly during the test and there is no ash sample that can be used as a reliable baseline indicator. However, if 5% is used for a typical value for native removal, the ash mercury measured during the Bull Mountain tests corresponds to a mercury removal increase from 5 to 14%.

4.1.3.3 Coal Additive Test

Coal Additive Testing was conducted during the week of April 23, 2007. KNX was added directly to each of the three coal feeders just ahead of the pulverizers. Testing began at the vendor's recommended KNX rate. However, it quickly became apparent that this rate was too high for this site so the flow was reduced in stages. Figure 15 shows the mercury removal for several KNX rates. The maximum mercury removal shown was 85% at a KNX rate of 0.5x of the vendor recommended rate.

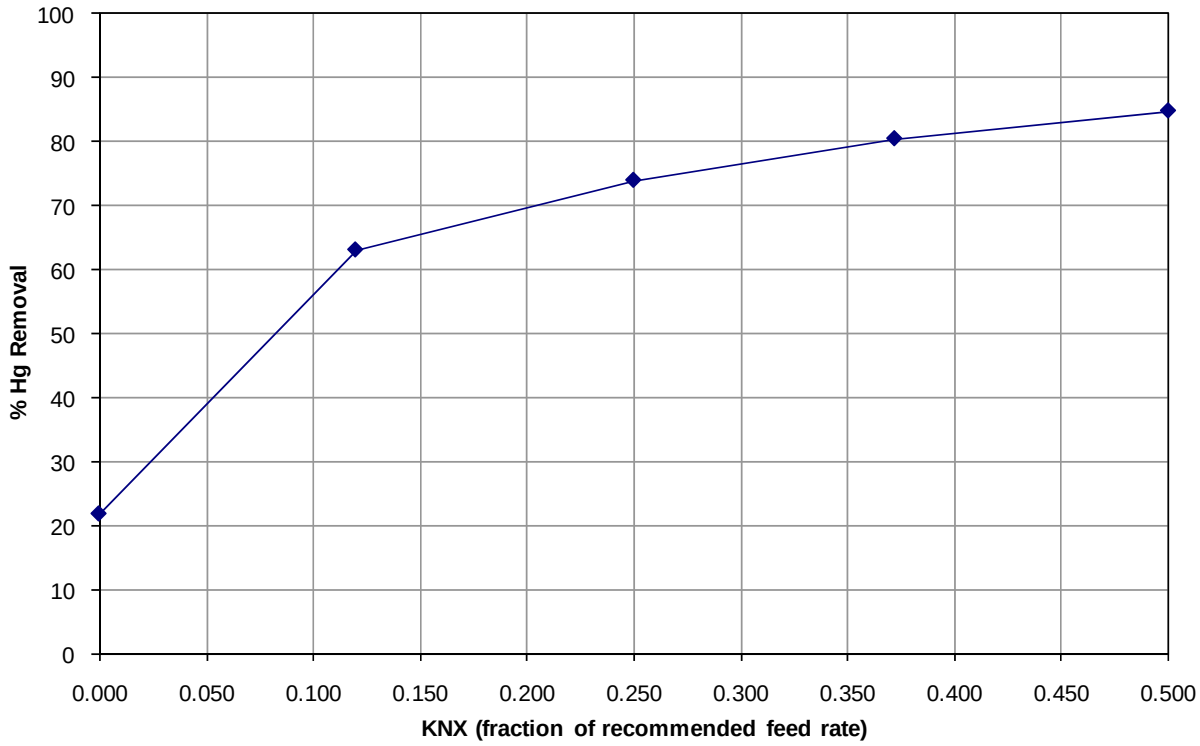

Figure 15. Mercury Removal for the Coal Additive Test.

Figure 16 shows the mercury trends during a four-hour period in which four different KNX injection rates were tested. The figure shows that it only took a few minutes for the effects of KNX addition to register on the Hg-CEMs. The system also recovered very quickly after stopping KNX flow. The trends also show that the KNX affected the SDA inlet mercury concentration as well as the stack concentration, indicating the mercury removal was occurring in the SCR, AH, or on the fly ash before the SDA inlet. This result indicates that the fly ash at Hardin, which contains about 0.5% unburned carbon, has an affinity for oxidized mercury. Finally, the figure shows that the oxidized mercury formed by KNX addition is completely scrubbed in the SDA-FF. Based upon these results, KNX was later tested in combination with carbon injection during the Parametric test.

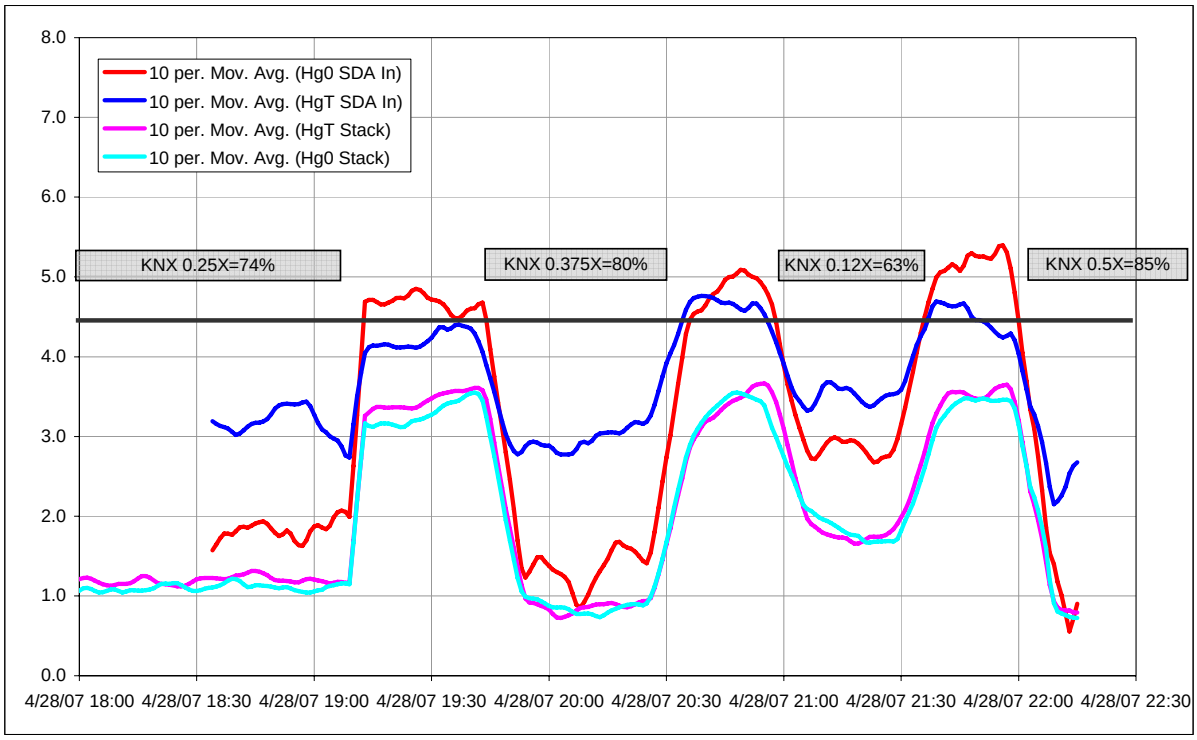

Figure 16. Hg-CEM Trends for the Coal Additive Test.

4.1.3.4. Effect of Ammonia on Hg Removal

The Hardin Station spent much of 2008 operating at 105 MW out of 121 MW due to a failure of the step-up transformer and its subsequent, temporary replacement with a smaller unit. When the plant returned to full-load operation, however, the mercury removal was often less than the targeted 90% even though the activated carbon injection rate was at maximum for screw size installed in the injection system. A larger screw was installed on one feed train to increase the maximum feed rate, but maintaining 90% mercury control was still a challenge.

It is believed that atypically high ammonia concentration at the SCR outlet was impacting the performance of the PAC because:

- Plant personnel reported that during a tube leak in March 2008, more than 25% of the SCR was plugged with ash. Consequently, it became necessary to increase ammonia injection to the SCR to maintain NO_x levels.
- On September 16, 2008, an operator noticed that the amount of ammonia being fed to the SCR affected mercury control performance. Figure 17 shows that when the ammonia flow was reduced, mercury removal increased.
- During the source tests in September 2007, a characterization of ammonia feed rate versus mercury control was conducted by measuring ammonia concentration at the AH outlet. During three tests, the plant changed the position of the ammonia control valve from 67% open to 55% open and to 45% open, and the ammonia concentration at the AH outlet decreased proportionally. Figure 18 clearly shows that ammonia affects mercury control performance. It should be noted the ammonia flow rate could not be

measured directly because the flow meter installed for this purpose was found to be over-ranged and not indicating properly.

- After the SCR was refurbished, mercury control performance returned to normal levels.

The mechanism for the ammonia interference may simply be that the ammonia competes with the mercury for sites on the activated carbon. Mercury is present in ppb concentrations while ammonia was measured at ppm levels. The effect ammonia can have on mercury control performance was another significant finding of the co-benefit analysis.

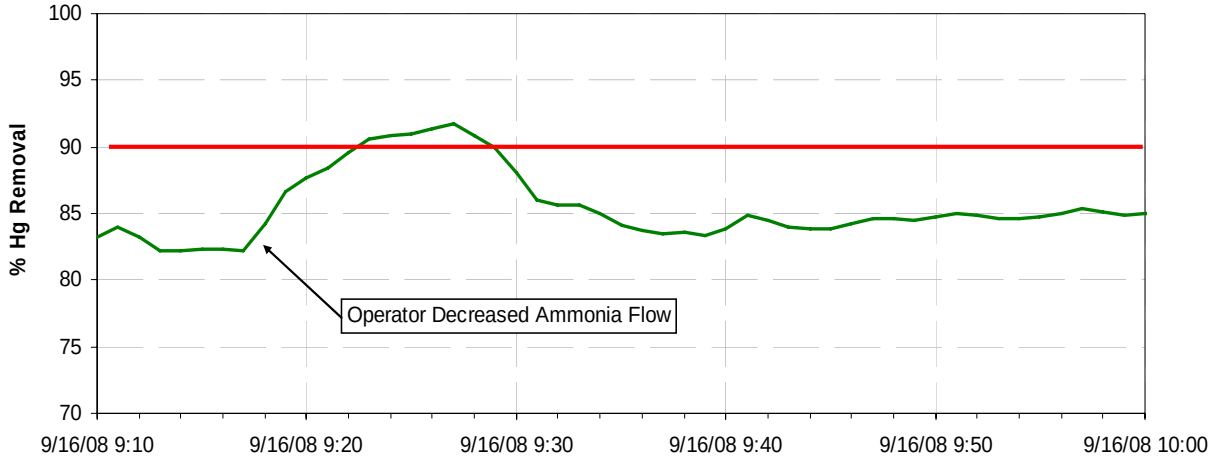

Figure 17. Effect of Ammonia Flow on Mercury Removal, 09/16/08.

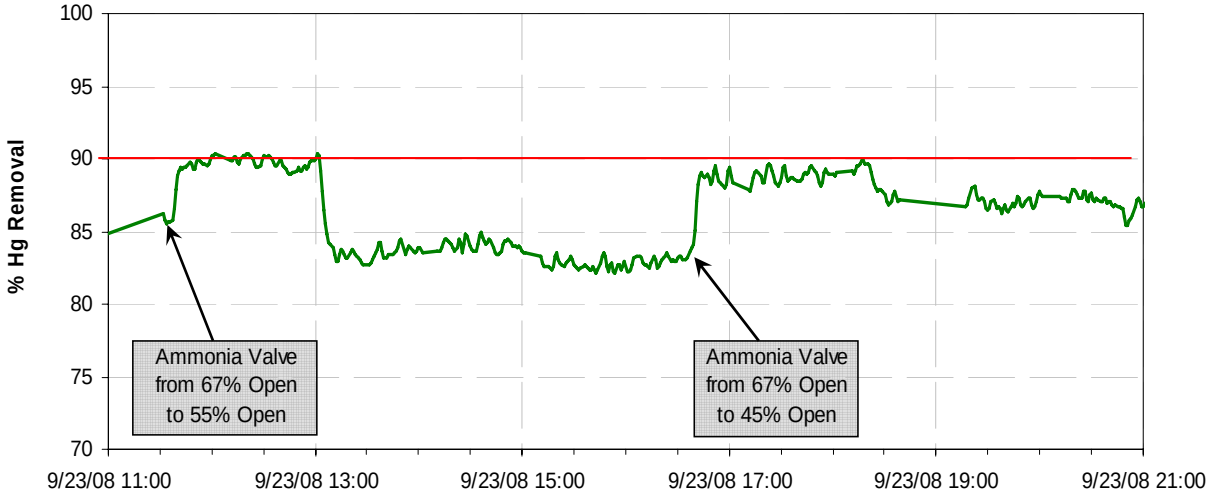

Figure 18. Effect of Ammonia Flow on Mercury Removal, 09/23/08.

4.1.4. Parametric Test

The goal of the Parametric test was to evaluate the best candidate sorbents under various operating conditions. Parametric tests involved injecting sorbents into the flue gas upstream of the SDA for short periods (four hours) or until the stack Hg-CEM indicated steady performance. The Hg-CEMs were the basis for all Parametric test results. Parameters that were studied included:

- Sorbent type
- Sorbent injection concentration
- Unit combustion parameters
- Co-benefit enhancement additives

Parametric testing was conducted during the weeks of May 21, May 28, and June 18, 2007. Tests included three activated carbons: DARCO® Hg, DARCO® Hg-LH, and Calgon FLUEPAC™-MC PLUS, as well as one test combining PAC with KNX injection. MC PLUS and Hg-LH are brominated carbons while DARCO® Hg is not treated. Unfortunately, due to a super sack malfunction while loading MC PLUS, the results with DARCO® Hg were actually a mixture of MC PLUS and DARCO® Hg and had to be discounted. Also, the tests combining PAC injection with KNX coal additive are identified only as PAC+KNX because this PAC was also a mixture of the two carbons.

Figure 19 shows very similar performance between the two brominated carbons. Both Hg-LH and MC PLUS removed 90% of mercury at an injection concentration slightly below 1.0 lb/MMacf, which agrees well with results collected in the DOE Cooperative Agreement DE-FC26-03NT41986 at Sunflower Electric's Holcomb Station in 2004, as reported in Topical Report No. 41986R07, June 28, 2005.

When combining the mixed PAC and KNX addition, mercury removal levels were nearly 90% at a PAC loading of only 0.14 lb/MMacf and a relatively low KNX rate. Nearly 100% removal was obtained at a higher KNX rate and 0.14 lb/MMacf of the PAC mix.

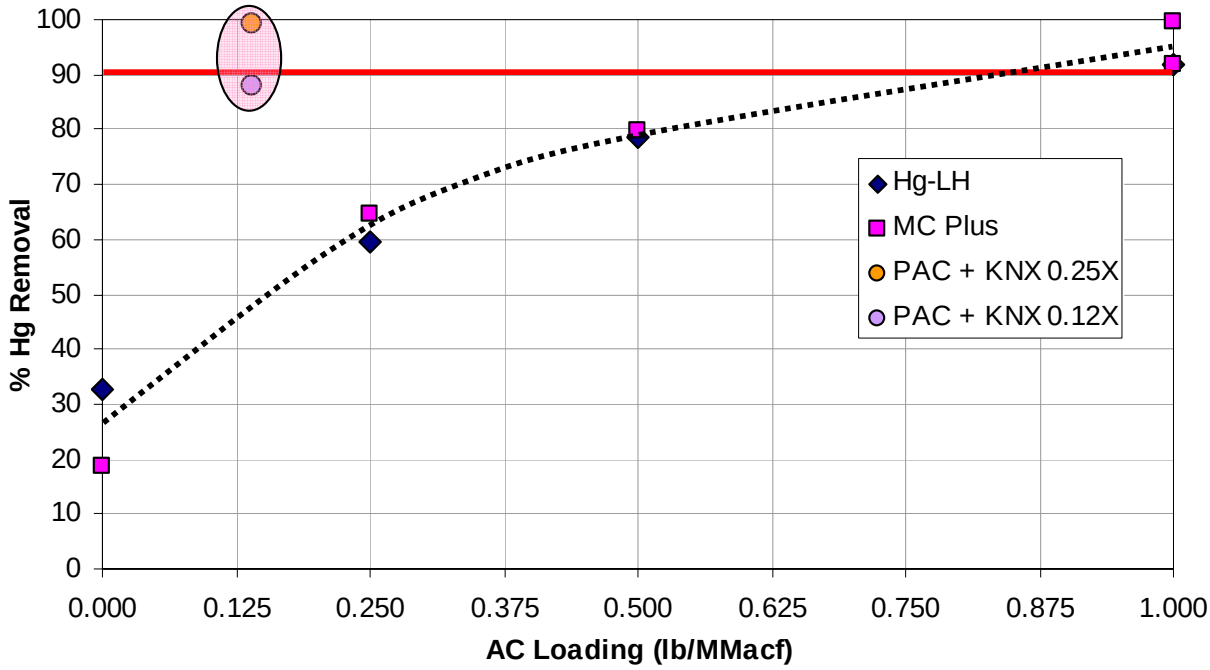

Figure 19. Mercury Removal for the Parametric Test.

4.1.5. Optimization Test

Upon completion of the Parametric tests, ADA reviewed results with the project team and identified the most promising options to achieve 90% mercury removal. Each option was then tested for a two-day period to verify performance. Following these tests, ADA compiled an informal report summarizing the results to guide the project team and DOE in choosing the system parameters for the Long-Term activated carbon injection test.

The Optimization test was conducted August 6–9, 2007. Two brominated sorbents were tested: Calgon FLUEPAC™-MC PLUS and NORIT DARCO® Hg-LH. Figure 20 and Figure 21 show that the sorbents performed about the same and achieved 90% mercury removal at a loading of 2.0 lb/MMacf during the two-day tests. When analyzing these figures, it is important to take boiler load into consideration. At low load (90 MW), the sorbents performed better because of the higher amount of oxidized mercury formed at this plant at low load.

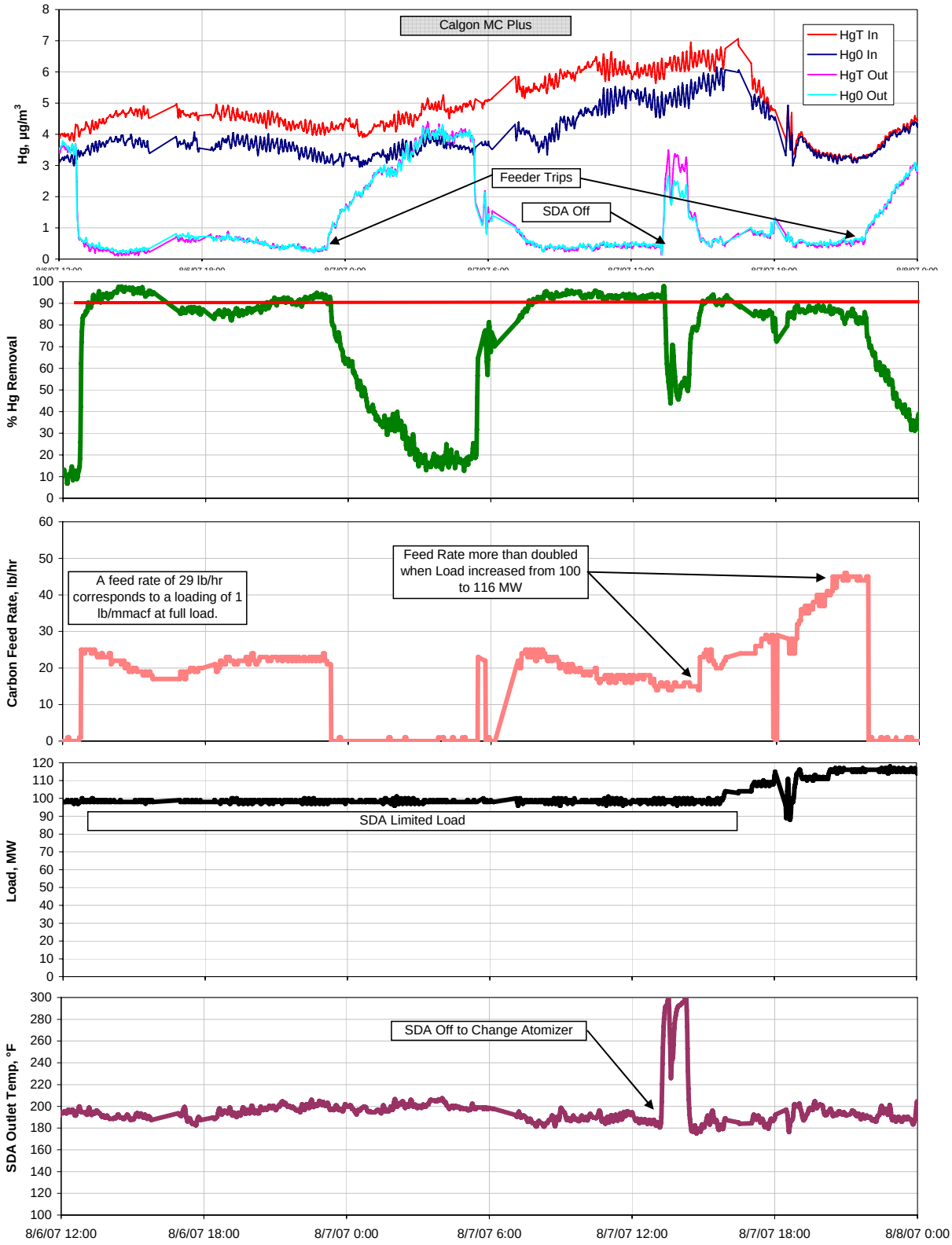

Figure 20. Mercury Removal with Calgon FLUEPAC™-MC PLUS.

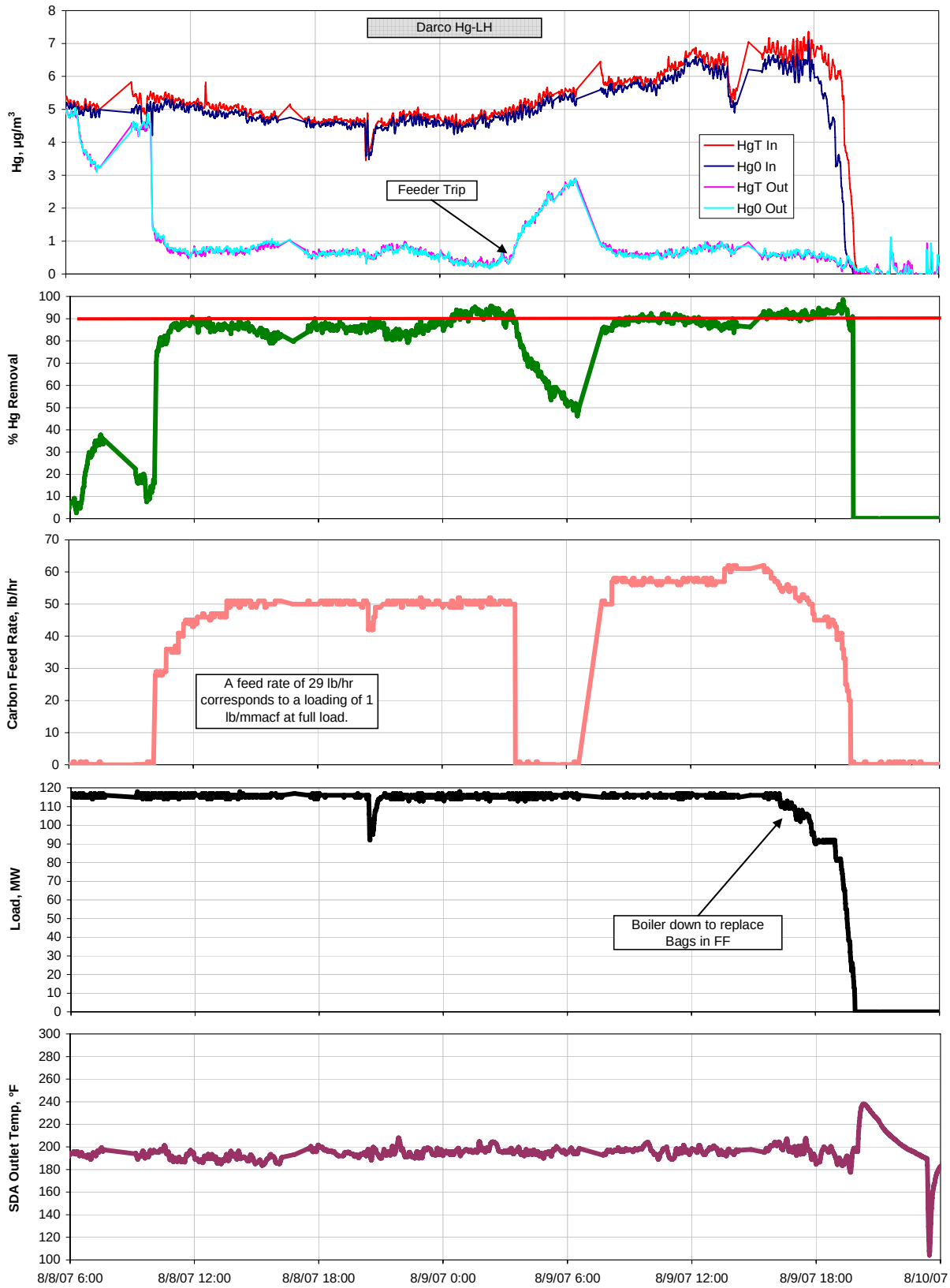

Figure 21. Mercury Removal with DARCO® Hg-LH.

4.1.6. Long-Term Test

After approval from the DOE project officer, the selected sorbent identified in Task 3.4, Hg-LH, was continuously injected into the flue gas over a period eight months. A second sorbent, MC PLUS, was then tested for a two-month period. The Long-Term test was designed to collect the data necessary to evaluate whether sorbent injection created any long-term operational problems, whether 90% mercury control was sustainable, and to ascertain O&M costs.

Long-Term test measurements included a second full suite of manual flue gas measurements (presented in 4.1.6.2) at the SDA inlet and stack involving Hg-CEM measurements, particulate, halogens, sulfur trioxide, and ammonia measurements. The accuracy of the Hg-CEM was verified via a Method 30A RATA, in lieu of O-H measurements, using a mercury analyzer approved as an instrumental reference method (IRM) under 40 CFR Part 75.22.

Notably, three events are so important to the general understanding of the project they are listed and discussed separately at this point.

1. **Hg-CEM Nitrogen Generators (NG)** – On September 5, 2007, nitrogen generators were installed on the Hg-CEMs as an upgrade offered by Thermo Fisher. The purpose of the NGs is to create an oxygen-free gas for use as a carrier gas for calibrations and as a sample dilution and carrier gas. This event is important because it significantly increased the reliability and precision of the Hg-CEM measurements. Up to this time, signal variation was on the order of ± 0.5 µg/wscm. This made it difficult to perform accurate calibrations and to interpret results when the mercury concentration at the stack fell below 0.5 µg/wscm, which was often the case during coal additive and Parametric testing. The NGs reduced signal variation to nominally ± 0.05 µg/wscm.

2. **Step-Up Transformer Failure** – The Long-Term test began on September 26, 2007. On December 15, 2007, the plant's step-up transformer failed. On February 5, 2008, this transformer was replaced with a temporary, smaller unit that limited operation to 106 MW out of 121 MW. This is important because at low load the native mercury capture and, therefore, overall mercury capture increases at Hardin. This was discussed with the project team and it was decided to continue the Long-Term test in spite of the consequence to the interpretation of results. The original transformer was repaired and re-installed on July 22, 2008.

3. **SCR Deposition** – On March 13, 2008, shortly after the Long-Term test resumed with the temporary transformer, a tube leak caused > 25% of the SCR to be plugged with ash. To compensate for the reduced available SCR surface area, the plant increased ammonia flow to maintain NO_x emission levels. However, the ammonia flow meter was not functioning properly and this significant operational change went unnoticed by ADA until the original transformer was reinstalled on July 22, 2008. At this time, mercury capture performance decreased significantly and it was discovered that excess ammonia negatively affects capture at full load (121 MW). The SCR was refurbished and the unit returned to "normal" operation on October 26, 2008. The Long-Term test ended on November 17, 2008.

Taken in combination, these events reduced the time at which the unit was operating normally during the 12-month (total duration) Long-Term test to about two months. However, valuable information was gained about the effect of the SCR and excess ammonia on mercury capture.

The section below presents the long-term data from shortly after start-up and for every quarter thereafter. Operating data for the quarterly results are presented as bulleted highlights for each quarter. Some important information is given in these highlights such as when outages occurred and when upgrades to the Hg-CEMs were implemented, etc. Table 12 presents the entire timeline for the Long-Term test.

Table 12. Timeline for the Long-Term Test.

3 Q 07	**9/5/07: Nitrogen Generators installed on Hg-CEMs - performance significantly improved** **9/26/07: Began Long Term Test with DARCO® Hg-LH** 90% removal at AC of 1.5-2.75 lb/MMacf and 121 MW.
4 Q 07	**12/6/07: Mercuric Chloride Generator installed on Stack Hg-CEM** **12/15/07: Step-up transformer failed causing 2-mo outage**
1 Q 08	**2/5/08: Plant resumed operation at 106 MW of 121 MW** **2/25/08: Resumed Long Term Tests with Hg-LH** 90% removal at AC of 1.0-2.5 lb/MMacf and 106 MW 3/6/08: New Carbon w/low Br - 90% removal at AC of 2.0-2.75(max) lb/MMacf and 106 MW. **3/13/08: Major tube leak plugged 25+% of SCR** Cannot maintain 90% with low Br carbon and and high NH3 slip
2 Q 08	4/7/08: New Carbon - 90% removal at AC of 1.75-2.5 lb/MMacf and106 MW. **4/21/08: First Method 30A RATA Tests** 5/14/08: New Carbon - 90% removal at AC of 1.0-1.75 lb/MMacf and 106 MW. **5/26/08-6/16/08: Dispatch Outage.**
3 Q 08	**7/4/08-7/22/08: Outage to install new step-up transformer.** Could not maintain 90% removal w/high NH3 slip and 121 MW. **8/19/08: Long Term Test concluded with DARCO® Hg-LH** **DARCO® Hg-LH was tested for 167 days during which 208,731 lb were fed** **8/26/08: BeganCalgon FLUEPAC®-MC PLUS for 2-mo test** Could not maintain 90% removal at 2.75-3.0 lb/MMacf w/high NH3 slip and 121 MW. **9/22/08: Manual Sampling for Long Term and second M30A RATAs.**
4 Q 08	**10/13/08: Final M30A RATA Test. Dynamic Spike Test.** **10/19/08-10/26/08: Outage to refurbish SCR.** **10/29/08: Resume test w/Calgon MC PLUS** 90% removal at 2.0-3.0 lb/MMacf and 116 MW. **11/17/08: Long Term Test completed** **Calgon FLUEPAC®-MC PLUS was tested for 60 days during which 110,431 lb were fed** **Began Test with ADA Power PAC Premium (not part of DOE Project)** 90% removal at 2.0-3.0 lb/MMacf and 121 MW.
1 Q 09	1/14/08-…..: Running in auto with emissions control. Emissions under 0.9 lb/TBtu at 1.0-3.0 lb/MMacf

4.1.6.1. Long-Term Test Data

The first phase of the Long-Term test began on September 26, 2007. Shortly after start-up using DARCO® Hg-LH, 90% mercury removal was consistently achieved at a carbon loading of 1.5 lb/MMacf as shown in Figure 22. Removal increased to 95% at low load even though the carbon feed rate was automatically reduced by a ratio of the current load to full load.

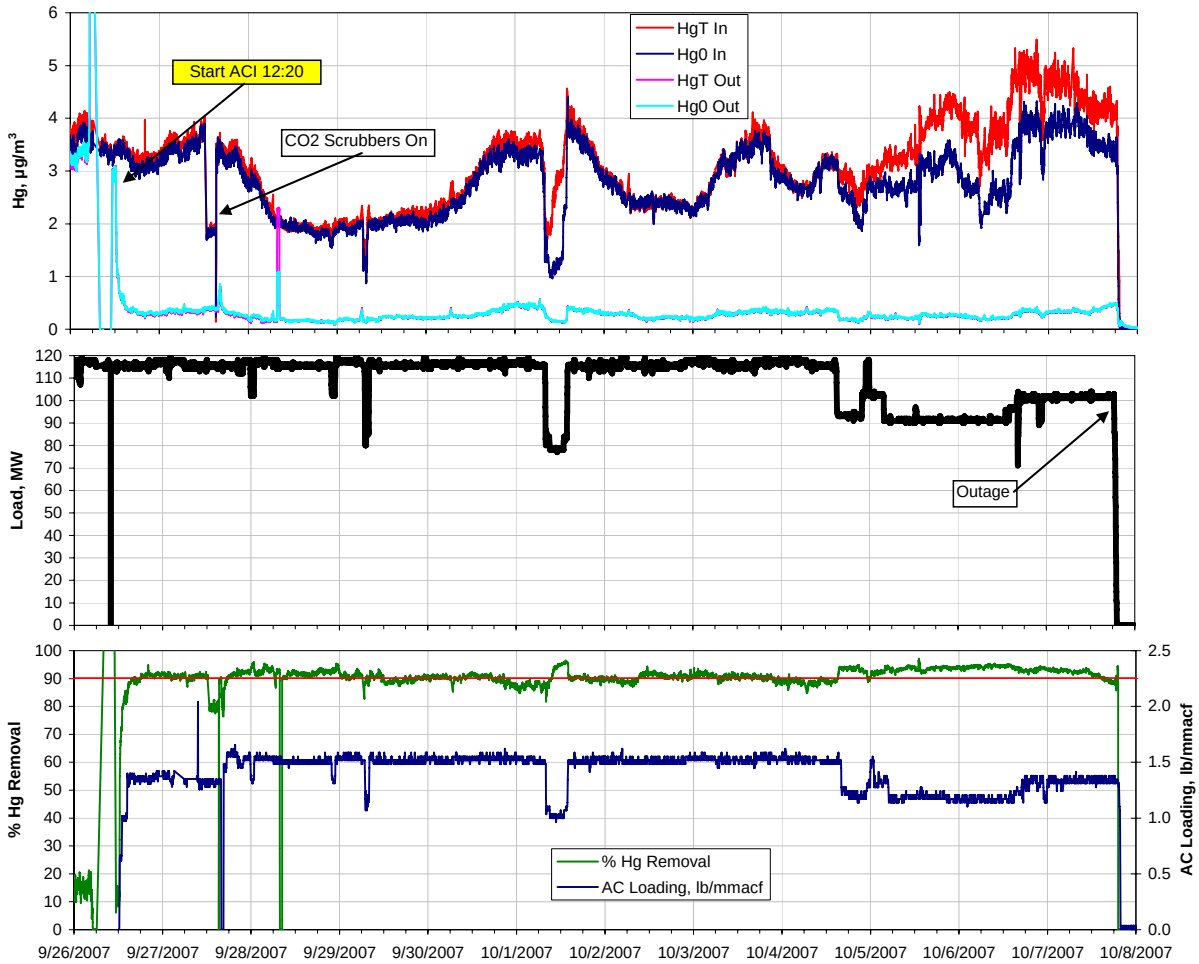

Figure 22. System Performance after the Start of the Long-Term Test.

4Q07 Performance trends are presented in Figure 23.

- The goal of 90% mercury removal was achieved and often exceeded with DARCO® Hg-LH. At full load (121 MW), 90% removal was maintained at ACI of 2.0–2.5 lb/MMacf.
- Inlet mercury concentration varied from 2–10 µg/wscm.
- **12/17/07: The plant's step-up transformer failed, leading to a 2-month outage.**

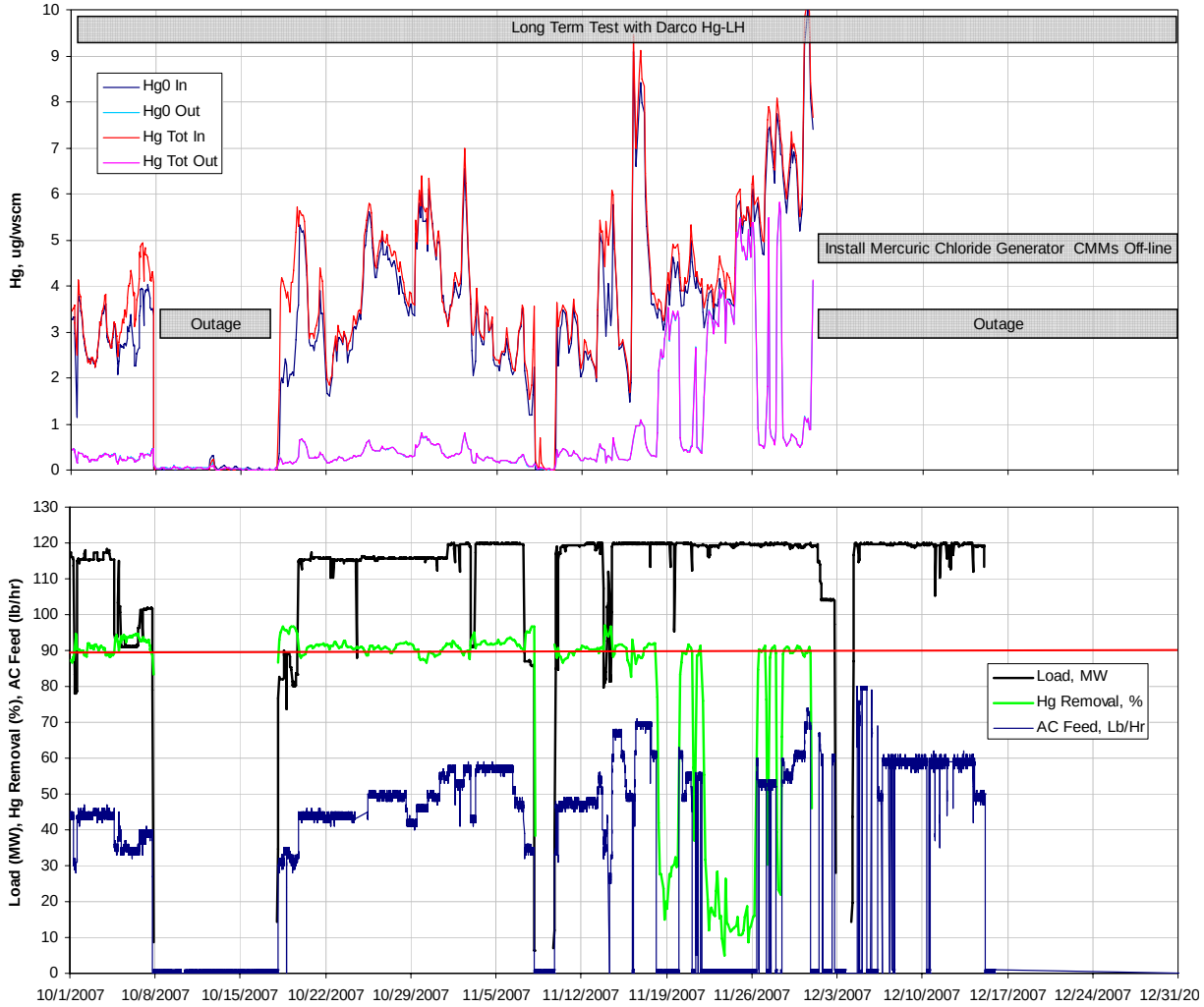

Figure 23. 4Q07 Long-Term Mercury Removal with DARCO® Hg-LH.

1Q08 Performance trends are presented in Figure 24.

- **Outage**: 12/15/07–02/05/08: step-up transformer failure. A temporary, smaller transformer installed that **limited load to 106 MW out of 121 MW**.
- 02/25/08: Resumed Long-Term tests with Hg-LH.
- At "full" load (106 MW), achieved 90% removal at ACI of 1.5–2.75 lb/MMacf.
- 03/06/08: A new batch of PAC was received with low Br concentration; could not always achieve 90% removal with this PAC.
- **03/13/08: Tube leak plugged 25+% of the SCR.**
- Inlet mercury concentration varied from 2–12 µg/wscm.

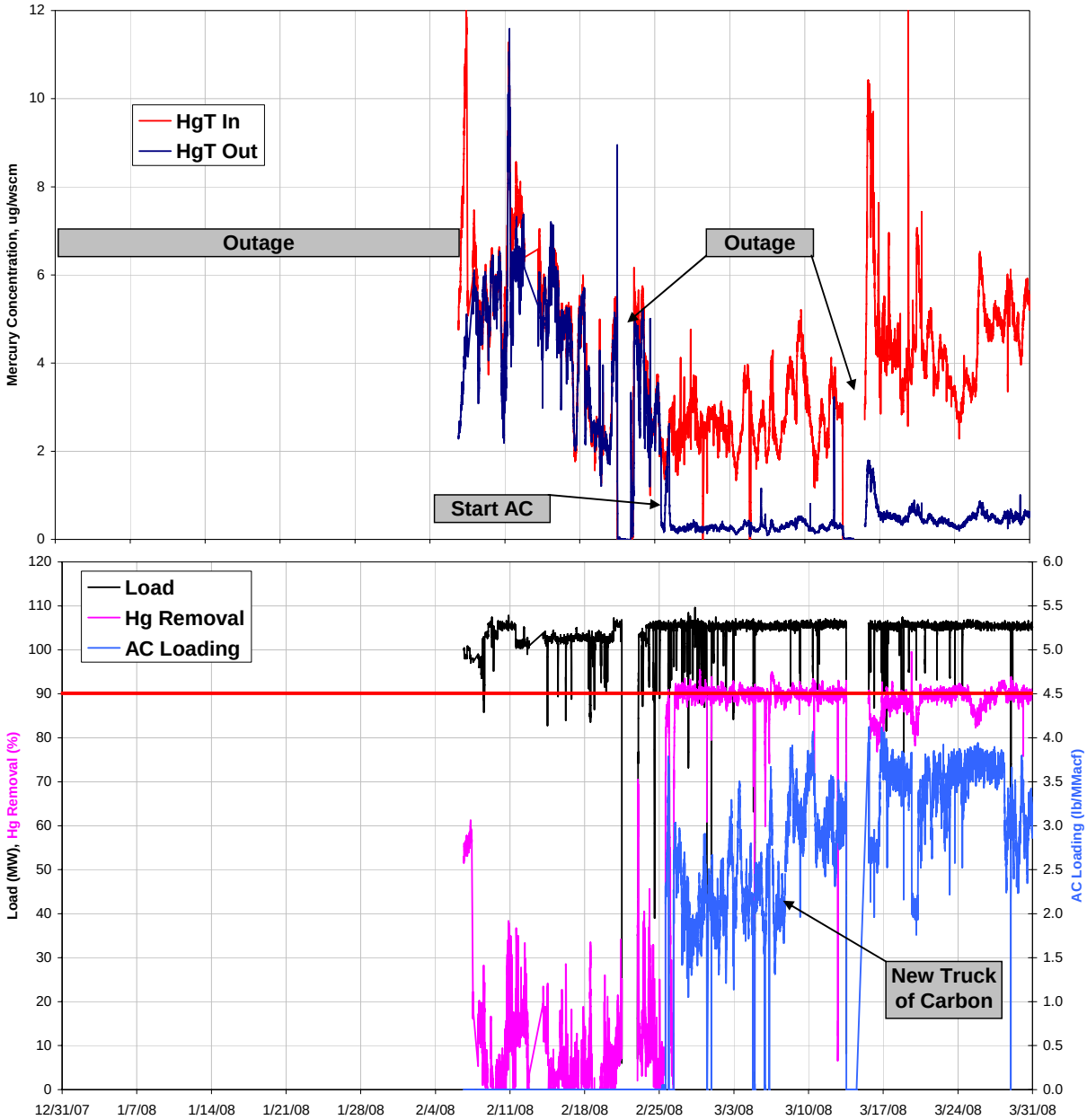

Figure 24. 1Q08 Long-Term Mercury Removal with DARCO® Hg-LH.

There were several instances during 1Q08 when the system could not maintain 90% removal at the maximum feed rate of the screw feeder (about 3.75 lb/MMacf). This was normally not an issue. Three theories were developed as to the cause of the poor performance. The first two were checked and discounted as discussed below.

1. Higher Baghouse Temperature – There was no significant difference in the baghouse temperature during this period compared to previous periods.
2. Poor inlet Hg-CEM Measurements – The inlet CEM was operating well during this period according to the daily QA checks. An ADA representative inspected the system to assure proper operation and noted that the inlet stinger heater had failed. This was repaired but did not change the relative mercury measurements.
3. Inconsistent Batch of PAC – The poor performance appeared to correlate with the receipt of a new truckload of activated carbon. During a routine comparison of feed rates calculated by a) the loss in weight of the silo as determined by load cells, and b) the screw speed and a typical value for sorbent density, the difference in feed rate was found to be about 10% when, historically, the difference was less than 1%. Further analyses of samples from the suspect batch and batches that performed well indicated leachable bromine content for the suspect batch of 2.5% when, historically, this value is around 5.5%.

Later in the project, it was discovered that during this quarter, a tube leak in March plugged 25^{+}% of the SCR with ash. This resulted in higher ammonia injection rates to maintain permitted NO_x levels. The high ammonia levels were later determined to affect PAC performance (see section 4.1.3.4). However, because the boiler was de-rated to 106 MW and the ammonia flow meter was not operating properly, the full effects of the compromised SCR were not realized until the original transformer was reinstalled and 121 MW operations resumed. It is possible that the high ammonia rates, combined with the lower bromine content of one batch, resulted in the relatively poor performance observed during the latter part of this quarter.

2Q08 Performance trends are presented in Figure 25.

- 04/21/08: The first Method 30A RATA test was performed on the Hg-CEMs.
- 05/14/08: A new batch of PAC gave 90% removal at 1.0–1.75 lb/MMacf.
- **Upgrade**: Feedback control was implemented into the ACI control logic. The system was able to maintain 90% mercury removal in automatic.
- Inlet mercury concentration varied from 1–8 µg/wscm.
- **Outage**: 05/26–06/16/08 due to dispatch.

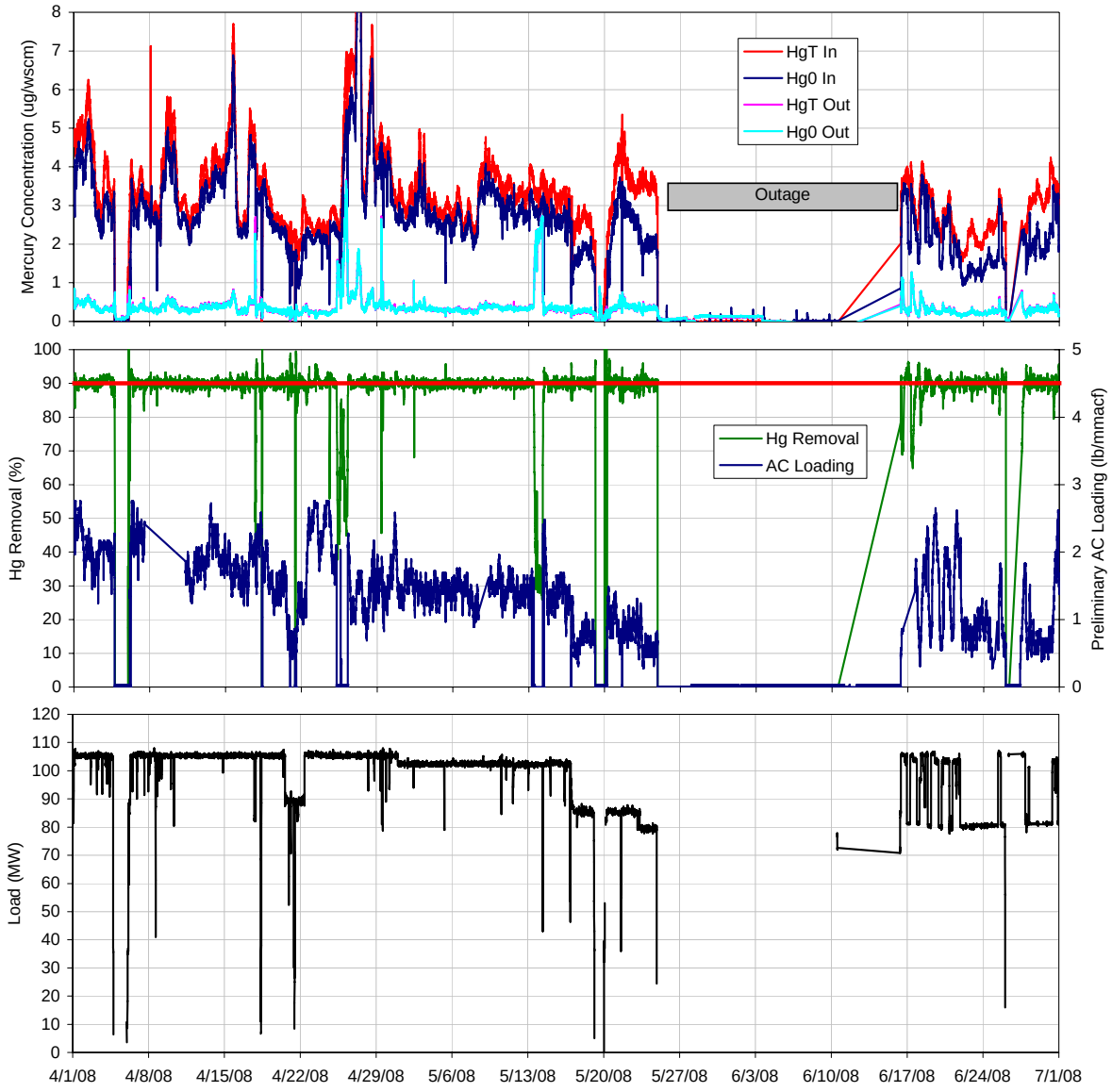

Figure 25. 2Q08 Long-Term Mercury Removal with DARCO® Hg-LH

3Q08 Performance trends are presented in Figure 26.

- **07/04–22/08: Outage to reinstall the 121 MW step-up transformer.**
- 90% removal was not achieved at 121 MW due to excess ammonia (see 4.1.3.4).
- 08/19/08: Long-Term test concluded with DARCO® Hg-LH. It was injected for 167 days during which 208,731 lb were fed.
- 08/26/08: Began injecting Calgon FLUEPAC™-MC PLUS for a two-month test.
- Could not maintain 90% removal due to excess ammonia when operating at 121 MW.
- 09/22/08: Completed the manual sampling tests with ACI and the second M30A RATA.
- Inlet mercury concentration varied from 2–9 µg/wscm.

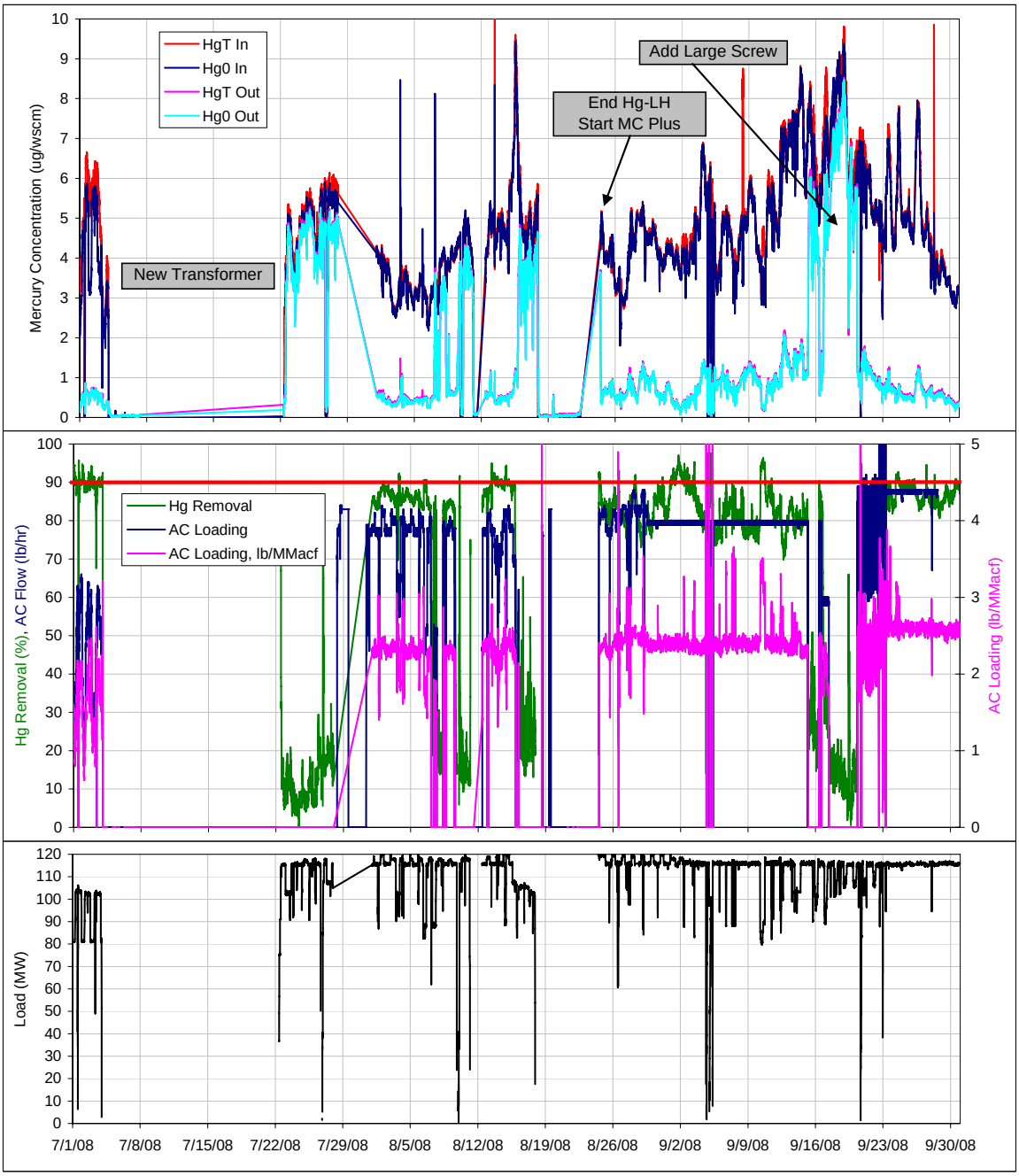

Figure 26. 3Q08 Mercury Removal with Hg-LH and MC PLUS.

4Q08 Performance trends are presented in Figure 27.

- 10/13/08: Completed the final M30A RATA Test including a Dynamic Spike Test.
- 10/19–26/08: Outage to refurbish the SCR.
- **10/29/08: Resume test with Calgon MC PLUS.**
- Achieved 90% removal at 2.0–3.0 lb/MMacf (116 MW).
- **11/17/08: Completed the Long-Term test. Calgon FLUEPAC™-MC PLUS was tested for 60 days, during which 110,431 lb were fed.**
- Began a test with ADA's Power PAC *PREMIUM* carbon (not part of the DOE project). Initial results showed 90% mercury removal at ACI of 1.0–2.0 lb/MMacf.
- Inlet mercury concentration varied from 2.5–8.5 µg/wscm.

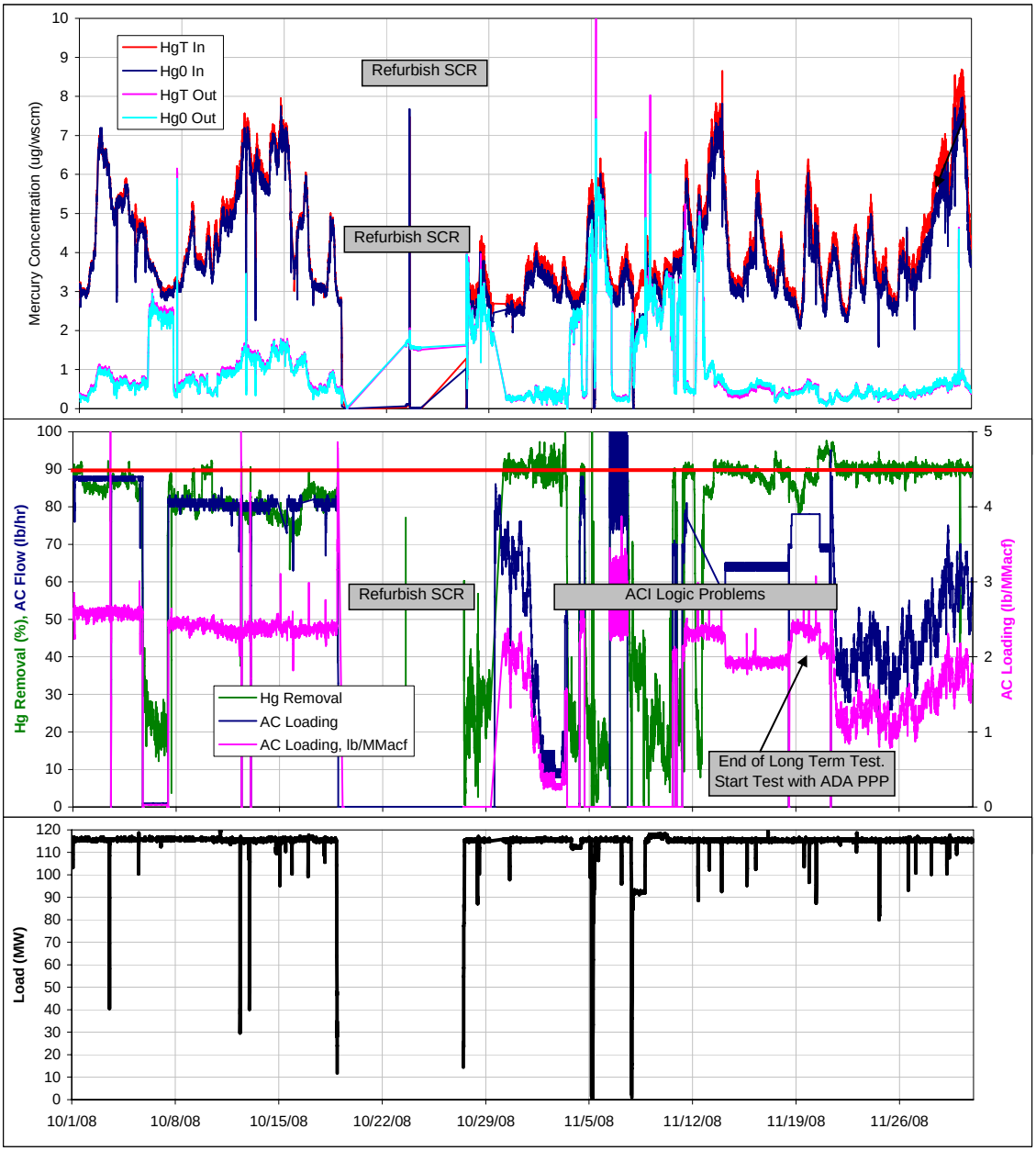

Figure 27. 4Q08 Mercury Removal with MC PLUS and ADA Power PAC *PREMIUM*.

4.1.6.2. Comparison of Baseline and Long-Term Source Testing

Manual gas measurements were collected during baseline testing and after several months of ACI to determine the effects of ACI on emissions. Sampling was conducted at the AH outlet ahead of the ACI location and at the stack. Measurements at the AH Outlet included particulates, condensables (SO_3), halogens (Cl, HCl, Br, HBr, and F), and ammonia. Measurements at the stack included particulates (including $PM_{10}/PM_{2.5}$), condensables (SO_3), and halogens (Cl, HCl, Br, HBr, and F). Complete tables of all the sampling results are included in Appendix E.

Table 13 lists the sampling results at the AH Outlet/SDA Inlet. There was generally good agreement between the two test dates except that the Cl and SO_3 values were slightly higher during the Long-Term tests, but this is likely caused by a difference in boiler operation and coal properties than as a result of PAC injection. It should be noted that the high ammonia value for the Long-Term test is unrepresentative of normal operations. The plant was injecting at high ammonia rates during this period because the SCR was more than 25% plugged with ash and the high rates were needed to maintain permitted NO_x levels. After the SCR was refurbished, ammonia usage dropped significantly.

Table 13. Comparison of Baseline and Long-Term Gas Measurements at the SDA Inlet at Hardin.

Particulate, Ammonia, Halogens, SO_3	Baseline	Long Term
Test Date	12/2006	9/2008
Flow Rate – DSCFM (STP=29.92"Hg, 68°F)	292,800	293,196
Gas Temp. - °F	319	333
O_2 - %Vol. (dry)	5.6	5.6
CO_2 - %Vol. (dry)	13.8	13.9
Moisture Content - %	10.69	11.12
Particulate – gr/dscf (Front Half)	4.2394	4.6874
– lbs/hr (Front Half)	10640	11786
Ammonia - ppm	3.2	57.34
Chlorine – mg	0.175	0.611
– mg/dscm	0.263	0.836
Hydrogen Chloride – mg	ND	0.676
– mg/dscm	ND	0.914
Bromine – mg	ND	<0.080
– mg/dscm	ND	<0.110
Hydrogen Bromide – mg	ND	<0.024
– mg/dscm	ND	<0.034
Hydrogen Fluoride – mg	ND	<0.027
– mg/dscm	ND	<0.038
Sulfur Trioxide		
- Moisture Content - %	0.555	0.514
- Sample Volume – DSCM	10.48	10.50
- ppm	3.50	5.99

Table 14 lists the particulate and halogen values measured at the stack. The table shows that there was no significant difference in the particulate concentration at the stack during Baseline (22.1 and 18.9 lb/hr) and ACI testing (20.1 lb/hr). It also shows that there was no measurable amount of halogens, including bromine, in the stack gas except for some Cl measured during the final tests in concentrations just above the detection limit.

Table 14. Comparison of Baseline and Long Term Gas Measurements at the Stack at Hardin.

Particulate and Halogens		Baseline and Repeat		Long Term
Test Date		12/2006	4/2007	9/2008
Flow Rate – dscfm (STP=29.92"Hg, 68°F)		293,809	295,494	303,428
Stack Temp. - °F		209	224	207
O_2 - %Vol. (dry)		6.9	6.7	6.1
CO_2 - %Vol. (dry)		12.5	12.6	13.6
Moisture Content - %		15.07	14.74	15.52
Particulate				
	- gr/dscf (Front Half)	0.0088	0.0072	0.0082
	- lbs/hr (Front Half)	22.09	18.34	20.07
Chlorine	– mg	<0.468	<0.467	0.495
	– mg/dscm	<0.384	<0.393	0.474
Hydrogen Chloride	– mg	ND	<0.272	<0.303
	– mg/dscm	ND	<0.229	<0.285
Bromine	– mg	ND	<0.950	<0.082
	– mg/dscm	ND	<0.799	<0.079
Hydrogen Bromide	– mg	ND	<0.930	<0.032
	– mg/dscm	ND	<0.779	<0.030
Hydrogen Fluoride	– mg	ND	<0.286	<0.017
	– mg/dscm	ND	<0.241	<0.017

Table 15 lists the results of $PM_{10}/PM_{2.5}$ and SO_3 measurements. The table shows a slight increase in the $>PM_{10}$ level and slight decreases in the $<PM_{10}>PM_{2.5}$ and $PM_{2.5}$ levels. These results indicate the ACI had no significant effect on fine particulate emissions.

Table 15. Comparison of Baseline and Long-Term PM and SO_3 Measurements at the Stack at Hardin.

Particulate $PM_{10}/PM_{2.5}$ and SO_3		Baseline	Long Term
Test Date		09/2007	9/2008
Flow Rate – dscfm (STP=29.92"Hg, 68°F)		311,182	285,972
Stack Temp. - °F		220	212
O2 - %Vol. (dry)		6.7	6.2
CO2 - %Vol. (dry)		12.8	13.4
Percent Excess Air		46.1	41
Moisture Content - %		15.18	15.24
Particulate (>PM10)	- gr/dscf	0.0030	0.0044
	- lbs/hr	7.90	10.76
Particulate (<PM10>PM2.5)	- gr/dscf	0.0030	0.0031
	- lbs/hr	7.90	7.70
Particulate (PM2.5)	- gr/dscf	0.0023	0.0022
	- lbs/hr	6.31	5.27
Particulate Total	- gr/dscf	0.0083	0.0097
	- lbs/hr	22.11	23.73
Sulfur Trioxide			
- Moisture Content - %		14.88	15.66
- Sample Volume – DSCM		0.508	0.518
- ppm		1.10	1.22

4.2. Coal and Coal Byproduct Sample Evaluation

Samples of coal and ash were collected and analyzed in conjunction with the baseline and Long-Term tests. Sample locations at Hardin are shown in Figure 28. Ultimate, proximate, and calorific analyses were performed on select coal samples as well as determinations for mercury and halogen content. Fly ash, bottom ash, and SDA slurry samples were analyzed for mercury content, LOI carbon, total carbon, and organic carbon. Ash sample from Baseline and Long-Term tests were analyzed by the synthetic groundwater leaching procedure (SGLP) for mercury and other trace constituent stability. Several large FF ash samples (five gallon) were also collected in accordance with DOE/NETL requirements from the Baseline and Long-Term tests and sent to DOE. A complete accounting of all chemical analyses is included in Appendix F.

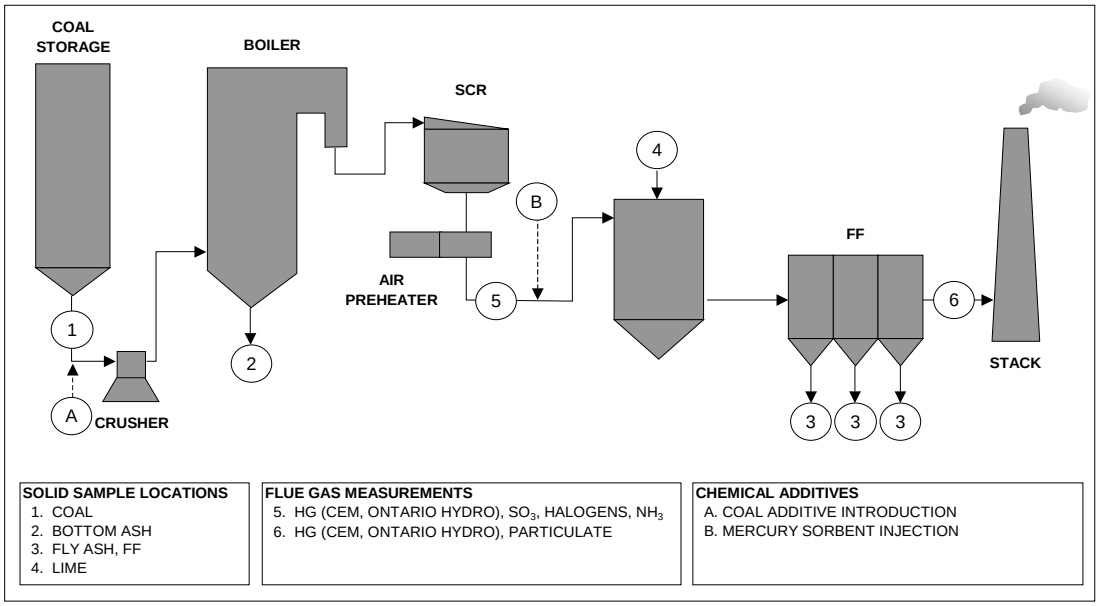

Figure 28. Sampling Locations at Hardin.

4.2.1. SGLP Results

The synthetic groundwater leaching procedure (SGLP) was developed at the University of North Dakota Energy and Environmental Research Center (EERC). It was designed to simulate the leaching of coal combustion byproducts (CCB) under more realistic conditions than the toxicity characteristic leaching procedure (TCLP). SGLP is modeled after TCLP, but uses deionized water for leaching, instead of an acidic solution, to more closely simulate the conditions found in a sanitary landfill. In the SGLP, samples are diluted 20:1 (liquid to solid ratio) and then agitated end-over-end. Samples are extracted after 18 hours and 20 days and analyzed for trace constituents. Hydration reactions that can take days or weeks to complete often incorporate trace toxins so that the 30-day concentration of these species is often lower than the 18-hour concentration.

An SGLP was conducted on a baseline (no ACI) ash sample and a sample collected after months of ACI with a brominated PAC. Trace materials, including bromide, chloride, fluoride, arsenic, selenium, and mercury, were measured after 18 hours and 30 days of agitation. The concentrations of these species were also measured in the raw samples to determine a maximum possible concentration for the leachate. These values are represented by “Max” in the following table and figure.

Table 16 and Figure 29 show the results of the SGLP. The leachate concentrations in the six figures are compared to EPA’s maximum containment level (MCL) for drinking water for all species except chloride and bromide that have no MCL. MCL levels are much stricter than the RCRA leaching values for sanitary landfills. In all cases, the leachate concentrations are below the MCL and decrease over time due to slow reactions with other ash constituents. The figures also show that, although the use of a brominated PAC increases the mercury concentration in the waste ash, the mercury does not leach from the sample. The table also gives the percentage of total constituent (Max) that was measured in the leachate.

Table 16. SGLP Results on Baseline and Long-Term Ash Samples.

Arsenic	FF-B Ash			
mg/L	Baseline	% Leach	Long Term	% Leach
Max	0.25		0.35	
18-hr	<0.01	#N/A	<0.01	#N/A
30-day	<0.01	#N/A	<0.01	#N/A

Bromide	FF-B Ash			
mg/L	Baseline	% Leach	Long Term	% Leach
Max	1.00		6.5	
18-hr	1.33	133	5.35	82
30-day	0.29	29	3.26	50

Chloride	FF-B Ash			
mg/L	Baseline	% Leach	Long Term	% Leach
Max	31		27	
18-hr	24	77	17	63
30-day	23	74	16	59

Fluoride	FF-B Ash			
mg/L	Baseline	% Leach	Long Term	% Leach
Max	16.5		19.5	
18-hr	2.33	14	2.33	12
30-day	0.05	0	0.12	1

Selenium	FF-B Ash			
mg/L	Baseline	% Leach	Long Term	% Leach
Max	0.25		0.2	
18-hr	0.01	4	<0.01	#N/A
30-day	<0.01	#N/A	<0.01	#N/A

Mercury	FF-B Ash			
mg/L	Baseline	% Leach	Long Term	% Leach
Max	0.00373		0.0133	
18-hr	0.000113	3	3.37E-05	0
30-day	5.4E-07	0	9.9E-07	0

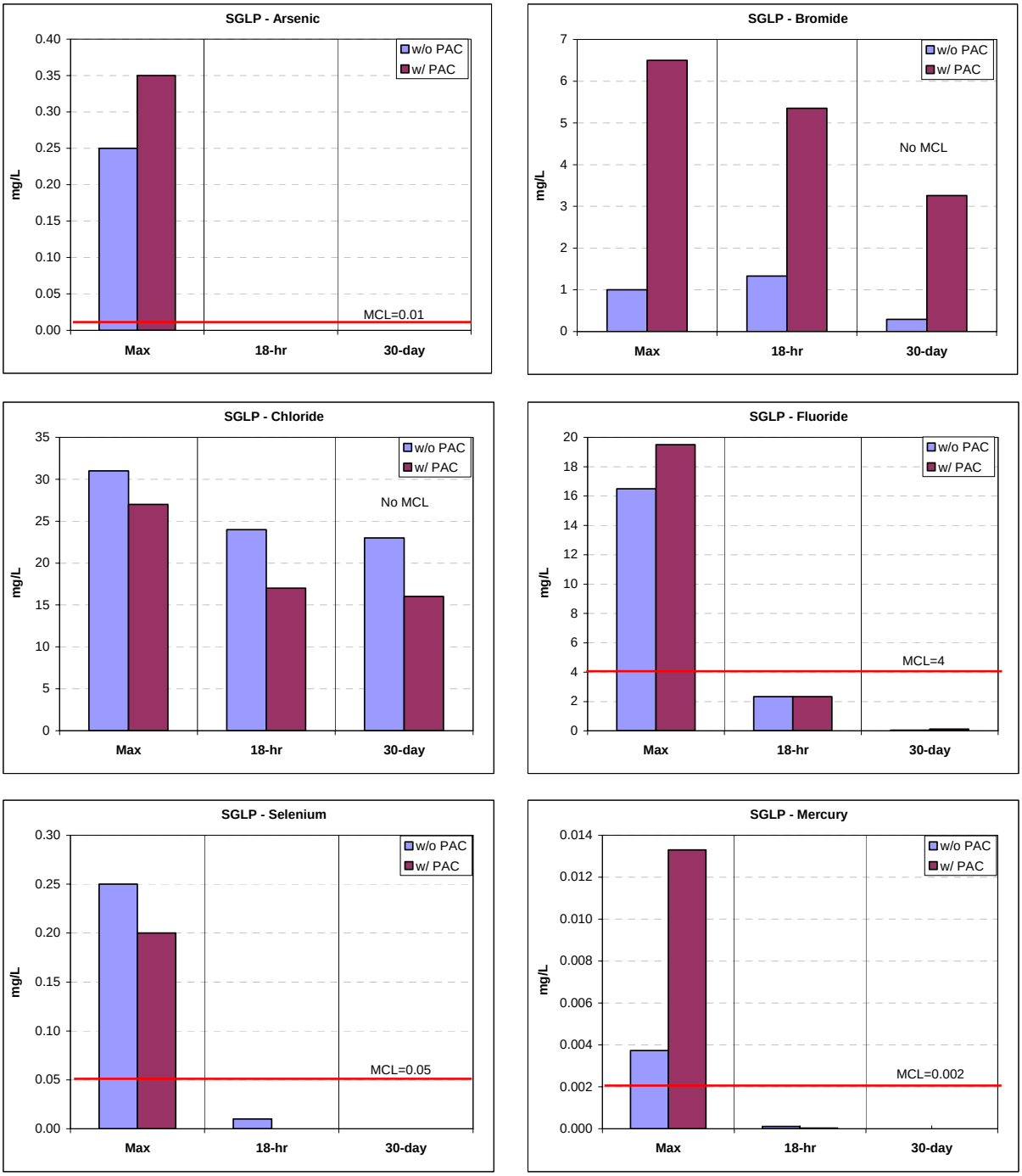

Figure 29. Results of the SGLP Leaching Test on Ash Samples with and without Carbon Injection.

4.2.2. Ash Analysis With and Without PAC

Ash samples were collected from the six FF hoppers on several occasions and from the B hopper on a regular basis. The samples were analyzed for moisture, carbon, and mercury. Samples of bottom ash and SDA slurry were also analyzed for mercury and found to contain less than the detection limit.

Early in the test, the values obtained for carbon concentration in the ash were uncharacteristically high. The method used to determine the carbon levels was the loss on ignition (LOI) test. This test involves weighing, drying, weighing, and then heating the sample to drive off carbon, followed by a final weighing. However, it is known that for ash containing SDA solids, this method produces falsely high values probably because the heating process also drives off waters of hydration bound to the calcium sulphite and sulphate formed in the SDA. Therefore, the test procedure was changed to one that determines total carbon. However, these values also seemed high and the reason was traced to the fact that SDA solids contain a small amount of calcium carbonate from the lime used in the scrubbing process. Finally, a test was chosen that measures only organic carbon, not carbon tied up with other species like carbonates. This test produced results consistent with LOI values obtained from ash samples collected upstream of the SDA. Figure 30 shows the results of three analyses performed on the same ash samples.

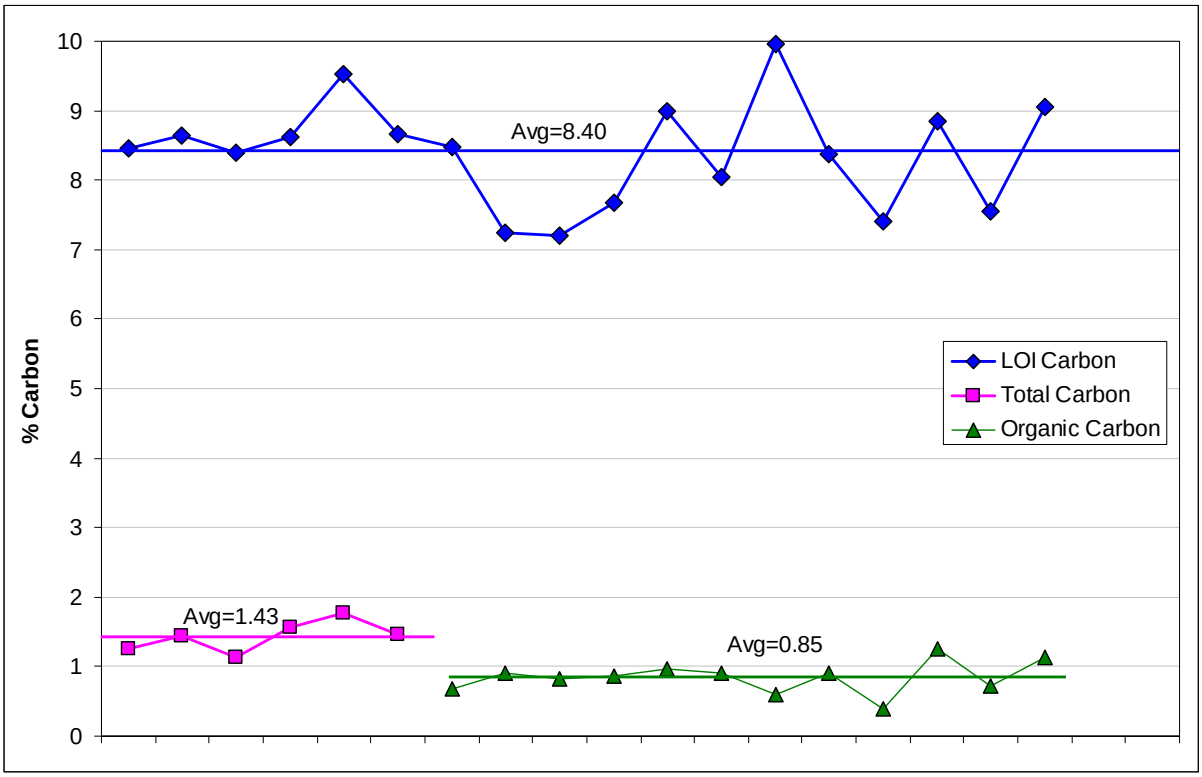

Figure 30. Comparison of LOI, Total, and Organic Carbon in Ash with SDA Solids.

Figure 31 shows the results of analyses performed on ash samples taken in-situ from the duct upstream of the SDA and downstream of the ACI location. The ash was collected with a device known as a CEGRT. The figure shows that both carbon and mercury concentration increases as carbon loading increases. The carbon increase was expected, however the increase in ash mercury indicates that mercury was being absorbed onto the carbon even before the SDA and FF.

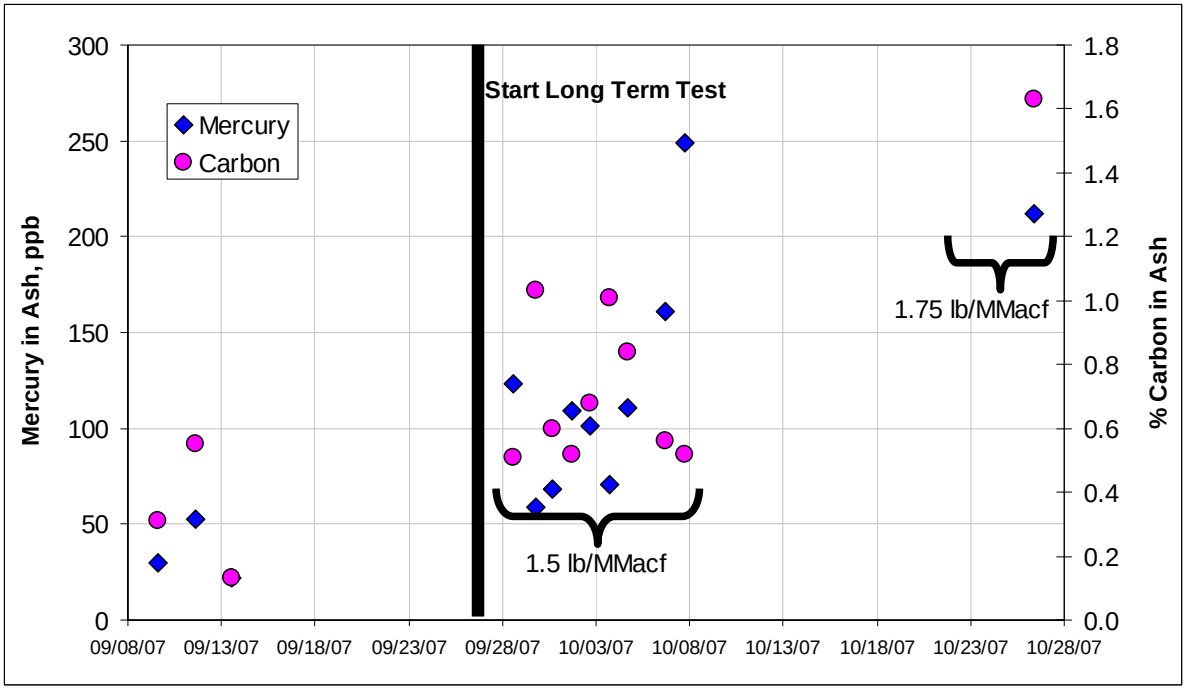

Figure 31. CEGRIT In-Situ Ash Analyses Downstream of the ACI Location.

Figure 32 is included to demonstrate the time required for the mercury concentration in the FF ash to reach a steady value. A large portion of the ash at Hardin is re-slurried and reinjected into the SDA to increase lime utilization and to increase the solids concentration of the lime/ash slurry mixture. The large hold-up of material in the ash slurry tanks increases the time required for the mercury in the ash to reach a steady level. It also makes it difficult to obtain a representative sample of ash from the hoppers for any short-term test. The figure shows that it takes at least several days for the ash mercury to reach a steady value.

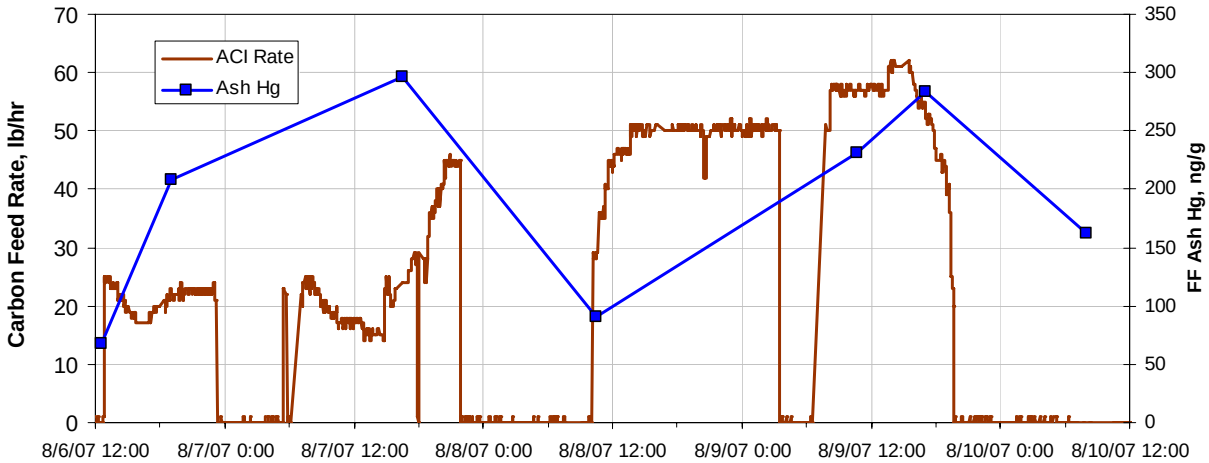

Figure 32. Mercury in FF Ash Samples during the Optimization Test.

Figure 33 shows how the mercury and bromine concentration in the ash increased during the coal additive test with KNX. Mercury concentration increased from an average of 53 to 158 ppb and bromine increased from 4 to 181 ppm.

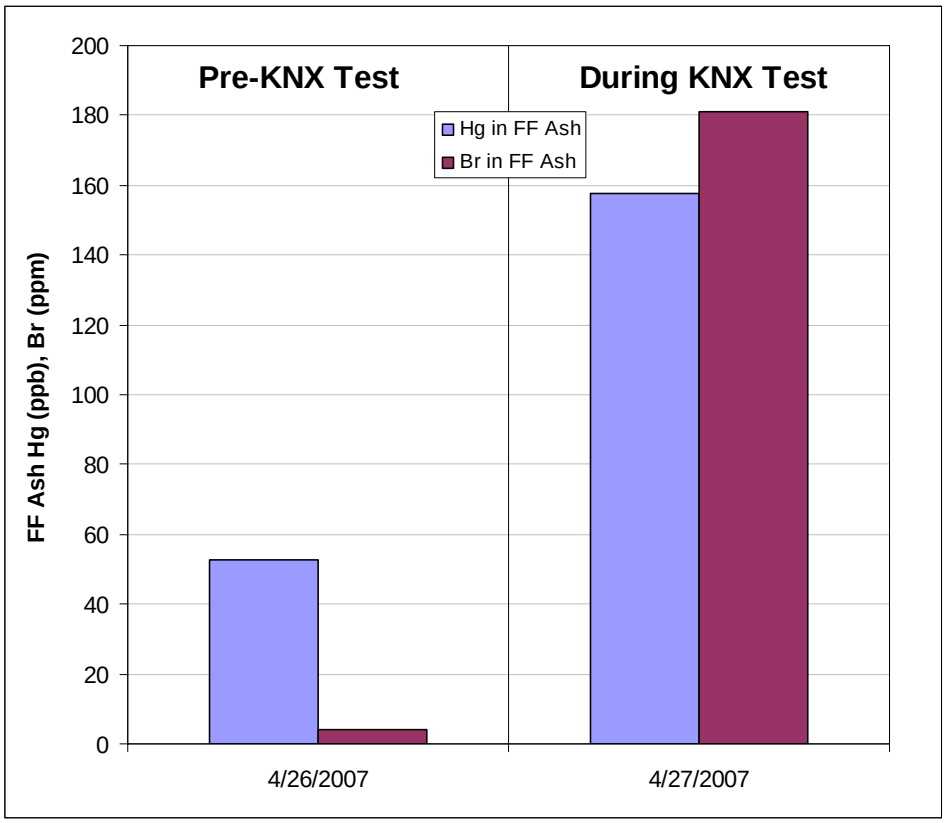

Figure 33. Hg and Br in FF Ash before and during the KNX Test.

4.2.3. Coal Properties

Hardin burns a PRB coal from the local Absaloka mine. Coal samples were collected from the main feed belt leading to the three coal bunkers. The coal bunkers have a nominal 16-hour capacity at full load. Table 17shows the average, minimum, maximum, standard deviation, and sample size for all of analyses completed on Absaloka coal. For the samples taken, mercury averaged 46 ppm with a high of 94 ppm and a low of 14 ppm. This corresponds well to minimum and maximum mercury concentrations measured at the SDA inlet, nominally 2–10 µg/wscm (as a general rule of thumb for Hardin, and as confirmed by combustion calculations, the mercury concentration of the gas can be estimated by dividing the coal mercury, in ppm, by 10 to give the gas concentration in µg/wscm). The coal table in Appendix F also shows that coal mercury was variable from sample to sample, which accounts for the day-to-day variations recorded by the Hg-CEMs.

Table 17. Absaloka Coal Properties at Hardin.

Absaloka Coal	% H2O	Hg as rec (ng/g)	Hg dry (ng/g)	% Ash (as rec)	% FC (as rec)	% H2O (as rec)	% S (as rec)	% Vol (as rec)	Btu/lb (as rec)	MAF (Btu/lb)
Average	11.73	40.82	46.16	8.22	37.84	24.38	0.55	29.55	8807	13066
Min	7.80	12.00	13.60	5.85	35.37	23.29	0.40	27.04	8533	12695
Max	16.10	84.31	94.10	10.04	39.81	26.55	0.70	31.82	9231	13268
Std Dev	2.31	17.12	18.99	1.14	1.36	0.76	0.08	1.15	192	142
No. of Samples	32	32	32	19	19	19	19	19	19	19

Absaloka Coal	Br (ug/g)	Cl (ug/g)	F (ug/g)	% Ash (as rec)	% C (as rec)	% H (as rec)	% H2O (as rec)	% N (as rec)	% O (as rec)	% S (as rec)
Average	1.72	30.75	42.50	8.22	51.12	3.46	24.38	0.66	11.61	0.55
Min	1.20	6.00	25.00	5.85	49.73	3.22	23.29	0.48	10.68	0.40
Max	2.80	77.00	60.00	10.04	53.40	3.61	26.55	0.74	13.48	0.70
Std Dev	0.67	22.64	24.75	1.14	0.91	0.11	0.76	0.07	0.55	0.08
No. of Samples	5	8	2	19	19	19	19	19	19	19

5. ECONOMIC ANALYSIS

After completion of testing and analysis of the data, the requirements and costs for full-scale, permanent commercial implementation of the necessary equipment for mercury control using sorbent injection at the 121-MW Hardin Generating Station were determined. The related process equipment was sized and designed based on the Long-Term test results for 90% mercury control. Plant-specific requirements (sorbent storage capacity, plant arrangement, retrofit issues, winterization, controls interface, etc.) were also considered when determining the final cost. The system design was based on the criteria listed in Table 18.

Table 18. Design Criteria for the Mercury Control System at Hardin (50 lb/hr PAC Injection, 90% Mercury Control).

Parameter	Activated Carbon
Number of silos	1
Number of injection trains	2
Design feed capacity/train (lb/hr)	100
Operating feed capacity/train (lb/hr)	50
Sorbent storage capacity (lbs)	40,000
Conveying distance (ft)	250
Sorbent	DARCO® Hg-LH
Aerated density (lb/ft^3)	18
Settled density (lb/ft^3)	28
Particle MMD (microns)	18

The estimated uninstalled cost for an activated carbon injection system and storage silo for the 121-MW unit is $781,000. Costs were estimated based on a long-term activated carbon injection concentration of 1.75 lb/MMacf. For Hardin, this would require an injection rate of nominally 50 lbs/hr of activated carbon at full load. Assuming a unit capacity factor of 81% and a delivered cost of $1.00/lb for DARCO® Hg-LH sorbent, the annual sorbent cost for injecting upstream of the existing SDA and FF would be about $355,000. This corresponds to a nominal sorbent cost of $7,250 per pound of mercury removed.

Results from the field tests conducted to date indicate different levels of mercury removal can be achieved depending on the air pollution control equipment and different flue gas conditions. Data collected from the Phase I DOE tests at Gaston indicate mercury removal levels of up to 90% were obtained with COHPAC® (a baghouse installed downstream of an ESP) and DARCO® Hg sorbent injection. At Pleasant Prairie, 50–70% removal while injecting DARCO® Hg was the maximum achievable mercury control, with the configuration of an ESP collecting PRB ash. At Brayton Point, mercury removal levels of up to 90% were obtained with an ESP collecting bituminous ash with DARCO® Hg sorbent injection. DOE Phase II testing at Holcomb showed mercury removal levels of 90% were obtained with an SDA and FF while injecting DARCO® Hg-LH. Data from Hardin and seven other sites are summarized in Table 19.

Table 19. Mercury Removal Efficiencies and Costs for Different APC Configurations, Coals, and Sorbents.

Plant	APC Equipment	Coal	Sorbent	Removal %	Sorbent Cost (mills/kWh)
Gaston	COHPAC®	Bituminous	DARCO® Hg	90	0.43
Pleasant Prairie	ESP	PRB	DARCO® Hg	67	1.2
Brayton Point	ESP	Bituminous	DARCO® Hg	90	2.4
Holcomb	SDA-FF	PRB	DARCO® Hg-LH	90	0.44
Meramec	ESP	PRB	DARCO® Hg-LH	90	0.74
Independence	TOXECON II™	PRB	DARCO® Hg-LH	80	1.14
Merrimack	ESP	Bituminous	DARCO® Hg-LH with trona	70	1.31
Hardin	SDA-FF	PRB	DARCO® Hg-LH	90	0.41

The results from Hardin indicate that using DARCO® Hg-LH would result in similar mercury removal (90%) at less cost than at Holcomb. Both units have an SDA and FF and fire PRB coals; however, Hardin uses ash recycle to the SDA whereas Holcomb does not. A critical difference in the sorbent costs is the improved effectiveness of brominated carbon over unbrominated carbon, the only sorbent available during testing at Brayton Point. These results are presented as mills/kWh in Table 20 and as $/kWh in Table 21. The use of DARCO® Hg-LH at Hardin resulted in mercury removal at projected costs similar to what would be expected at sites using an SDA and FF for emissions control combusting PRB coal.

5.1. System Description

For this cost estimate, the permanent PAC injection system for Hardin will consist of one bulk storage silo and two dilute-phase pneumatic conveying systems. DARCO® Hg-LH sorbent will be received in 40,000-pound batches delivered by pneumatic bulk tanker trucks. The silo is equipped with a pulse jet type bin vent filter to contain dust during the loading process. The silo is a shop-built, dry-welded tank with two mass flow discharge cones. Point level probes and weigh cells monitor sorbent level and inventory. Silo sizing was based on the capacity to hold approximately one truckload of DARCO® Hg-LH sorbent, sufficient for 33 days of operation at the design injection rate.

The sorbent is fed from the discharge cone by a rotary valve into feeder hoppers. From the hoppers the sorbent is metered into the conveying lines by volumetric feeders. Conveying air

supplied by regenerative blowers passes through an eductor, which provides suction to draw the sorbent into the conveying piping and carry it to the injection lance. The blowers and feeder trains are contained beneath the silo.

A Programmable Logic Controller (PLC) is used to control all aspects of system operation. The PLC and other control components will be mounted in a NEMA4 control panel. The control panel, motor control centers (MCCs), and disconnects will be housed in a prefabricated power and control building located adjacent to the silo.

5.2. Cost and Economic Methodology

Costs for the sorbent storage and injection equipment were provided by ADA based on the design requirements in Table 18. ADA has built and installed many similar systems at coal-fired power plants for mercury control. Estimated costs for the distribution manifold, piping and injection lances, installation man-hour and crane-hour estimates, and an estimate for foundations including pilings are also included. As construction costs are rising rapidly, these costs are tentative and very dependent upon local labor conditions as well as current national demand for related equipment.

EPRI Technical Assessment Guide (TAG) methodology was used to determine the indirect costs. A project contingency of 15% was used. Since the technology is relatively simple and well proven on similar scale, the process contingency was set at 5%. Based upon requested guarantee language, that contingency may increase to cover anticipated risks for a newer technology. ACI equipment can be installed in a few months; therefore, no adjustment was made for interest during construction, a significant cost factor for large construction projects lasting several years.

Operating costs include sorbent costs, electric power, operating labor, maintenance (labor and materials), and spare parts. An average incremental operating labor requirement of one hour per day per injection system was estimated to cover the incremental labor to operate and monitor the ACI injection system. The annual maintenance costs were based on 5% of the uninstalled equipment cost.

Levelized costs were developed based on a twenty-year book life and are presented in constant dollars.

5.3. Capital Costs

The uninstalled activated carbon storage and feed equipment costs are estimated at $781,000. The estimated cost for the sorbent injection system and storage silo installed at the 121-MW unit is $1,574,000 and includes all process equipment, foundations, support steel, plant modifications utility interfaces, engineering, taxes, overhead, and contingencies. The capital and O&M costs are summarized in Table 20.

Table 20. Capital and O&M Cost Estimate for the ACI System at Hardin. Annual Basis 2008.

Capital Costs Summary	
Equipment, FOB Hardin	$781,000
Site Integration (materials and labor)	$95,000
Installation (ACI silo and process equipment, foundations)	$250,000
Taxes (6%)	$56,000
Indirects/Contingencies	$393,000
Total Capital Required	$1,574,000
$/kW	$13.01

Operating and Maintenance Costs Summary	
Sorbent @ $1.00/lb, DARCO® Hg-LH	$355,000
Power, labor, maintenance	$85,000
Variable O&M for 2008 ($/kW)	$3.64
Variable Mills/kW-hr	0.51

5.4. Operating and Levelized Costs

The most significant operational cost of sorbent injection for mercury control is the DARCO® Hg-LH sorbent. Sorbent costs were estimated for 90% mercury control based on the long-term sorbent injection concentration of 1.75 lbs/MMacf for activated carbon. For Hardin, this would require an injection rate of nominally 50 lbs/hr of activated carbon at full load. Assuming a unit capacity factor of 81% and a delivered activated carbon cost of $1.00/lb, the twenty-year levelized annual cost of injecting sorbent at the SDA and FF inlet would be $744,000. Included in this is other annual operating levelized costs including electric power, operating labor, and maintenance.

Based on the test program results and assuming that sorbent injection at the SDA inlet for mercury control is sustainable, an average of 90% mercury control can be attained at Hardin for an initial capital investment of $1,574,000 with first year operating costs of $5.68/kW, or annual twenty-year constant-dollar levelized costs of $6.15/kW. This information is summarized in Table 21.

Table 21. Levelized Costs

Twenty-Year Levelized Costs Summary—$ Constant	
Fixed Twenty-Year Levelized Costs	$184,000
Variable O&M Twenty-Year Levelized Costs	$560,000
Total Twenty-Year Levelized Costs	$744,000
Fixed Levelized Costs $/kW	$1.52
First-Year Operating Levelized Costs $/kW	$3.64
Total Twenty-Year Levelized Costs $/kW	$6.15
First-Year Operating Levelized Costs mills/kW-hr	0.51
Total Twenty-Year Levelized Costs mills/kW-hr	0.87
Total Twenty-Year Levelized Cost $/lb Hg removed	$15,000

6. CONCLUSIONS

The main project objective of 90% mercury removal was achieved with two brominated PACs, DARCO® Hg-LH and Calgon FLUEPAC™-MC Plus. Shorter-term results with ADA Power PAC *PREMIUM* also indicate that it is capable of 90% mercury removal at similar ACI rates. At full load (121 MW) and under normal operating conditions, 90% mercury removal was maintained at carbon loadings of 1.5 to 2.5 lb/MMacf depending on the inlet mercury flue gas concentration. Much less carbon is needed at lower loads due to the higher mercury oxidation across the SCR. The twenty-year levelized cost was determined to be 0.87 mills/kW-hr or $15,000/lb mercury removed.

- Manual Gas Measurements
    - The only halogen detected at either the SDA Inlet or Stack was chlorine and it was present in low concentrations (no HCl, HBr, HF, Br, or F). The ammonia concentration at the SDA Inlet was 3.2 ppm and the sulfur trioxide was 3.5–6.0 ppm (all sulphates are reported as SO_3 but were likely ammonia salts). The sulfur trioxide measured at the Stack was 1.2 ppm (also likely that SO_3 was present as ammonia salts). The particulate measurements at the stack, including $PM_{10}/PM_{2.5}$ were not impacted by ACI.
    - Baseline Ontario Hydro and STM measurements agreed well with the Hg-CEMs.
- Co-Benefit Analysis
    - Mercury removal trends show that mercury removal increases at low load from less than 20% to as high as 50% due to the increased oxidation across the SCR. All of the oxidized mercury is scrubbed in the SDA-FF. It is theorized that the increase in mercury oxidation at low load results from the corresponding decrease in ammonia flow. With less ammonia in the SCR, mercury is able to more successfully compete for oxidation sites on the catalyst.
    - High levels of ammonia were found to negatively impact mercury removal during ACI. It is believed that the ammonia competes with mercury for active sites on the PAC. Ammonia is present in ppm quantities whereas mercury is at ppb levels.
- Coal Blending Tests – Blends with West Elk coal increased native mercury capture from 10 to 27% at a 7% blend, and from 15 to 51 % at a 14% blend. Blends with Bull Mountain coal showed only marginal increases in mercury removal.
- Coal Additive Test – KNX achieved a maximum mercury capture of 85% with no ACI.
- Parametric Test
    - Both DARCO® Hg-LH and Calgon FLUEPAC™-MC Plus achieved 90% mercury capture at a carbon loading of about 1.0 lb/MMacf.
    - The test combining KNX addition with PAC injection achieved 90% removal at a carbon loading of 0.14 lb/MMacf and a low KNX rate. When the KNX was increased, >95% mercury removal was achieved.

- Hg-CEM Upgrades – The addition of Nitrogen Generators on the Hg-CEMs increased the precision from nominally ±0.5 µg/wscm to less than ±0.1 µg/wscm.
- Integration of PAC Silo Control and Hg-CEMs – The control scheme for the PAC silo was successfully integrated with feedback from Hg-CEMs. As much as a 50% reduction in carbon usage was realized at low load. Plant personnel were successfully trained in the operations of the Hg-CEMs and ACI systems. Plant personnel operated the ACI system during the last portion of the Long-Term test.
- Method 30A RATA – The Hg-CEMs installed at Hardin passed three RATA tests conducted by the EPA Method 30A.

LIST OF ACRONYMS AND ABBREVIATIONS

ACI	Activated carbon injection
AH	Air heater
CAMR	Clean Air Mercury Rule
CCB	Coal combustion byproducts
CEM	Continuous emission monitor
DOE	Department of Energy
EPA	Environmental Protection Agency
FF	Fabric filter
Hg+2	Oxidized gaseous mercury
Hg0	Elemental gaseous mercury
Hg-CEM	Mercury continuous emission monitor
HgT	Total gaseous mercury
IRM	Instrumental Reference Method
LOI	Loss on ignition
M30A	EPA Method 30A
MACT	Maximum Achievable Control Technology
MCC	Motor control center
MCG	Mercury chloride generator
MCL	Maximum containment level
MW	Megawatt
NETL	National Energy Technology Laboratory
NG	Nitrogen generator
NOx	Nitrogen Oxide
O-H	Ontario Hydro Method
O&M	Operating and Maintenance
PAC	Powdered activated carbon
PLC	Programmable logic controller
PRB	Powder River Basin
QA/QC	Quality Assurance/Quality Control
RATA	Relative Accuracy Test Audit
RMP	Rocky Mountain Power

SCR	Selective catalytic reduction
SDA	Spray dryer absorber
SGLP	Synthetic Groundwater Leaching Procedure
SO_2	Sulfur Dioxide
STM	Sorbent Trap Method
TAG	Technical Assessment Guide
TCLP	Toxicity Characteristic Leaching Procedure

APPENDIX A: PROJECT TEST PLAN

PHASE III MERCURY CONTROL TECHNOLOGY FIELD TESTING AND RELATED MERCURY CONTROL RESEARCH AND DEVELOPMENT

Long-Term Carbon Injection Field Test for >90% Mercury Removal for a PRB Unit with a Spray Dryer and Fabric Filter

Test Plan

Prepared for:
Rocky Mountain Power, Inc.
DOE NETL (DE-FC26-06NT42774)
EPRI

Prepared by:
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June 23, 2006

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Project Overview

Hardin Generating Station was chosen to be included in Phase III of DOE's mercury control evaluation program. The overall objective for the Phase III program is to achieve 90% mercury control in excess of native removal. The goal of the testing at Hardin is to demonstrate >90% mercury removal for a period of 10 to 12 months using sorbent injection. This will allow an evaluation of long-term mercury removal capability, emissions variability, and the O&M costs associated with sorbent injection at a power plant with a configuration representative of many new plants. The project will also access the potential benefits of coal additives and coal blending with Western bituminous coal to increase mercury removal. During this project, a commercial-grade activated carbon injection system will be integrated with a new-generation mercury analyzer to allow automated feedback control of the outlet mercury emissions. The cost savings associated with feedback control will be assessed. Testing will be conducted at Rocky Mountain Power's Hardin Station that burns a PRB coal and is configured with an SCR (selective catalytic reduction) for NOx control, an SDA (spray dryer absorber) for SO_2 control, and a FF (fabric filter) for particulate control. The unit was brought on line in January 2005.

Based upon previous results at PRB sites with SCRs, very little additional mercury oxidation is expected across the SCR at Hardin. In addition, results from DOE/NETL Phase II Round 1 at the Holcomb Station and similar sites, showed low native mercury removal across the SDA and FF. However, there is little data on the synergistic effects at PRB sites configured with an SCR, SDA and FF. However, it is possible that the use coal blending or coal additives will increase mercury oxidation across the SCR and enhance the subsequent mercury capture in the SDA and FF.

ADA-ES will design and procure a mercury sorbent injection system and mercury CEM for the Hardin Generating Station. This equipment, along with other portable equipment, will be used to conduct a series of tests to evaluate various combinations of potential mercury removal technologies including:

- Baseline Test – Perform speciated baseline mercury measurements across the SCR, SDA and FF,
- Co-Benefit Analysis - Characterize the range of mercury removal achievable by varying the operation of the SCR and SDA, and access the effectiveness of coal additives and coal blending to enhance mercury oxidation across the SCR and subsequent removal in the SDA and FF,
- Parametric Test - Evaluate the effectiveness of sorbent injection for mercury control with and without co-benefit enhancements.

The Parametric Test may be followed by an 11-month, Long-Term Test, with approval from DOE/NETL, if a technology is identified that meets the goal of >90% mercury removal. Upon completion of testing, ADA-ES will submit a comprehensive final report and participate in all functions required by DOE/NETL, including technology transfer to the industry.

Host Site Description

Hardin is a 116 MW, pulverized coal boiler that burns PRB coal from the nearby Absaloka Mine. The coal contains approximately 0.65% sulfur, 0.04 ppmd mercury and <20 ppm chlorine. The unit is configured with low NOx burners and an SCR for NOx control, an SDA for SO_2 control and a FF for particulate control. Key characteristics of the configuration at Hardin are included in Table 1.

Table 1: Key Parameters of the Hardin Power Plant

Size (MW_{gross})	116
Coal (typical)	PRB, Absaloka Mine
Boiler Type	PC Boiler Opposing wall-fired
Sulfur Control	Spray Dryer with Recycle
Nitrogen Oxide Control	Low NOx Burners/SCR
Particulate Control	Fabric Filter
Gas Flow Rate, full load (acfm) at injection location	~ 550,000
Flue Gas Temperature, Injection Location (^oF)	260-320

General Technical Approach

A series of six tasks are planned to accomplish the objectives of this project. These tasks provide the outline for the test plan. A brief description of each task is provided below.

Task 1. Site Coordination, Kick-Off Meetings, Develop Test Plan and QA/QC Plan

The purpose of this task is to develop a detailed test plan agreed upon by contributing team members, personnel from the host site, environmental agencies and DOE/NETL. The planning process includes meetings with the appropriate personnel to gather the information necessary to develop the test plan and define the potential impact on plant equipment and operation. Efforts include identifying any permit requirements, developing a QA/QC plan, identifying potential mercury sorbents and coal additives, finalizing the scope for each of the team members, and putting subcontracts in place for manual measurement services.

As part of the proposed scope, QA/QC will be documented and specific procedures adhered to. The primary objectives of the QA/QC effort will be to control, evaluate, and document data quality to ensure that data generated are of sufficient quality to meet program objectives. Specific key parts of the QA/QC plan will include:

- QA/QC in sample collection, analytical and data analysis
- Integral performance evaluation and verification of mercury removal
- Procedural remedies for identified data deficiencies

- Oversight and documentation of all QA/QC

ADA-ES has developed and implemented successful QA/QC plans for other DOE/NETL projects. These shall serve as a general framework for this project's plan.

This task began upon award of the contract and the progress to date includes:

- Requesting a quote for the mercury Continuous Emissions Monitors (CEM)s,
- Scheduling a Site Visit/Meeting for June 26, 2006,
- Developing a preliminary equipment installation package based on previous projects,
- Writing the initial draft of the Test Plan.

Task 2. Design, Procure and Install Equipment

There are two major systems associated needed for this project, a mercury CEM system and a sorbent injection system (SIS). Descriptions of these systems are included in the appendix.

Two Thermo Electron CEMs will be used during this program. One CEM will be installed downstream of the air preheater with a secondary extraction location downstream of the SDA. The second CEM will be installed downstream of the FF at the stack.

The SIS will include a silo for sorbent storage, a metering system, sorbent distributor, injection grid in the duct upstream of the SDA, and the interconnecting piping. The output of both mercury CEMs will be interfaced with the silo control system for automatic control of the sorbent feed rate. The stack CEM will be interfaced with the plant data handling system (DHS) to allow real-time monitoring of mercury concentration by plant personnel.

Another system that will be required at Hardin is a coal additive injection skid for the introduction of additives upstream of the pulverizers. For liquid additives, this will be a simple pump arrangement. For dry additives, a small volumetric feeder will be used.

Coal blending will be achieved either by using a secondary coal storage silo.

Task 2.1. System Design and Procurement

The purpose of this task is to acquire and install the necessary equipment to complete the project. Some equipment will be site-specific and, by necessity, will be designed for Hardin. Examples may include the sorbent storage silo, sorbent distribution manifold, and injection lances. Figure 1 shows a typical activated carbon storage silo and feeding system with an outline of a proposed shelter around the bottom of the silo to protect the controls from the harsh Montana winters. ADA-ES engineers will work with plant engineers to develop an installation and contractor bid package for installation activities. ADA-ES will also oversee the work by contractors to ensure all installation is done properly and efficiently. Hardin will be responsible for all permitting and any variance requirements.

ADA-ES will also oversee installation and system checkout of the mercury measurement equipment. Procedures followed in this task will be similar to those used in previous full-scale mercury control programs that ADA-ES conducted for DOE. The actual equipment installation, not including preparation tasks, is estimated to take three weeks.

Figure 1. Sorbent Injection Silo w/Outline of Proposed Shelter

Task 2.2. Installation

A scope of work will be developed that includes a division of responsibilities between ADA-ES and RMP. A typical work split is shown in Table 2. Required site support may include the pouring of a cement platform for the silo, installation of injection and sampling ports (if not available), erection of any needed platforms and scaffolding to access the ports, supplying compressed air, electrical power, and the appropriate plant signals, including boiler load, to the injection skid and control trailer, and balance of plant engineering.

Table 2. Work Breakdown Between RMP and ADA-ES

RMP/Hardin	ADA-ES
Unload and store the injection silo until installation	Prepare installation document
Install the injection silo foundation	Oversee installation of SIS
Install the injection system	Install mercury analyzers
Erect a shelter around the base of the silo	Provide oversight to integrate stack Hg CEM into plant DHS
Install and/or inspect Sampling Ports	Install office trailers
Provide utilities such as power, instrument quality air and water to testing locations and office trailers	Develop Plan to integrate stack Hg CEM into plant DAS
Arrange for safe access to sorbent injection and mercury sampling locations	Provide the coal additives system
Provide access to plant data	Provide portable Hg measurement systems such as STMs (Sorbent Trap Method)
Provide cable and support to integrate stack Hg CEM into plant DHS (additional support from Monitor Labs)	

Task 3. Field Testing

Field testing shall cover a period of 20 months, and will include the Baseline Test, Co-Benefit Analysis, Parametric Test, and Long-Term Test. The current test schedule is shown in Table 3. The test matrix will be developed following the Site Kickoff Meeting and included in the final test plan.

Table 4 presents the frequency of manual emissions measurements and a summary of coal and byproduct samples that will be collected during the program. Additionally, comprehensive plant data will be logged through the plant DCS system. Such data will include combustion parameters, back-end parameters, and stack CEMs data (NO_X, SO_2, CO_2, flow). Operating parameters will include, at a minimum, flow rates, temperatures, pressures, and emission levels. A comprehensive list will be included in the final version of the test plan which will be completed following the site kickoff meeting.

The composition of all sorbents and chemical additives to be tested under this project must be provided to the DOE Project Officer prior to testing. The proprietary nature of such data will be protected by DOE/NETL. All sorbents and chemical additives must receive prior approval by the DOE Project Officer prior to testing.

Table 3. Proposed Test Sequence for Hardin

Test Description	**Start Date**	**Comments/Duration**
Baseline	10/06	1-month Manual Sampling[a]
Co-benefits	11/06 – 2/07	Vary System Performance (4-months) Coal Additives (1 to 2 weeks) Coal Blending (1-week)
Parametric Testing	4/07	1 to 2-weeks
Verify Optimum Performance	4/07	1 to 2 days field testing
Break	4/07	Review Results Request DOE Approval for Long-Term Tests
Long-term tests	5/07 - 3/08	Control to maximum emission rate 24 hours a day, 10 to 12 months. Conduct Manual Sampling[a] tests at least twice. .

[a] Manual Sampling includes: ASTM M6784-02 (mercury), STM (modified 40 CFR, pt. 75 app.K, mercury), EPA M5 or 17 (particulate), EPA M26a (halogens), CTM-027 (Ammonnia)

Table 4. Sample Schedule for Hardin Testing

		Flue Gas Measurements									Solid Sampling			
Task	Description	Inlet Hg (CEM)	Oulet Hg (CEM)	SDA Inlet Hg (Ontario Hydro[A])	SDA Outlet Hg (Ontario Hydro[A])	SDA Inlet Hg (Sorbent Traps)	SDA Outlet Hg (Sorbent Traps)	NH_3 (CTM-027)[C]	Halogens (Method 26A)	Particulate (Method 5 or 17)	Coal	Bottom Ash[B]	Fly Ash, FF[B]	Sample Storage for DOE/NETL
3.1	Baseline Tests	X	X	1	1	TBD	TBD	1	1	1	D	D	D	3
3.2	Co-Benefits Analysis	X	X	0	0	TBD	TBD	0	0	0	W	0	W	0
3.3	Parametric Tests	X	X	0	0	TBD	TBD	0	0	0	D	0	D	0
3.4	Choose Long Term Test Parameters	X	X	0	0	TBD	TBD	0	0	0	0	0	0	0
3.5	Long Term Test	X	X	3	3	TBD	TBD	1	1	1	W	W	W	3

D = Daily
W = Weekly Composite

Notes:

A Each set of Ontario Hydro measurements shall consist of three runs
If a mercury CEM is approved as an instrumental reference method under 40 CFR Part 75.22 by the EPA Administrator, such instrumental method may be substituted for the Ontario Hydro measurements in this project with permission of DOE and team members.

B Samples of Fly Ash will be stored for independent analysis per DOE NETL requirements

C Ammonia in flue gas measurements will only be taken if ammonia injection is ongoing
Plant data available through the DCS will be recorded for all tests, including combustion and back-end parameters
Equipment to conduct sorbent trap measurements shall be on site for the entire duration of the field testing.
Measurements shall be taken at the discretion of the field team.

Task 3.1. Baseline Tests

After installation of the Hg CEMS, a series of baseline tests will be conducted to establish the mercury removal during typical plant operating conditions. There will be no addition of mercury sorbent or any other chemical additive during this period.

Baseline measurements will include one complete set of flue gas measurements and sample analyses. These will include Hg CEM measurements and the appropriate gas analyses, performed by an independent contractor, at the SDA inlet and FF outlet. The independent contractor will perform, at a minimum, particulate, mercury, halogen, and ammonia measurements. The accuracy of the Hg CEM will be verified with an appropriate reference method, such as the Ontario Hydro Method. If a mercury CEM is approved as a reference method under 40 CFR Part 75.22 prior to this test, it may be used in place of Ontario Hydros with permission from DOE and other team members.

Task 3.2. Co-Benefits Analysis

The purpose of this task is to determine if mercury capture across the SDA and FF can be enhanced by changes in plant operations or by the use of coal additives or coal blending. The first test series in this task include changes to plant operating practices and use of coal additives to determine if mercury oxidation can be increased across the SCR and, if so, if this increases the

subsequent mercury capture in the SDA and FF. The mercury concentration will be monitored continuously while varying the performance of the SCR and SDA over the range of acceptable operating conditions. Variables may include adjusting the space velocity and temperature across the SCR by lowering the boiler load, adjusting the ammonia injection rate, and varying lime feed to the SDA. ADA-ES will work with Reaction Engineering to model the mercury oxidation potential of the SCR under various conditions, including the use of coal additives, prior to on-site testing. Another option for co-benefit mercury removal is through blending West Elk coal, a higher chlorine Western bituminous coal, with PRB coal. This combination may increase the overall mercury removal through two potential mechanisms: 1) increased oxidation across the SCR and subsequent removal in the SDA resulting from the higher chlorine content, or 2) increased removal across the FF due to unique characteristics of the West Elk coal. Mercury CEM measurements will be the sole basis for determining the success of all Co-Benefit Analyses.

Task 3.3. Parametric Tests

The goal of the parametric tests is to evaluate the mercury capture of several candidate sorbents under various operating conditions. Parametric tests will be conducted at full scale by distributing sorbents across the entire flue gas ductwork at the SDA inlet. Each sorbent will be injected at a variety of concentrations in order to closely establish the mercury control relationship. For a given sorbent, it is typical to test between two and four injection concentrations over a period lasting 4-12 hours. It is expected that the team will evaluate up to three sorbents during parametric testing. Initial parametric test runs will be conducted with the SOx and NOx control equipment operating at the standard conditions defined by the plant. The best sorbent material and optimal injection rate will be repeated with the SOx and NOx control equipment operating at conditions determined for optimal mercury removal from the Co-Benefit Analysis in Task 3.2. Key parameters include:

- Mercury sorbent
- Mercury sorbent injection concentration
- Injection location
- Unit combustion parameters
- SCR Operation - ammonia feed and space velocity
- SDA Operation - lime feed rate.
- FF Operation – cleaning cycle

Mercury CEM measurements will be the sole basis for determining the success of all Parametric Tests.

Task 3.4. Choose Long-Term Test Parameters

Upon completion of the Parametric Tests, ADA-ES will review results with the project team and identify the best options for achieving the goal of >90% mercury removal during a long-term test. The best one or two options will then be evaluated during two-day test periods to verify the performance seen during the Parametric Test. Following the verification tests, ADA-ES will compile a report summarizing the results and conclusions of the testing to date. This report will provide the data and analysis necessary to guide the project team and DOE in choosing the system parameters for the long-term test.

Task 3.5. Long-Term Test

After approval from the DOE COR, the sorbent selected in Task 3.4 will be continuously injected into the flue gas over a period of 11 months. This shall be done in conjunction with any operating changes or enhancement additives agreed to in Task 3.4. During this period, any long-term operational problems will be identified to determine if the chosen mercury control scheme is sustainable. Potential operational impacts that will be monitored include degradation of SDA or FF performance, injection system performance, and/or SCR performance if enhancement additives are used.

Long-term test measurements shall include a full set of flue gas measurements and solid sample analyses. These shall include CEM measurements at the SDA inlet and FF outlet Hg, as well as particulate, halogen, mercury and ammonia measurements by an outside contractor. The accuracy of the Hg CEM will be verified during these tests with an appropriate reference method, such as the Ontario Hydro method. It is the intent of the test team to operate the stack CEM as a compliance mercury CEM using the QA/QC procedures outlined in the CAMR and compliance monitoring requirements included in 40 CFR Part 60.49a. If the analyzer does not meet all certification requirements, the reference method check will be conducted at least three times during the long-term program. If a mercury CEM is approved as an instrumental reference method under 40 CFR Part 75.22 by the EPA Administrator, such instrumental method may be substituted for the Ontario Hydro measurements with permission from DOE and team members.

During the long-term test, Hardin may choose to make the site available for assessing the performance of other mercury CEMs. No funds were allocated in the DOE program for evaluating alternative CEMs, therefore, the CEM vendor or other interested party wishes to install the CEM will be responsible for all costs associated with its operation. However, upon approval from RMP and DOE, the data from the project mercury CEM will be provided to the CEM vendor for comparison in exchange for the operational data from the test CEM.

Task 4. Coal, Ash, and By-Product Sample Evaluation

In conjunction with each of the baseline and parametric tests, samples of coal and ash will be collected and analyzed. A Sample and Data Management Plan will be completed prior to site testing and included as an appendix in the final test plan.

Potential collection points are illustrated in Figure 2. The information is needed to complete the mercury mass balance around the unit and to clarify how and where the mercury is captured. Select coal samples will be analyzed for ultimate, proximate and calorific analyses as well as mercury and chlorine content. Fly ash and bottom ash samples will be analyzed for mercury content and LOI. At least one ash sample from baseline and from long-term testing will be tested for stability. These tests will include leaching of mercury and any chemical additive (in the coal or on the activated carbon) using the synthetic groundwater leaching procedure. Thermal desorption tests will also be conducted.

Additional samples shall also be collected in accordance with DOE/NETL requirements including fly ash samples taken from the FF during the baseline and long-term tests. These samples shall be made available for analysis at DOE/NETL's discretion. Bottom ash samples may also be taken if coal additives are used.

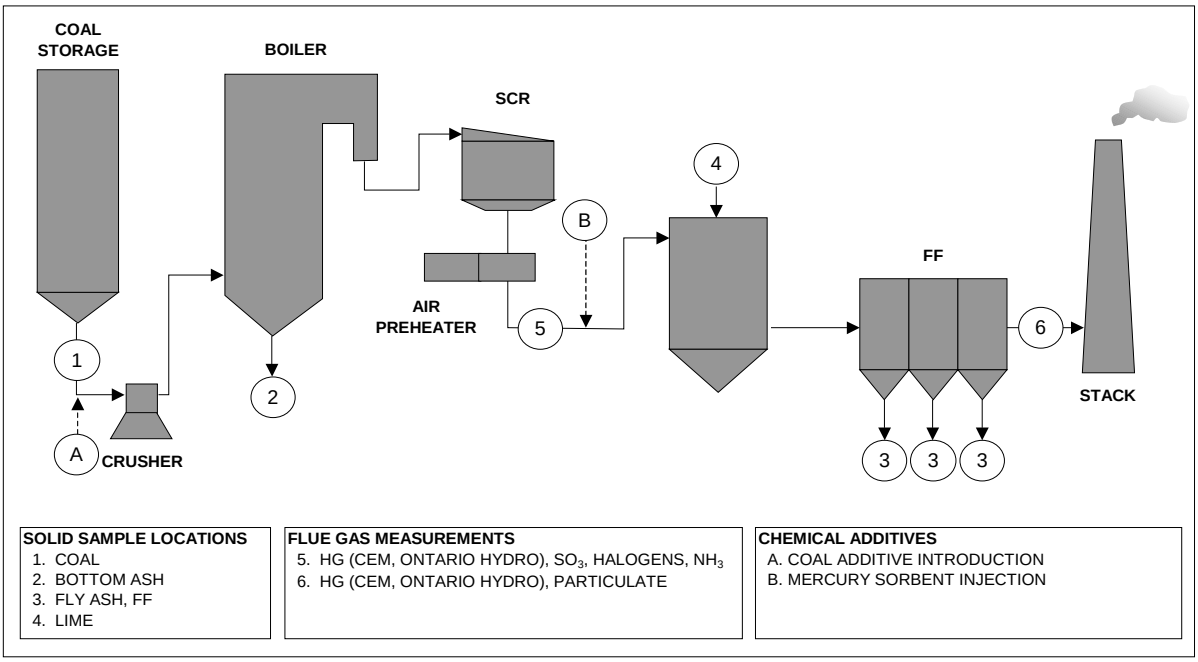


Figure 2. Sampling Locations for Hardin

Analysis of the fly ash will reflect the sorbent being injected. An important consideration for any plant contemplating sorbent injection is the impact on fly ash quality and disposal. With successful mercury capture in the FF, the fly ash mercury content will increase, as well as the sorbent content in the ash. If a chemically enhanced sorbent is used, the potential for additional ash contamination exists. Although previous test programs have shown that the byproducts mixed with activated carbon are highly stable, it is important to continue evaluating these byproducts. The primary pathways for mercury or halogen release would be vitalization and leaching, which DOE/NETL has already identified for testing

Task 5. Technology Transfer

Presentations will be made at selected conferences, with DOE approval, to increase exposure of the test results and receive comments on the applicability of the technology to the industry. Transferring the information generated during this project to the coal-fired utility customers will be an important part of the program. The ultimate goal of technology transfer is to make results available to the public as quickly, comprehensively and accurately as possible. Technology transfer activities performed in previous tests conducted by ADA-ES included participating in DOE/NETL-sponsored meetings and EPA Hg MACT Stakeholder meetings, presenting at more than 50 events or companies, hosting a Web site for project team members, presenting project information, and publication of more than 100 technical papers. ADA-ES will work with RMP and DOE/NETL in determining and supporting the key meetings, presentations and publications.

One of the key activities for Hardin's Air Quality Permit is the application for a Hg BACT emission limit from M-DEQ based on the performance of the mercury control equipment during the extended testing period. ADA-ES will work with RMP and M-DEQ to provide the information necessary for M-DEQ to assess the performance of the system. This includes

providing recommended sorbent injection rates and an incremental cost analysis for the dollars per pound of mercury removed.

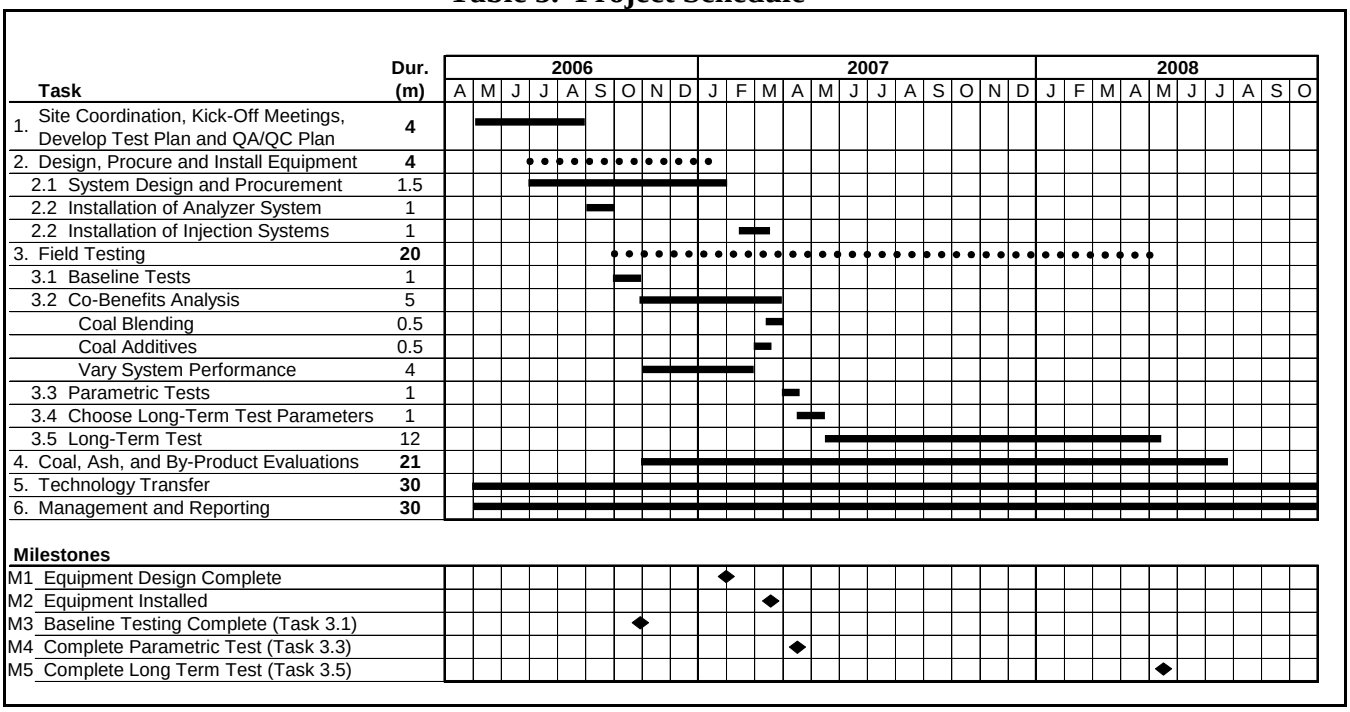
Task 6. Management and Reporting

This task provides time for overall program management, and preparation of financial and administrative reports. Upon completion of the field testing and receipt of the subsequent laboratory analyses, ADA-ES will issue a formal test report. The report will summarize all testing activities, results, initial economic analyses and conclusions. Periodic meetings with DOE to discuss progress and obtain direction from the DOE project manager will also be supported.

Schedule

The schedule for the project at Hardin is included in Table 5.

Table 5. Project Schedule



Key Personnel and Contact Information

Key personnel for the Conesville tests are identified in Table 6.

Table 6. Key Project Personnel for Hardin Project

Name	Company	Role	Phone #	E-MAIL/Cell Phone
Andrew O'Palko	DOE/NETL	Contract Manager	304-285-4715	andrew.opalko@netl.doe.gov
Sharon Sjostrom	ADA-ES	Program Manager	303-339-8856	sharons@adaes.com 303-919-8538
Rick Patzman	RMP	Project Manager	701-221-6462	rick.patzman@centennialenergy.com
Jerry Amrhein	ADA-ES	Project Engineer	303-339-8840	jerrya@adaes.com 303-921-8138
Kevin Calloway	RMP	Plant Engineer	406 638-9140 ext: 1038	kcalloway@coloradoenergy.com 406 679-0966
Connie Senior	Reaction Engineering	Tech Expert: SCR Modeling	801-364-6925 ext 37	senior@reaction-eng.com

Hardin Generating Station Contact Information
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Appendix A – Equipment Descriptions

Sorbent Injection System Description

The carbon injection system, shown installed at Holcomb in Figure 1, consists of a bulk-storage silo and twin blower/feeder trains. PAC is delivered in bulk pneumatic trucks and loaded into the silo, which is equipped with a bin vent bag filter. From the discharge section of the silo, the sorbent is metered by variable speed screw feeders into eductors that provide the motive force to carry the sorbent to the injection point. Regenerative blowers provide the conveying air. A PLC system is used to control system operation and adjust injection rates. The unit is approximately 50 feet high and 10 feet in diameter with an empty weight of 10 tons. The silo will hold 20 tons of sorbent. Flexible hose carries the sorbent from the feeders to distribution manifolds located on the flue gas ducts, feeding the injection probes. Each manifold supplies up to six injectors.

Mercury CEM Description

The Thermo Electron *Mercury Freedom System™* CEM has been chosen for flue gas mercury measurements at Hardin. Three key components of the CEM are the sample extraction probe/converter, the mercury analyzer, and the calibration module. These are described briefly below and presented in Figure 3, a schematic of the entire system, showing the key components and other supporting instrumentation.

- **Sample Extraction Probe/Converter**. An inertial filter is used to separate a particulate-free vapor-phase sample while minimizing the interactions with fly ash, which can cause sampling artifacts. The sample is immediately diluted with pre-heated dilution air to minimize mercury reactions with other flue gas species.
- **Mercury Analyzer**. Mercury is measured directly in the analyzer using Cold Vapor Atomic Fluorescence Spectroscopy (CVAFS). There is no cross interference from SO_2 with CVAFS. Because the sample is diluted, it has low moisture, is relatively non-reactive and therefore has minimal interference from other gases.
- **Calibration Module**. The calibrator module incorporates a mercury source in a temperature-controlled chamber that can be heated or cooled to maintain the source at a precise temperature. The operator can program the calibrator to deliver zero or span gas to the analyzer, to the sample port between the inertial filter and the critical orifice, or upstream of the inertial filter.

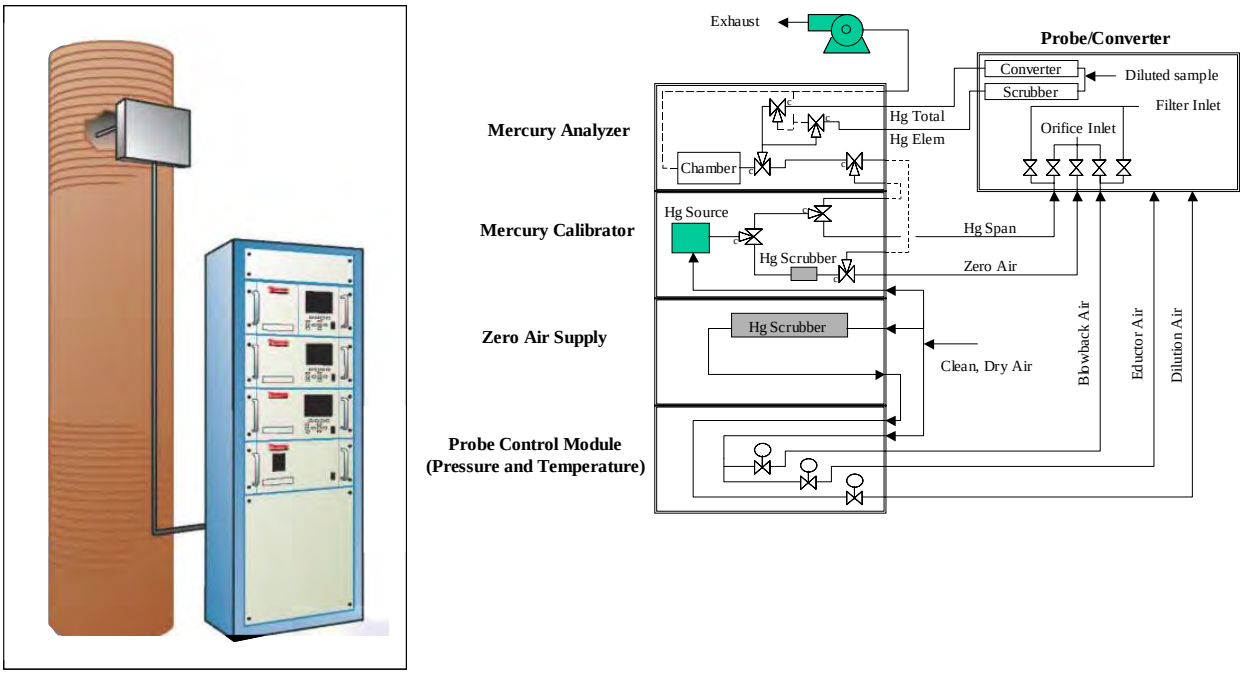

Figure 3. Thermo Electron Mercury Freedom System™.

The intent of the project team is to configure the mercury CEMs to automatically follow the QA/QC procedures for a compliance mercury CEM as defined in the CAMR. Some aspects of this requirement are not available at the time of this proposal, such as NIST traceable calibration sources. Significant advancements are expected before mercury CEMs would be installed at Hardin.

The accuracy of the CEMs will be assessed by comparing the CEM concentration with a reference method during the baseline and long-term tests. At the time of this proposal, the method that has been approved in the CAMR and provides speciation information is the Ontario Hydro Method. EPA is actively working towards an instrumental reference method, which may be available for some or all of the relative accuracy tests scheduled during the program at Hardin. If a mercury CEM is approved as an instrumental reference method under 40 CFR Part 75.22 by the EPA Administrator, an instrumental method may be substituted for the Ontario Hydro measurements in this project with permission of DOE and team members. Sorbent traps, following a modified version of 40 CFR Part 75 Appendix K, will also be run periodically to check the accuracy of the CEMs and to facilitate troubleshooting.

The CEMs will be installed prior to baseline testing and they are expected to operate continually during field testing. The overall effectiveness of the technology will be assessed by comparing mercury emissions during the parametric and long-term tests against the baseline results. These mercury control results will then be blended with estimated operating costs to determine the mercury removal costs.

APPENDIX B: STANDARD CALCULATIONS

Standard Calculations

1. Standard Calculations

1.1. Sorbent Injection Concentration

The convention for describing the concentration of sorbent injected into a duct is pounds per million actual cubic foot of flue gas or lb/MMacf. This value is referred to as the "injection ratio" or the "injection concentration." The actual mass flow rate of sorbent is therefore dependent on the total volumetric flow of flue gas at the point of injection. The mass flow rate is determined by the following calculation:

$$\dot{m}_{sorbent} = \frac{\dot{Q}_{fluegas}}{10^6} \times Ratio * 60 \qquad 1$$

where,

$\dot{m}_{sorbent}$	lb/hr	mass feed rate of sorbent
$\dot{Q}_{fluegas}$	acfm	volumetric flow rate of flue gas
Ratio	lb/MMacf	sorbent injection ratio
60	min/hr	conversion factor

If the flue gas flow is provided in standard cubic feet per minute (scfm), the flowrate at actual temperature can be calculated as follows:

acfm = scfm *(459 + Ti)/(459+ 68) 2

where Ti = temperature n degrees Fahrenheit at the injection location.

The actual injection ratio can be calculated as follows:

$$Ratio = \frac{\dot{m}_{sorbent} / 60}{\dot{Q}_{fluegas} / 10^6} \qquad 3$$

1.2. Coal Mercury Concentration Conversion

The mercury concentration of the coal is typically reported by the lab in ng/g or µg/g. To convert ng/g to lb/TBtu, the gross calorific value (GCV) of the coal must be measured and both the mercury concentration and GCV must be on the same moisture basis (i.e. both dry or both wet). The following equation described the conversion:

$$I_{Hg} = W_{Hg} \times \frac{1}{GCV} \times \frac{10^{-9}\, lb}{nlb} \times \frac{10^{12}\, Btu}{TBtu} \qquad 4$$

where I = Hg lb/Tbtu, W = Hg ng/g

For example, if the coal mercury concentration were 54.3 ng/g and the GCV were 11942, both on a dry basis, then

I_{Hg} = 54.3 ng/g /11942 * 10^3 = 4.55 lb/Tbtu

1.3. Flue Gas Mercury Concentration Conversion

Thermo CEMS data are measured in µg/wetsm^3 and using guidelines provided in Method 19 in Appendix A to Part 60, which uses an EPA F Factor and CO_2 values, one can convert into units of lb/TBtu. Note than TBtu equals 10^{12} Btu, or 10^6 MMBtu. An F factor is the ratio of combustion gas volume to heat inputs, and it is used to calculate emission rates from concentrations.

CO_2 based F-factor (F_C)

<u>If the CO_2 concentration is measured on a wet basis</u>:

$$E = C_W \times Fc \times \frac{100}{\%CO_2} \times 10^6 \, MMBtu/TBtu \qquad 5$$

Where,

E = emission rate in lb/TBtu

C_w = mercury concentration, wet basis, in lb Hg/scf. Convert from the CEMS basis of µg/wsm^3 as follows:

$$C_W(lb/scf) = C_w(\mu g/wsm^3) \times \frac{1g}{10^6 \mu g} \times \frac{1lb}{453.6g} \times \frac{1m^3}{35.31 ft^3} \qquad 6$$

$\%CO_2w$ = concentration of CO_2 on a wet basis, in %

F_c = carbon dioxide-based F factor, in scf CO_2/MMBtu

The F_c factor is calculated using the following equation:

$$F_c = 0.321*10^6*(\%C)/GCV \qquad 7$$

Where,

%C = concentration of Carbon in coal, % dry basis (from ultimate analysis if available)

GCV = gross calorific value, Btu/lb dry basis

<u>If the CO_2 concentration is measured on a dry basis</u>, you must adjust for the moisture fraction in the flue gas as follows:

$$E = \frac{C_W \times Fc}{1 - B_{WS}} \times \frac{100}{\%CO_{2d}} \times 10^6 \, MMBtu/TBtu \qquad 8$$

All terms are the same as above with the exception of

B_{ws} = moisture fraction of the flue gas, in %

$\%CO_{2d}$ = concentration of CO_2 on a dry basis, in %

O_2 based F-factor (F_d)

<u>If the O_2 concentration is measured on a wet basis</u>:

$$E = C_W \times Fd \frac{20.9}{20.9(1 - B_{WS}) - \%O_{2w}} \qquad 9$$

<u>If the O_2 concentration is measured on a dry basis</u>, you must adjust for the moisture fraction in the flue gas as follows:

$$E = \frac{C_W \times Fd \times 20.9}{(1 - B_{WS})(20.9 - \%O_{2d})} \qquad 10$$

The F_D factor is calculated using the following equation:

$$F_D = \frac{3.64 \times W_H + 1.53 \times W_C + 0.57 \times W_S + 0.14 \times W_N - 0.46 \times W_O}{HHV} \times 10^6 \qquad 11$$

Where W_H = fraction of hydrogen in the coal
W_C = fraction of carbon in the coal
W_S = fraction of sulfur in the coal
W_N = fraction of nitrogen in the coal
W_O = fraction of oxygen in the coal
HHV = higher heating value of the coal in lb/BTU

Cw is calculated as described above in Equation F-6.

1.4. Mercury Removed by Fly Ash

The mercury concentration in the fly ash is typically measured in ng/g. This can be converted to lb/TBtu using the following technique:

$$E_{ash} = \frac{\%A/100}{GCV} \times K_1 \times K_2 \times C_{ash} \times 10^{12} (Btu/TBtu) x 10^{-9} (lb/nlb) \qquad 12$$

Where E_{ash} is the mercury collected by the ash in lb/TBtu
%A is the fraction of ash in the coal sample
GCV is the gross caloric value in lb/Btu
K_1 is the fraction of ash entering the ESP (nominally 0.85 for PC plants)
K_2 is the collection efficiency of the first collection field (nominally 0.8 for many ESPs)
C_{ash} is the concentration of mercury in the ash, ng/g

APPENDIX C: HG-CEM QA/QC PROTOCOLS

ADA Hg-CEM QA/QC Protocol

Hg-CEM QA/QC Protocol

Mercury CEMS Quality Assurance/Quality Control Program

ADA has developed an extensive internal Mercury Continuous Emissions Monitoring System Quality Assurance and Quality Control Program that is implemented as a guideline during ADA's Thermo Fisher Mercury Freedom System™ operation and deployment.

In order to have confidence in the individual measurements and the conclusions based on those measurements, a set of quality assurance checks were developed during the test phase. Many of the quality control requirements were used as referenced in Appendix A and Appendix B of CFR 40 Part 75. While these QA/QC checks were generally observed, they are only guidelines. ADA has significant experience and expertise in designing and conducting test programs of this nature and in conducting the subsequent analyses.

A QA/QC program for the Hg-CEMs was not in place at the beginning of the Hardin project due to the unproven history of the CEMs in 2006 as well as a lack of clearly specified performance requirements in federal regulations. The ADA QA/QC program was developed through year of experience operating these systems at Hardin and at other sites.

Equipment Functionality Assessment

Each component of the Hg-CEMs was evaluated to ensure it was functioning according to the performance specifications supplied by the manufacturer. The CEMs were assembled and run through an exhaustive checklist to simulate and confirm typical operating conditions. The systems installed at Hardin were purchased specifically for this project and, therefore, were not used at any other facility.

Installation and Acceptance Procedure

The Hg-CEMs were installed in accordance with ADA established practices and procedures. Each step of the procedure was documented to ensure that the systems were installed and configured correctly and that components were not damaged during transportation.

An Hg-CEM was considered to be operating properly when it completed the certification procedures in Appendix A of CFR 40 Part 75, as applicable. The certification tests include a two-point calibration error test, 3-point linearity error test, a cycle time test, and a 3-point system integrity test. Periodic monitoring of the Hg-CEMs was conducted by the ADA Technology Group.

The low-, mid-, and high-level span values used for all calibration routines may be determined from mercury concentration data collected from previous test programs. If

this data is not available or accuracy can not be assured, then the type of coal burned may be used to determine the initial span values. ADA used previous test values during the installation procedure and made adjustments during the test program as conditions changed (e.g. fluctuations in coal mercury concentration and the onset of ACI).

ADA acquired a procedure used by ThermoFisher to evaluate their systems during production. This procedure was used by ADA during the installation of the two CEMs in September, 2006 to ensure that the systems were configured properly and to evaluate the performance of the system after installation. This procedure was later expanded to include a linearity test, cycle time test and 3-point system integrity test, and was used during the latter stages of the project.

The first Hg-CEM verification test was performed in September, 2007 after ThermoFisher released an upgrade package for the mercury system. The package included a lamp heater, calibration gas hydrator, nitrogen generator and new software packages. This upgrade did not include a mercuric chloride generator. Both systems passed the criteria for the 7-day calibration drift test, system cycle time test and the 3-point linearity check during this, and subsequent verification tests.

Daily Calibration Error Test

Daily calibration checks were modeled after the regulations defined by Appendix B of CFR 40 Part 75, Section 2.1.1 and 2.1.2. The CEMs are required to meet a performance specification of 5.0% of span *OR* ±1.0 µg/wscm difference between the reference gas and the analyzer response for span values <10 µg/wscm. The daily calibration checks are automatically initiated by the analyzer software each day, and the responses analyzed to determine if adjustments to the calibration coefficients are needed.

When a daily calibration error test failed, or when a CEM was returned to service after repair or maintenance, data were considered invalid until an additional calibration error test had been successfully completed. Small adjustments to the calibration coefficients are permitted after a successful calibration error test. These adjustments are made to maintain the highest precision possible. They can be made by means of a mathematical algorithm or by a manual calibration. However, an additional calibration error test is required if a manual calibration is performed.

To maximize the CEM availability and maintain high measurement precision, ADA developed an extensive program to analyze the calibration check responses and CEM operations. This program uses criteria that are stricter than those in federal and state regulations. The error criterion specified in CAMR is 5% or 1 µg/wscm. The criteria used by ADA, based on the error of the calibration response, define the level of action required to maintain peak performance. If the difference in zero or span response is less than ±0.1 µg/wscm and less than 0.5% error, the system did not require adjustment. If the error is greater than 0.1 µg/wscm or 0.5%, then there are several possible actions depending on if it is the first occurrence of the error and on what channel (zero or span) the error occurred. An error above 0.5 µg/wscm or 2.5% required a calibration factor update. This procedure was not in place when the Hg-

CEMs were installed at Hardin, and it changed during the life of the project due to upgrades in software and equipment. Many of the first calibration checks were unstable and inaccurate, but these improved significantly and are now a routine part of all projects.

Weekly System Integrity Check

Any ThermoFisher Mercury Freedom System may be equipped with a Mercuric Chloride Generator (MGC) depending on the intended use of the system and on state and federal regulations. At Hardin, the stack CEM is equipped with a MGC, while the AH outlet CEM is not. The MGC converts elemental mercury from the calibrator into oxidized mercury in a proprietary process. For systems equipped with a MCG, system integrity checks are required by CAMR and are performed to access the response of the system to low-, mid-, and high-levels oxidized mercury injected prior to the inertial filter in the extraction probe.

There are several criteria used to determine the validity of a system integrity check. According to Part 75, the CEM measurement must not differ from the reference value by more than 5.0% at any of the three levels. Another criterion, defined by ThermoFisher, is that the recovery efficiency for the oxidized mercury be greater than 90%. A third criterion is that the response must not differ from the reference value by more than 10% of the span value (the span value is not the same as the reference value).

An MCG was installed in the stack probe at Hardin in December, 2007 shortly before the two month outage. Initial tests in April, 2008 did not meet the test criteria. Several modifications were made to the MGC, as recommended by ThermoFisher, during the course of the project, but they did not produce results that passed acceptance criteria. As of the date of this report, the system integrity checks still do not pass the requirements of the test.

Quarterly Linearity Check

Linearity checks were performed to access the response of the system with the low-, mid- and high-level reference gas injected ahead of the inertial filter in non-repetitive, triplicate runs. Part 75 states that the CEM is required to meet a performance specification of 10.0% of reference or a difference of ±1.0 $\mu g/m^3$, whichever is less restrictive. Linearity checks are required each quarter and at least 30 days apart and must be completed within 24 unit operating hours. Linearity checks were performed manually by changing the span concentration of the calibrator.

Table E1 shows the results of all linearity checks performed during the project. The first complete linearity check performed on the inlet and stack CEMs at Hardin was performed on January 22, 2007. This linearity check failed, but an investigation found problems with the configuration of the CEMs and performance of the calibrators which were corrected, and a subsequent linearity test passed. Some linearity checks were not performed in a quarter-year because there was uncertainty regarding specific federal quality control requirements (2007) and/or because of plant

outages that disrupted the test schedule (2008). The stack CEM failed a few linearity checks in the ten quarters spanned by the project. These can be attributed to the use equipment that was later upgraded (June, 2007), the use of incorrect calibration concentrations (the test was initiated with incorrect settings in the calibrator and could not be stopped as per the rule), and calibrator maintenance activities (early in the project, the calibrators were found to be non-linear due to degradation of the mercury reservoir in the calibrator that was later corrected by use of nitrogen as the calibration carrier gas).

Table E1. Linearity Check Results.

HARDIN Hg-CEM LINEARITY CHECK – SDA INLET			
QUARTER	**DATE**	**HIGH ERROR**	**RESULT**
1Q 2007	3/17/07	1.6 / 9.1 %	PASS
2Q 2007	N/A	N/A	N/A
3Q 2007	9/19/07	0.50 / 4.1%	PASS
4Q 2007	N/A	N/A	N/A
1Q 2008	N/A	N/A	N/A
2Q 2008	4/4/08	0.31 / 3.8%	PASS
	4/28/08	0.31 / 4.0%	PASS
3Q 2008	7/25/08	0.45 / 7.2%	PASS
	9/17/08	0.39 / 4.7%	PASS
4Q 2008	11/18/08	0.15 / 2.0%	PASS

HARDIN Hg-CEM LINEARITY CHECK – STACK			
QUARTER	**DATE**	**HIGH ERROR**	**RESULT**
1Q 2007	3/17/07	4.48 / 47.0%	FAIL *
	3/25/07	0.25 / 2.0%	PASS
2Q 2007	N/A	N/A	N/A
3Q 2007	7/20/07	1.48 / 24.0%	FAIL *
	9/19/07	1.71 / 9.3%	PASS
4Q 2007	N/A	N/A	N/A
1Q 2008	N/A	N/A	N/A
2Q 2008	4/4/08	4.81 / 35.4%	FAIL *
	4/28/08	0.32 / 10.7%	PASS
3Q 2008	7/25/08	0.77 / 8.5%	PASS
3Q 2008	9/18/08	0.38 / 8.7%	PASS
4Q 2008	11/18/08	0.40 / 5.0%	PASS

* failed tests that were repeated after corrections were made

APPENDIX D: M30A RESULTS

Relative Accuracy Test Audit (RATA) Utilizing EPA's Method 30A and Performance Testing at Rocky Mountain Power's Hardin Generating Station, Hardin, MT

Test Dates: April 21st – 24th, 2008
Project Number 06-7008

DOE Award Number DE-FC26-06NT42774

Project Director: Sharon Sjostrom
Project Engineer: Jerry Amrhein

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EXECUTIVE SUMMARY

ADA Environmental Solutions, Inc. (ADA-ES) conducted mercury continuous emissions monitoring system (Hg-CEMS) testing during the week of April 21, 2008 at Rocky Mountain Power's Hardin Generating Station, Hardin, MT using regulations outlined in 40 CFR Part 75.20. Method 30A was the instrumental reference method (IRM) employed to conduct a Relative Accuracy Test Audit (RATA) of the Stack Hg-CEMS, downstream of Activated Carbon Injection (ACI). Modified Method 30A procedures were also used for a RATA on the Air Heater Outlet Hg-CEMS, upstream of ACI.

This technical report was prepared with the support of the U.S. Department of Energy under Award No. DE-FC26-06NT42774, to be included in the "Long-Term Carbon Injection Field Test for >90% Mercury Removal for a PRB Unit with a Spray Dryer and Fabric Filter" project of DOE's "Phase III Mercury Control Technology Field Testing and Related Mercury Control Research and Development" program. This was the first of three RATA tests that will be performed during the Long-term Test Phase of this project as specified in the test plan.

The stack Hg-CEMS passed all performance tests conducted during this evaluation except the 3-Level System Integrity Check and the Bias Test. The air heater outlet CEMS passed all applicable performance tests except the Bias Test. The instrumental analyzer failed the dynamic spiking test. A summary of these results are presented in Table 1 and details are discussed in this report.

Table 1: Summary of Test Results

Test	Stack Hg-CEMS (downstream of ACI)	Air Heater Outlet Hg-CEMS (upstream of ACI)
Linearity Check	PASS	PASS
7-Day Calibration Error Test	PASS	PASS
Cycle Time Test	PASS	PASS
3-Level System Integrity Check	FAIL	N/A
Relative Accuracy Test Audit	PASS	PASS
IRM System Performance Tests		
Interference Check (Optional)	-	-
3-Point System Calibration Error Test	PASS	-
System Integrity Check	PASS	-
Measurement System Response	PASS	-
Dynamic Spiking Test	FAIL	-
Bias Test	FAIL	FAIL

* Note: The 3-Level System Integrity Check is not applicable to the CEMS installed on the Air Heater Outlet because no oxidizer is installed at this location.

It is important to note that the 121 MW plant had been operating at approximately 105 MW due to a transformer casualty and the subsequent replacement transformer's limitations. A new transformer capable of full load is scheduled to be installed in July 2008. Despite this lower output, the plant was still operating at the "high load" deemed to be the normal load for the unit as defined in Section 6.5.2.1 [40 CFR Part 75 Appendix A].

The failure of the 3-Level System Integrity Check on the Stack Hg-CEMS was attributed to improper insulation of the mercuric chloride generator. This unit will be upgraded and tested before the next RATA in June 2008. The failure of the Bias Tests was attributed to a flaw in the design of the Heating Ventilation and Air Conditioning (HVAC) system on the IRM that made it difficult to maintain constant temperature within the housing. This flaw has been corrected and the Bias Test will be repeated during the June test. No Bias Adjustment Factor (BAF) was implemented into the CEMS at this time.

A Linearity Check performed the week before the site visit on the Stack Hg-CEMS failed due to calibrator non-linearity. As a result, the IRM calibrator was used to successfully calibrate the Stack Hg-CEMS for the test period, and was later installed into the Stack system after the RATAs to allow for the non-linear unit's being serviced. The remaining tests were performed remotely with the IRM calibrator.

The Dynamic Spiking Test failure was attributed to difficulties in maintaining vapor phase oxidized mercury in the sample gas stream. Recovery of the oxidized mercury proved unsuccessful as evident in failure of both mean percentage recovery and absolute difference criteria. This test is intended to be reevaluated in August 2008 and its feasibility will be reassessed.

This report documents detailed operating procedures, and includes supporting documentation in a dedicated appendix.

INTRODUCTION

Rocky Mountain Power's Hardin Generating Station – Hardin, MT

Figure 1: Hardin Facility View

Facility Description

Rocky Mountain Power's Hardin Generating Station is a new and relatively small plant (121 MW) that was first brought online in December of 2005. It fires a pulverized Powder River Basin (PRB) coal from the nearby Absaloka Mine, and is configured with low NO_x burners and a Selective Catalytic Reduction (SCR) for NO_x control, a Spray Dryer Absorber (SDA) for SO_2 control, and a Fabric Filter (FF) for particulate control. The coal contains approximately 0.65% sulfur, 0.04 ppm mercury and <20 ppm chlorine. A commercial-grade Activated Carbon Injection (ACI) system is integrated with a new-generation mercury analyzer to allow automated feedback control of the outlet mercury emissions.

Table 2: Key Parameters of the Hardin Power Plant

Rated Capacity	121 (MW)
Range of Operation	81 – 121 MW
Operating Levels	Low: 81-93 MW Mid: 93-105 MW High (Normal): 105-121 MW
Coal (typical)	PRB, Absaloka Mine
Boiler Type	PC Boiler Opposing wall-fired
Sulfur Control	Spray Dryer with Recycle
Nitrogen Oxide Control	Low NO_x Burners/SCR
Particulate Control	Fabric Filter
Gas Flow Rate **(ACI Location)**	~ 550,000 acfm
Flue Gas Temperature **(ACI Location)**	260-320 ^{o}F

Mercury CEMS Description

The Mercury Freedom™ System manufactured by Thermo Fisher Corporation is installed at Hardin. This CEMS is being used to measure the mercury emissions at the Stack and the Air Heater Outlet. Thermo Electron's Mercury Freedom™ System is comprised of an Hg Analyzer (80i), Calibrator (81i), Probe Controller (82i), Probe (83i) and related peripheral components including an umbilical and instrument rack.

Sampling Port Locations

Air Sampling Associates, Inc. previously measured and documented the sampling port locations at the Stack and Air Heater Outlet depicted in Figures 2 and 3, respectively, during stack testing:

"The sampling ports on the SDA Inlet duct [Air Heater Outlet duct] are approximately 36 feet 9 1/2 inches above the ground. The sampling ports are located 13 feet 4 inches (1.12 equivalent duct diameters) downstream from a bend in the duct and 56 feet 3 inches (4.75 equivalent duct diameters) upstream from a bend in the duct. The sampling ports on the Stack are approximately 123 feet 1 1/2 inches above the ground. The sampling ports are located 33 feet 1 1/2 inches (3.64 stack diameters) downstream from the inlet to the Stack and > 18 feet 2 3/8 inches (> 2.00 Stack diameters) upstream from the outlet to the Stack."

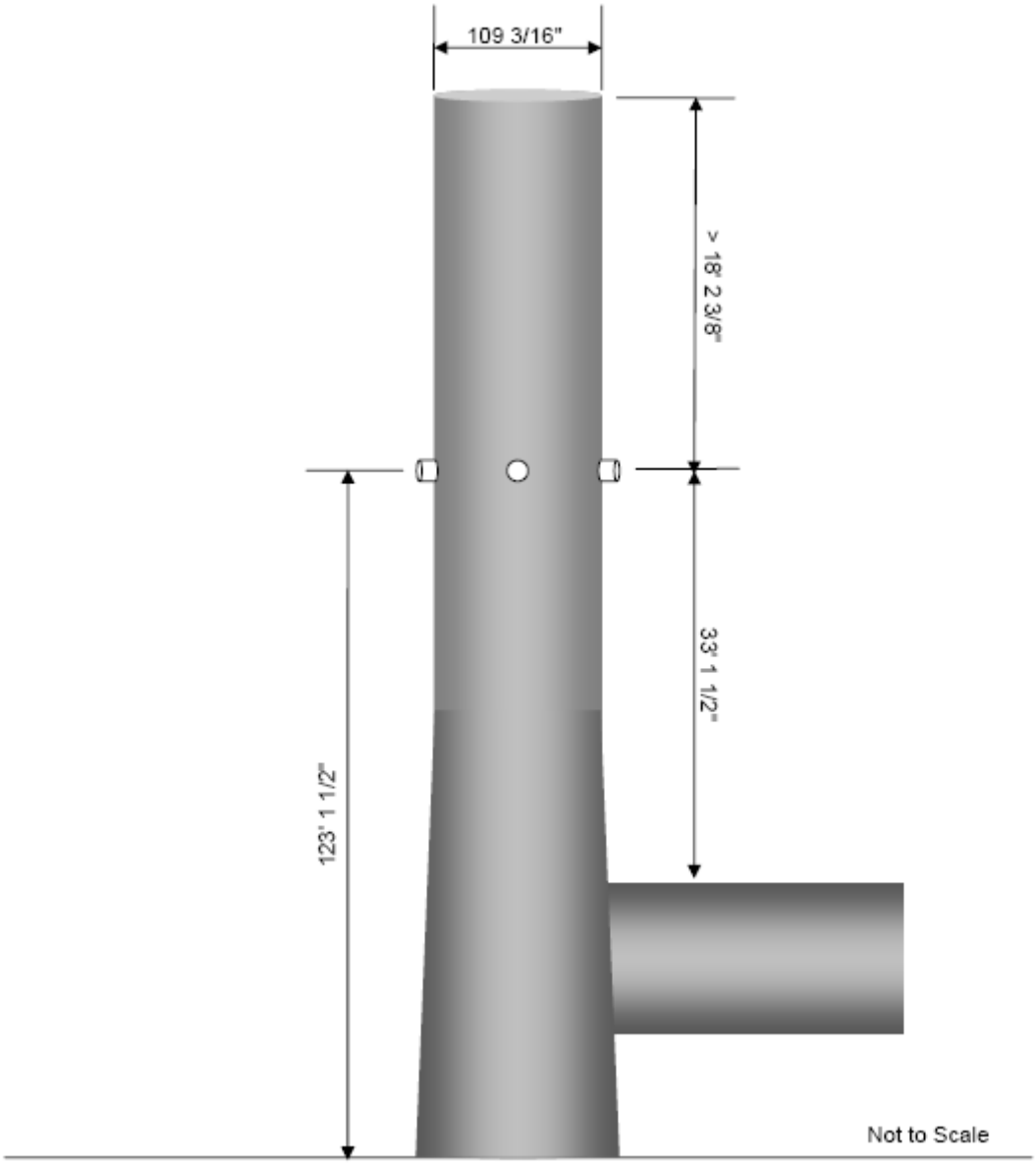

Figure 2: Stack Sampling Port Location [ASA, Inc.]

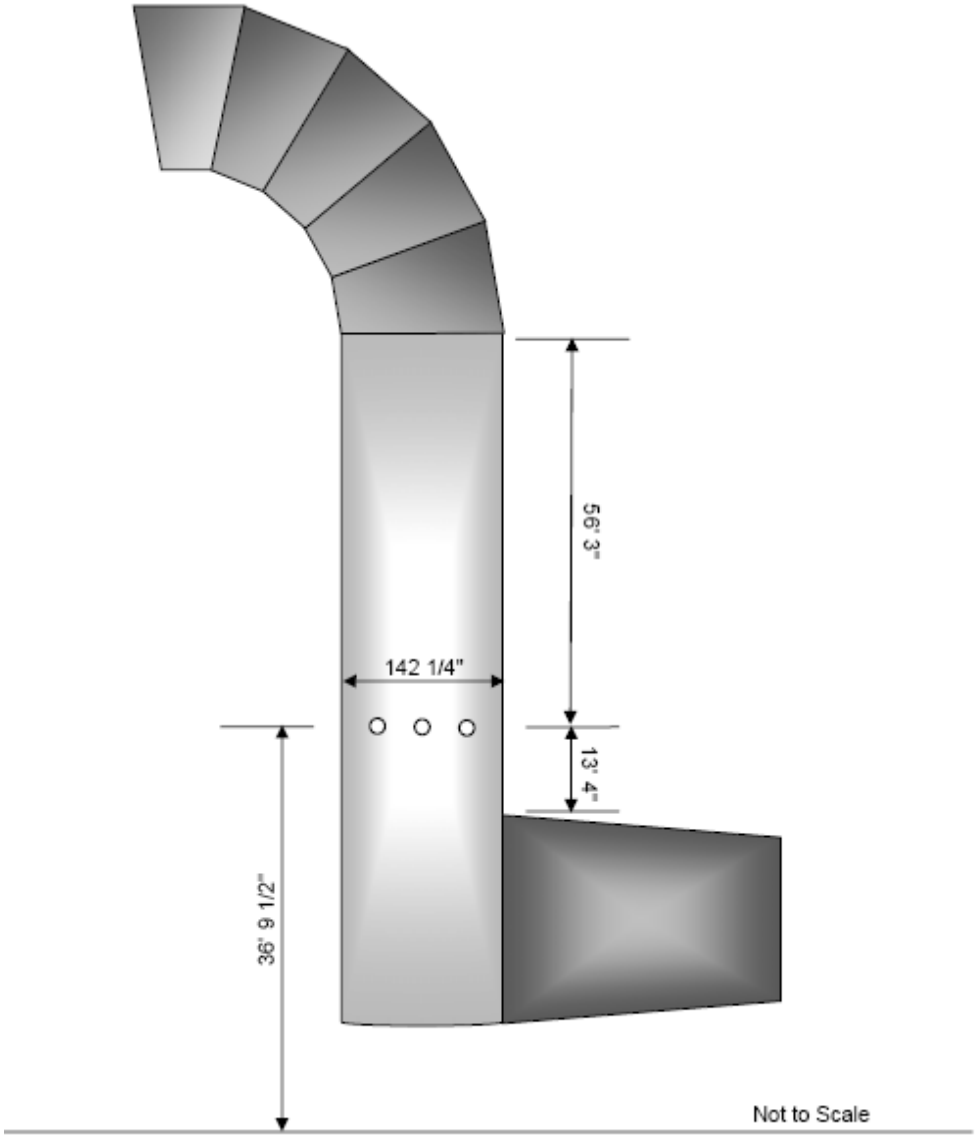

Figure 3: Air Heater Outlet Sampling Port Location [ASA, Inc.]

Method 30A IRM Equipment & Description

A Thermo Mercury Freedom™ System has been configured for IRM testing. A photo of the unit is shown in Figure 4. The unit consists of a standard Model 80i Mercury Analyzer and Model 81i Mercury Calibrator installed in a temperature controlled enclosure. Probe control (temperature, flow, pressure) is achieved through analog controls installed in the environmental enclosure. A standard Model 83i Probe, shown in Figure 5, has been modified by removing the mantle and stinger, connecting calibration gas to a port upstream of the sampling filter, and adding additional pressure monitoring capabilities to the flow measurement venturi. A modified mantle/stinger portion of the probe has been fabricated to facilitate traversing. A sketch of this component is shown in Figure 6. The mantle/stinger was coupled to the other probe components

by a 25-foot long heated umbilical. At Hardin Generating Station, the IRM enclosure was located at ground level while the probe enclosure, 25-foot heated umbilical, and mantle/stinger were located at the sampling platform.

Figure 4: Thermo CEMS Configured for an IRM

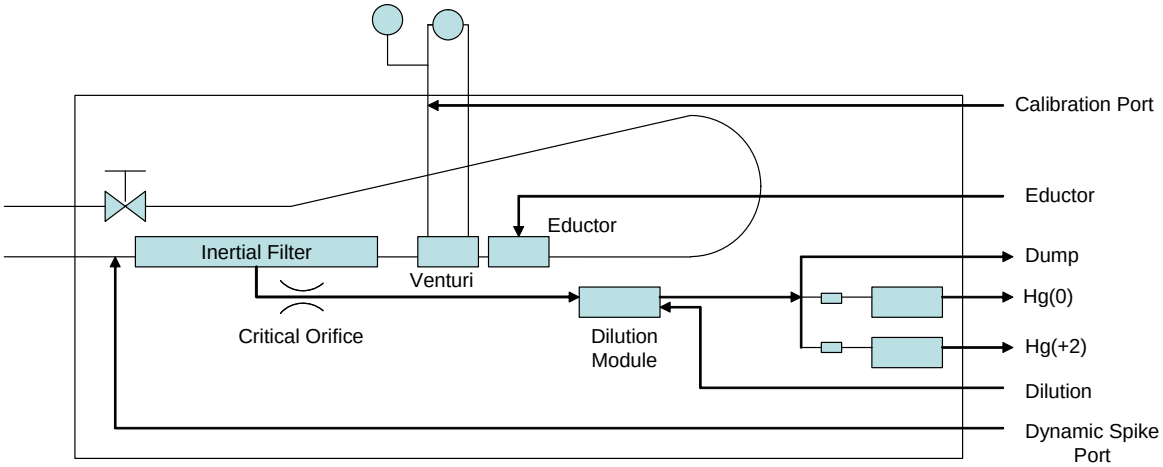

Figure 5: Filter and Conversion Unit

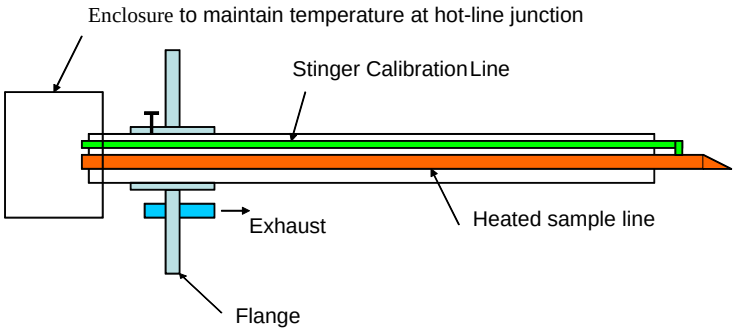

Figure 6: IRM Probe Designed for Traversing

APPROACH

CEMS Parameters

System parameters for the installed Hg-CEMS are presented in Table 3. The Maximum Potential Concentration (MPC), Removal Efficiency (RE), and Maximum Expected Concentration (MEC) were determined in order to calculate the Span (S), Range, and appropriate concentration levels. These calculated values are necessary for calibration of the analyzer, and consequently the validation of measured data.

Table 3: Span and Range Value(s)

	Air Heater Outlet Hg-CEMS (Upstream of ACI)	**Stack Hg-CEMS** (Downstream of ACI)	**Reference**
MPC	10 μg/scm	10 μg/scm	Section 2.1.7.1 40 CFR Part 75 Appendix A
RE	0%	90%	Equation A-2, Section 2.1.1.2 40 CFR Part 75 Appendix A
MEC	10 μg/scm	1 μg/scm	Section 2.1.7.2 40 CFR Part 75 Appendix A
S (High : Low)	20 μg/scm	20 μg/scm : 10 μg/scm	Section 2.1.7.3 40 CFR Part 75 Appendix A
Range	20 μg/scm	10 μg/scm	Section 2.1.7.3 40 CFR Part 75 Appendix A
Zero-level Concentration (0-20% * S)	0 μg/scm (0%)	0 μg/scm (0%) : 0 μg/scm (0%)	Section 5.2 40 CFR Part 75 Appendix A
Low-level Concentration (20-30% * S)	5 μg/scm (25%)	5 μg/scm (25%) : 3 μg/scm (30%)	Section 5.2 40 CFR Part 75 Appendix A
Mid-level Concentration (50-60% * S)	11 μg/scm (55%)	11 μg/scm (55%) : 5 μg/scm (50%)	Section 5.2 40 CFR Part 75 Appendix A
High-level Concentration (80-100% * S)	18 μg/scm (90%)	18 μg/scm (90%) : 9 μg/scm (90%)	Section 5.2 40 CFR Part 75 Appendix A

* The high span value on the Outlet CEM is neglected because Hg concentrations at the stack will never exceed 2.0 μg/scm by design of emissions control.

Performance Tests

The following tests were performed on the installed CEMS in accordance with applicable procedure outlined in 40 CFR Part 75 Appendix A:

(A) Linearity Check
(B) 7-Day Calibration Error Test
(C) Cycle Time Test
(D) 3-Level System Integrity Check
(E) Relative Accuracy Test Audit (RATA)/Bias Test

(A) Linearity Check

A Linearity Check was conducted on the Hg monitor with the unit combusting fuel at conditions of typical stack temperature and pressure in accordance with procedures described in Section 6.2 [40 CFR Part 75 Appendix A]. The monitor was challenged with calibration gas at the low-, mid-, and high-range concentrations, passing through all monitor components used during normal sampling and through as much of the sampling probe as practical. The monitor was challenged three times with each reference gas, without the same gas's being used twice in succession.

Acceptance criteria:

(1) LE ≤ 10.0 %, where

$$LE = \frac{|R - A|}{R} \times 100$$

LE – Linear error, based upon the reference value.

R – Reference value of low-, mid-, or high-level concentration gas introduced into the monitoring system.

A – Average of the monitoring system response.

(2) |R-A| ≤ 1.0 μg/scm

(B) 7-Day Calibration Error Test

A 7-Day Calibration Error Test was performed according to procedures outlined in Section 6.3.1 [40 CFR Part 75 Appendix A] utilizing zero- and mid-level calibration concentration calibration gas. Mid-level has been deemed representative of the actual stack gas concentrations, and therefore selected in lieu of high-level gas. Each monitor was challenged once with calibration gas at both the low- and mid-level concentrations, passing through all monitor components used during normal sampling and through as much of the sampling probe as practical. Calibration error was calculated daily at approximately 24-hour intervals and evaluated in accordance with performance specifications outlined in Section 3.1 [40 CFR Part 75 Appendix A].

Acceptance criteria:

(1) $CE_{zero/upscale}$ ≤ 5.0%, where

$$CE = \frac{|R - A|}{S} \times 100$$

CE - Calibration error as a percentage of the span of the instrument.

R - Reference value of zero or upscale (high- or mid-level, as applicable) calibration gas introduced into the monitoring system.

A - Actual monitoring system response to the calibration gas.

S - Span of the instrument, as specified in Section 2 [40 CFR Part 75 Appendix A].

(2) Alternatively, if S = 10 μg/scm, |R-A| ≤ 1.0 μg/scm.

(C) Cycle Time Test

Using a zero-level and a high-level calibration gas alternately, an upscale and downscale cycle time was determined in accordance with Section 6.4 [40 CFR Part 75 Appendix A]. A zero-level concentration calibration gas was injected into the injection port until a steady-state was attained. The system was then placed in sample mode until a stable response to flue gas emissions was obtained. The upscale elapsed time was determined by evaluating the time required for a 95% step change from the zero-level up to the flue gas emission steady-state responses. An analogous calculation was used to determine the downscale elapsed time of a steady-state high-level calibration gas response down to measured flue gas emissions. The cycle time is the higher of the two elapsed times.

Acceptance Criterion:

(1) Cycle time ≤ 15 min.

(D) 3-Level System Integrity Check

Oxidized mercury (Hg^{2+}) was utilized to conduct a 3-Level System Integrity Check with performance specifications outlined in Section 3.2(3)(iii) [40 CFR Part 75 Appendix A]. The monitor was challenged with calibration gas at the low-, mid-, and high-range concentrations, passing through all monitor components used during normal sampling and through as much of the sampling probe as practical. The monitor was challenged three times with each reference gas, without the same gas's being used twice in succession.

Acceptance Criterion:

(1) CE ≤ 5.0%, where

$$CE = \frac{|R - A|}{S} \times 100$$

CE - Calibration error as a percentage of the span of the instrument.

R - Reference value of zero-, mid-, and high-level calibration gas introduced into the monitoring system.

A - Actual monitoring system response to the calibration gas.

S - Span of the instrument, as specified in Section 2 [40 CFR Part 75 Appendix A].

(E) Relative Accuracy Test Audit (RATA) & Bias Test

As suggested in Section 6.5.1(b) [40 CFR Part 75 Appendix A], for the initial certification of a gas or Hg monitoring system and for recertification in which one or more tests are required (i.e., a linearity test, cycle time test, or 7-day calibration error test), EPA recommends that the RATA not be commenced until the other required tests of the CEMS have been passed.

Instrumental Analyzer Configuration

Calibration Span & Gas Concentrations

To the extent practicable the measured emissions are to be between 10 and 100% of the selected calibration span. It is recommended that the calibration span be at least twice the native concentration to accommodate the dynamic spiking procedure (Section 3.4, [Method 30A]). The selected value of the calibration span is limited by the capabilities of the calibrator. The parameters used for calibration and data validation tests of the instrumental analyzer are outlined in Table 4.

Table 4: IRM Calibration Span & Gas Concentrations

	Native Concentration =	2 μg/scm
	Calibration Span (CS) =	10 μg/scm
Gas Concentration	**Allowable Range**	**Hg Concentration**
Zero-level	Non-detectable	0 μg/scm (0 %)
Low-level	10-30 % CS	3 μg/scm (30 %)
Mid-level	40-60 % CS	5 μg/scm (50 %)
High-level	100 % CS	9 μg/scm (90 %)

Sample Point Selection

When Method 30A is used for relative accuracy testing of a Hg CEMS, the sampling site selection and sampling point layout procedures are referenced in the appropriate performance specification or applicable regulation described in Performance Specification 2, Section 8.1.3 [40 CFR Part 75 Appendix B] or Section 6.5.6 [40 CFR Part 75 Appendix A]. Alternatively, Section 8.1.3.4 [Method 30A] states that stratification testing need not be performed at a test location where it would otherwise be required to justify using fewer sample points or different sample points, if the Hg concentration in the stack gas is expected to be 3 $\mu g/m^3$ or less at the time of a Hg monitoring system RATA or an Hg emissions test. Documentation of at least one hour of Hg concentration data is required just prior to the RATA or emissions test. If a particular test location qualifies for the stratification testing exemption, sampling shall be performed at three points, as described in Section 8.1.3.2.2 [Method 30A]. Since the stack diameter (or equivalent diameter, for a rectangular stack or duct) is greater than 7.8 ft, the three Stack sampling points were therefore located at 4.4, 14.6, and 29.6 percent of the stack diameter (109 3/16") from the stack or duct wall (see Figure 2). Since only modified Method 30A procedures were performed at the Air Heater Outlet, a single sampling point depicted in Figure 3 was selected at 78.74" from the duct wall.

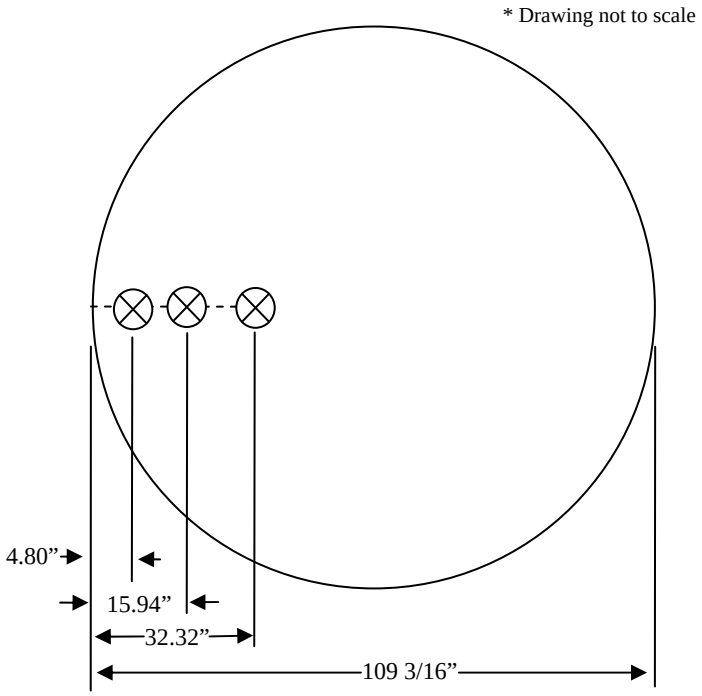

Figure 7: Stack Sampling Points

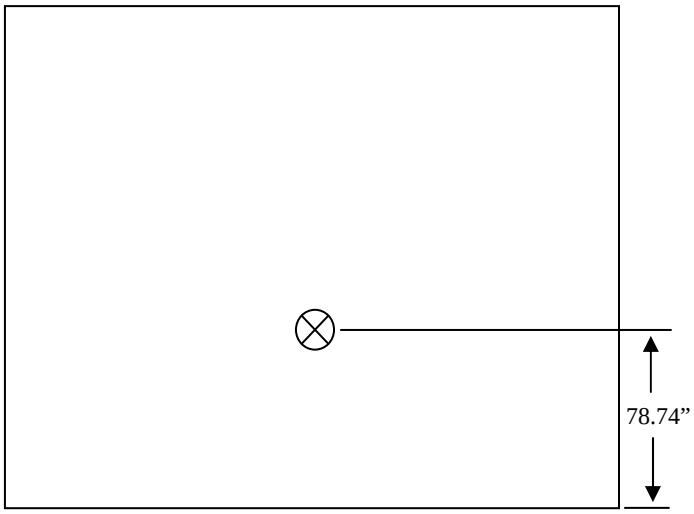

Figure 8: Air Heater Outlet Sampling Point

Initial Measurement System Performance Tests

Initial measurement system performance tests need to be met in accordance with Method 30A on the instrumental analyzer prior to conducting the nine (9) required test runs and evaluating the relative accuracy. The performance requirements of this method must be met to validate data, and are listed below:

(1) Interference Testing (Optional)
(2) Calibration Gas Verification
(3) Measurement System Preparation
(4) 3-Point System Calibration Error Test
(5) System Integrity Check
(6) Measurement System Response Time Test
(7) Dynamic Spiking (deferred until January 1, 2009)

(1) Interference Test (Optional)

It is recommended that this test be conducted prior to the initial use of the measurement system in the field to verify that the candidate test instrument is free from inherent biases or interferences resulting from common combustion emission constituents. The interference test procedure is found in Section 8.6 [Method 30A]. This procedure was not performed during this test period.

(2) Calibration Gas Verification

EPA Traceability Protocol for Qualification and Certification of Elemental Mercury Gas Generators and EPA Traceability Protocol for Qualification and Certification of Oxidized Mercury Gas Generators expected publication date December 2008, see www.epa.gov/ttn/emc.

(3) Measurement System Preparation

The measurement system was assembled, prepared, and preconditioned according to standard operating procedure.

(4) System Calibration Error Test

Using elemental mercury (Hg^0), a 3-point system calibration error test was conducted prior to the first test run. The low-, mid-, and high-level calibration gases were introduced in any order into the instrumental analyzer, and, after each gas injection, a stable response was obtained and recorded.

Acceptance criteria:

i. SCE ≤ 5%, where

$$SCE = \frac{|C_s - C_v|}{CS} \times 100$$

SCE - System Calibration Error [%].
C_s - Measured concentration of the calibration gas [μg/scm].
C_v - Certified concentration of the calibration gas [μg/scm].
CS - Calibration Span [μg/scm].

ii. Alternatively, $|C_s - C_v| \leq 0.5$ μg/scm

(5) System Integrity Check

Using oxidized mercury (Hg^{2+}), a two-point system integrity check was conducted as required before the first test run. The zero- and mid-level calibration gases were introduced into the instrumental analyzer, and, after each gas injection, a stable response was obtained and recorded.

Acceptance criteria:

i. SCE ≤ 5%, where

$$SCE = \frac{|C_s - C_v|}{CS} \times 100$$

SCE - System Calibration Error [%].
C_s - Measured concentration of the calibration gas [μg/scm].
C_v - Certified concentration of the calibration gas [μg/scm].
CS - Calibration Span [μg/scm].

ii. Alternatively, $|C_s - C_v| \leq 0.5$ μg/scm

(6) Measurement System Response Time

The measurement system response time provides the minimum sampling time for each sampling point. It is equal to the time that is required for the measured Hg concentration to increase from the stable low-level calibration gas response to a value within 5 percent of the stable high-level calibration gas response obtained during the system calibration error test in Section 8.2.4 [Method 30A], assuming the high-level calibration gas was injected immediately after the low-level.

(7) Dynamic Spiking Test (deferred until January 1, 2009)

The purpose of this procedure is to demonstrate that the site-specific flue gas matrix does not adversely affect the accuracy of the measurement system. If the specifications stated in Section 13.5 [Method 30A] are not met, the procedure must be repeated until satisfactory results are obtained. Dynamic spiking is a gas phase application of the

method of standard additions, which involves injecting a known quantity of Hg into the measurement system upstream of all sample conditioning components, similar to system calibration, except the probe is not flooded and the resulting sample stream includes both effluent gas and the spike gas. A written procedure that details how the spike is added to the system, how the spike dilution factor (DF) is measured, and how the Hg concentration data are collected and processed is required.

The spike gas must be a $HgCl_2$ calibration gas certified by an EPA traceability protocol (estimated promulgation ~December 2008), and chosen concentrations must produce the target levels while being injected at a volumetric flow rate that is ≤ 20 percent of the total volumetric flow rate through the measurement system. The target level, C_{target} for spiking must be 150 to 200 percent of the native Hg concentration, C_{native}. Alternately, if the Hg concentration is ≤ 1 μg/scm, the target level shall be between 1 and 4 μg/scm above the native concentration. At least 3 data points must be obtained, and the relative standard deviation specification must be met. Each baseline measurement must include at least 4 readings or 1 minute (whichever is greater) of stable responses.

C_{native} = 0.3 μg/scm
C_{target} = 4.27 μg/scm

Since the configuration of the IRM does not allow for accurate measurement of total volumetric flow rate through the system, a spike gas that includes a tracer for measuring the dilution factor (DF) was used.

DF Calculation:

$$DF = \frac{Q_{probe}}{Q_{spike}} = \frac{C_{Tdir} - C_{Tnative}}{C_{Tv} - C_{Tnative}}$$

Q_{probe} – Total flow rate of the stack gas sample plus the spike gas [liters/min].
Q_{spike} – Flow rate of the spike gas [liters/min].
C_{Tdir} – Tracer gas concentration injected with spike gas [ppm].
C_{Tv} – Diluted tracer gas concentration measured in a spiked sample [ppm].
$C_{Tnative}$ – Measured tracer gas concentration present in native effluent gas [ppm].

Dynamic Spike Gas Concentration Calculation:

$$C^*_{spike} = DF \times (C_{target} - C_{native}) + C_{native}$$

C^*_{spike} - Hg concentration of the spike gas required to achieve a certain target value for the spiked sample Hg concentration [μg/scm].
C_{target} – Target Hg concentration of the spiked sample [μg/scm].
C_{native} – Vapor phase Hg concentration in the source effluent [μg/scm].

Spiked Sample Concentration Calculation:

$$C^*_{ss} = C_{native} + \frac{C_{spike} - C_{native}}{DF}$$

C^*_{ss} - Expected Hg concentration of the spiked sample at the target level [μg/scm].
C_{spike} – Actual Hg concentration of the spike gas [μg/scm].

Acceptance Criterion:

i.(a) $90\% \leq \overline{R} \leq 110\%$, where

$$R = \frac{DF(C_{ss} - C_{native}) + C_{native}}{C_{spike}} \times 100\%$$

R – Spike recovery [%].

C_{ss} – Measured Hg concentration of the spiked sample at the target level [μg/scm].

i.(b) Alternatively, $|C^*_{ss} - C_{ss}| \leq 0.5$ μg/scm

ii.(a) RSD ≤ 5.0%, where

$$RSD = \frac{100\%}{\overline{R}} \sqrt{\frac{\sum_{i=1}^{n} (R_i - \overline{R})^2}{n-1}}$$

RSD – Relative Standard Deviation [%].

Test Runs

After the instrumental analyzer has successfully met the acceptance criteria of the initial system performance tests, the minimum nine (9) test runs of the RATA were performed. One test run constitutes one sampling at each successive sample point. Run validations listed below must be performed while sampling.

System Integrity Checks

Before and after each test run, a two-point system integrity check using the same procedure as the initial system integrity check must be conducted. No adjustments may be made to the measurement system during the checks, other than to maintain the target calibration gas flow rate and the proper dilution ratio. This check may be skipped between each run provided that a system integrity check performed on completion of runs passes the allowed specification. If a post-run integrity check is failed, all test runs since the last passed system integrity check are invalid. If a check is failed, corrective action must be taken and another 3-point Hg^0 System Calibration Error Test passed followed by another System Integrity Check before conducting any additional test runs.

Drift Check

Using the data from the successful pre- and post-run system integrity checks, calculate the zero and upscale drift. Exceeding the specification does not invalidate the run, but corrective action must be taken and a new 3-point Hg^0 System Calibration Error Test and a System Integrity Check must be passed before any more runs are made.

Sampling

For each sample point determined from Section 8.1, Method 30A, the system must be allowed to flush and equilibrate for at least two times the measurement system response time before recording any data. The minimum sampling time at each sampling point must be at least two times the system response time, but not less than 10 minutes.

Relative Accuracy Calculation

Acceptance criteria:

(1) RA ≤ 20.0%, where

Arithmetic Mean:

$$d = RM - CEM$$

d – The difference between a reference method value and the corresponding continuous emission monitoring system value at a given point in time.

RM – Reference method value.

CEM – Continuous emission monitoring system value.

$$\overline{d} = \frac{\sum_{i=1}^{n} d_i}{n}$$

n – Number of data points.

Standard Deviation:

$$S_d = \sqrt{\frac{\sum_{i=1}^{n} d_i^2 - \left[\frac{\left(\sum_{i=1}^{n} d_i\right)^2}{n}\right]}{n-1}}$$

S_d – Standard deviation.

Confidence Coefficient:

$$cc = t_{0.025} \times \frac{S_d}{\sqrt{n}}$$

cc – Confidence coefficient.

$t_{0.025}$ – t-value.

Relative Accuracy:

$$RA = \frac{|\partial| + |cc|}{\overline{RM}} \times 100$$

RA – Relative accuracy of a data set.

RM – Arithmetic mean of the reference method values.

∂ – Mean difference between the reference method values and the corresponding continuous emission monitoring system values.

(2) Alternatively, if $\overline{RM} \leq 5.0$ μg/scm, $\overline{CEM}$ - $\overline{RM} \leq 1.0$ μg/scm

Bias Determination & Adjustment Factor Calculation

If the following criterion is met for the relative accuracy test audit data set being tested, the monitoring system has passed the bias test:

(1) Acceptance criterion:

$$\overline{d} \leq |cc|$$

If the monitor or monitoring system fails to meet the bias test requirement, adjustment of the value obtained from the monitor is necessary using the following equation:

$$CEM_i^{Adjusted} = CEM_i^{Monitor} \times BAF$$

$CEM_i^{Adjusted}$ - Data value, adjusted for bias, at time i.

$CEM_i^{Monitor}$ - Data (measurement) provided by monitor at time i.

BAF – Bias Adjustment Factor.

Bias Adjustment Factor:

$$BAF = 1 + \frac{\overline{d}}{\overline{CEM}}$$

If the monitoring system meets the normal or the alternative relative accuracy specification in section 3.3.8 of 40 CFR Part 75 Appendix A but fails the bias test, the owner or operator may either use the BAF calculated above or may use a default BAF of 1.250 for reporting purposes. Each time a RATA is passed and the appropriate BAF has been determined, the BAF is to be applied prospectively to all monitoring system data, beginning with the first clock hour following the hour in which the RATA was completed.

RESULTS AND DISCUSSION

Data from the Linearity Checks for the Stack and Air Heater Outlet Hg-CEMS are presented in Table 5 and Table 6, respectively. The results for the CEMS installed at both locations indicate compliance with performance specifications documented in 40 CFR Part 75 Appendix A.

Table 5: Linearity Check - Stack Hg-CEMS

Linearity Check

Facility:	Hardin Generating Station	**Date(s):**	04/28/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	Erik Zipp	**Test Runs:**	N/A
		Analyzer Make/Model:	Thermo Mercury Freedom System™
Span, S =	10 μg/scm	**Serial No:**	0613917173

Calibration Gas Level	R [μg/scm]	A [μg/scm]	LE [%]	|R-A| [μg/scm]
Low-	3.00	2.68	10.67	0.32
Mid-	6.00	5.79	3.50	0.21
High-	9.00	8.57	4.78	0.43

LE - Linearity error
R - Reference value of calibration gas
A - Average of monitoring system response
S - Span value

Acceptance criteria:
(1) LE ≤ 10.0%
(2) Alternatively, |R-A| ≤ 1.0 μg/scm

Table 6: Linearity Check - Air Heater Outlet Hg-CEMS

Linearity Check

Facility:	Hardin Generating Station	**Date(s):**	04/28/2008
Project #:	06-7008	**Unit(s) tested:**	Air Heater Outlet Hg-CEMS
Personnel:	Erik Zipp	**Test Runs:**	N/A
		Analyzer Make/Model:	Thermo Mercury Freedom System™
Span, S =	20 μg/scm	**Serial No:**	0613917146

Calibration Gas Level	R [μg/scm]	A [μg/scm]	LE [%]	|R-A| [μg/scm]
Low-	5.00	5.20	4.00	0.20
Mid-	11.00	11.31	2.82	0.31
High-	18.00	17.96	0.22	0.04

LE - Linearity error
R - Reference value of calibration gas
A - Average of monitoring system response
S - Span value

Acceptance criteria:
(1) LE ≤ 10.0%
(2) Alternatively, |R-A| ≤ 1.0 μg/scm

Data from the 7-Day Calibration Error Tests for the Stack and Air Heater Outlet Hg-CEMS are presented in Table 7 and Table 8, respectively. Results for the CEMS installed at both locations also indicate compliance with performance specifications documented in 40 CFR Part 75 Appendix A.

Table 7: 7-Day Calibration Error Test - Stack Hg-CEMS

7-Day Calibration Error Test

Facility: Hardin Generating Station
Date(s): 05/05/2008
Project #: 06-7008
Unit(s) tested: Stack Hg-CEMS
Personnel: Erik Zipp
Test Runs: N/A
Analyzer Make/Model: Thermo Mercury Freedom System™
Span, S = 10 μg/scm
Serial No: 0613917173

Day	Calibration Gas Level	R [μg/scm]	A [μg/scm]	CE [%]	|R-A| [μg/scm]
1	Zero-	0.00	0.01	0.10	0.01
	Mid-	5.00	4.92	0.80	0.08
2	Zero-	0.00	0.01	0.10	0.01
	Mid-	5.00	4.88	1.20	0.12
3	Zero-	0.00	0.03	0.30	0.03
	Mid-	5.00	4.83	1.70	0.17
4	Zero-	0.00	0.04	0.40	0.04
	Mid-	5.00	4.86	1.40	0.14
5	Zero-	0.00	0.06	0.60	0.06
	Mid-	5.00	4.79	2.10	0.21
6	Zero-	0.00	0.03	0.30	0.03
	Mid-	5.00	4.84	1.60	0.16
7	Zero-	0.00	0.04	0.40	0.04
	Mid-	5.00	4.97	0.30	0.03

CE - Calibration error
R - Reference value of calibration gas
A - Actual monitoring system response
S - Span value

Acceptance criteria:
(1) CE ≤ 5.0%
(2) Alternatively, if S = 10 μg/scm: |R-A| ≤ 1.0 μg/scm

Table 8: 7-Day Calibration Error Test - Air Heater Outlet Hg-CEMS

7-Day Calibration Error Test

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: Erik Zipp

Date(s): 05/05/2008
Unit(s) tested: Air Heater Outlet Hg-CEMS
Test Runs: N/A
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No: 0613917146

Span, S = 20 µg/scm

Day	Calibration Gas Level	R [µg/scm]	A [µg/scm]	CE [%]	|R-A| [µg/scm]
1	Zero	0.00	-0.02	0.10	0.02
	Mid-	11.00	10.86	0.70	0.14
2	Zero	0.00	-0.03	0.15	0.03
	Mid-	11.00	10.79	1.05	0.21
3	Zero	0.00	-0.05	0.25	0.05
	Mid-	11.00	10.84	0.80	0.16
4	Zero	0.00	0.02	0.10	0.02
	Mid-	11.00	10.87	0.65	0.13
5	Zero	0.00	-0.03	0.15	0.03
	Mid-	11.00	10.74	1.30	0.26
6	Zero	0.00	-0.03	0.15	0.03
	Mid-	11.00	11.16	0.80	0.16
7	Zero	0.00	-0.06	0.30	0.06
	Mid-	11.00	10.61	1.95	0.39

CE - Calibration error
R - Reference value of calibration gas
A - Actual monitoring system response
S - Span value

Acceptance criteria:
(1) CE ≤ 5.0%
(2) Alternatively, if S = 10 µg/scm: |R-A| ≤ 1.0 µg/scm

Cycle Time Tests for the Stack and Air Heater Outlet Hg-CEMS are presented in Table 9 and Table 10, respectively. Both CEMS passed the performance criterion; however, improper procedure was followed in performing this test at the Stack Hg-CEMS. The mid-level concentration was used instead of the high-level, but this error does not indicate that the unit will fail when properly performed.

Table 9: Cycle Time Test - Stack Hg-CEMS

Cycle Time Test

Facility:	Hardin Generating Station	**Date(s):**	04/29/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	Pattie Garcia	**Test Runs:**	N/A
		Analyzer Make/Model:	Thermo Mercury Freedom System™
Span, S =	10 μg/scm	**Serial No:**	0613917173

Calibration Gas Level	R [μg/scm]	Start Time	A_i [μg/scm]	End Time	A_f [μg/scm]	Cycle Time [min.]
Zero-	0.00	12:27	0.01	12:47	0.42	5 min.
Mid-	5.00	13:08	5.12	13:28	0.46	5 min.

R - Reference value of calibration gas
A_i - Initial stable monitor system response
A_f - Final stable monitor system response
S - Span value

Acceptance criteria:
(1) Cycle Time ≤ 15 min.

Table 10: Cycle Time Test - Air Heater Outlet Hg-CEMS

Cycle Time Test

Facility:	Hardin Generating Station	**Date(s):**	05/21/2008
Project #:	06-7008	**Unit(s) tested:**	Air Heater Outlet Hg-CEMS
Personnel:	Pattie Garcia	**Test Runs:**	N/A
		Analyzer Make/Model:	Thermo Mercury Freedom System™
Span, S =	20 μg/scm	**Serial No:**	0613917146

Calibration Gas Level	R [μg/scm]	Start Time	A_i [μg/scm]	End Time	A_f [μg/scm]	Cycle Time [min.]
Zero-	0.00	10:22	0.03	10:42	4.27	5 min.
High-	18.00	11:05	18.21	11:25	4.37	5 min.

R - Reference value of calibration gas
A_i - Initial stable monitor system response
A_f - Final stable monitor system response
S - Span value

Acceptance criteria:
(1) Cycle Time ≤ 15 min.

The 3-Level System Integrity Check for the Stack Hg-CEMS is presented in Table 11. This test, which involves the injection of Hg^{2+} calibration gas concentrations, has proven problematic in meeting acceptance criteria. Concerns have been addressed to Thermo Fisher Corporation in attempts to resolve this problem. This unit will be upgraded and tested before the next RATA test in June 2008.

Table 11: 3-Level System Integrity Check - Stack Hg-CEMS

3-Level System Integrity Check

Facility:	Hardin Generating Station	**Date(s):**	05/05/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	Erik Zipp	**Test Runs:**	N/A
		Analyzer Make/Model:	Thermo Mercury Freedom System™
Span, S =	10 μg/scm	**Serial No:**	0613917173

Calibration Gas Level	R [μg/scm]	A [μg/scm]	CE [%]
Low-	3.00	2.13	8.70
Mid-	6.00	4.49	15.10
High-	9.00	6.52	24.80

CE - Calibration error
R - Reference value of calibration gas
A - Actual monitoring system response
S - Span value

Acceptance criteria:
(1) CE ≤ 5.0%

The Relative Accuracy Test Audit conducted on the Stack Hg-CEMS demonstrated compliance with established performance specifications. The RATA conducted on Air Heater Outlet Hg-CEMS lacked the number of runs and sampling points required to meet the acceptance criteria, however the data trended to be acceptable. Bias tests on both monitoring systems failed the acceptance criterion, and bias adjustment factors were calculated but not implemented.

Table 12: RATA & Bias Test - Stack Hg-CEMS

Relative Accuracy Test Audit & Bias Test Summary

Facility:	Hardin Generating Station	**Date(s):**	04/23/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	Sharon Sjostrom	**Test Method:**	Method 30A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
	Brian Carlton		
		Serial No:	0613917173

Test Run	Start	End	Hg^T [µg/scm] RM	Hg^T [µg/scm] CEM	d [µg/scm]	d^2 [µg/scm]
1	08:53	09:05	-0.12	0.13	-0.25	0.06
3	12:55	13:07	-0.06	0.21	-0.27	0.07
4	14:15	14:27	-0.20	0.22	-0.42	0.18
5	15:28	15:40	-0.10	0.23	-0.34	0.11
6	16:40	16:52	-0.15	0.27	-0.42	0.17
7	17:16	17:28	-0.21	0.27	-0.48	0.23
8	18:28	18:40	-0.06	0.25	-0.31	0.10
9	19:04	19:16	-0.12	0.25	-0.37	0.14
10	19:40	19:52	-0.18	0.23	-0.41	0.17

RM - Reference method value
CEM - Continuous emission monitoring system value
d - Difference between RM and CEM values
n - Number of data points
S_d - Standard deviation
$t_{0.025}$ - t-value
cc - Confidence coefficient

Acceptance criteria:
(1) RA ≤ 20.0%
(2) Alternatively, if $\overline{RM} \leq 5.0$ µg/scm,
$\overline{CEM} - \overline{RM} \leq 1.0$ µg/scm

n =	9
$\overline{d}$ =	-0.36
$\overline{d_i^2}$ =	0.14
$\overline{RM}$ =	-0.14
$\overline{CEM}$ =	0.23
S_d =	0.08
$t_{0.025}$ =	2.306
cc =	0.059
RA =	-311.85%
$\overline{CEM} - \overline{RM}$ =	0.36

BAF - Bias adjustment factor
Acceptance criteria:
(1) $\overline{d} \leq |cc|$

BAF =	-0.595

Table 13: RATA & Bias Test - Air Heater Outlet Hg-CEMS

Relative Accuracy Test Audit & Bias Test Summary

Facility:	Hardin Generating Station	**Date(s):**	04/24/2008
Project #:	06-7008	**Unit(s) tested:**	Air Heater Outlet Hg-CEMS
Personnel:	Sharon Sjostrom	**Test Method:**	Method 30A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
	Brian Carlton		
		Serial No:	0613917146

Test Run	Start	End	Hg^T [μg/scm] RM	Hg^T [μg/scm] CEM	d [μg/scm]	d^2 [μg/scm]
1	16:04	16:19	2.26	2.66	-0.39	0.15
2	17:11	17:26	2.43	2.76	-0.34	0.11
3	18:05	18:20	2.38	2.56	-0.19	0.04

RM - Reference method value
CEM - Continuous emission monitoring system value
d - Difference between RM and CEM values
n - Number of data points
S_d - Standard deviation
$t_{0.025}$ - t-value
cc - Confidence coefficient

Acceptance criteria:
(1) RA ≤ 20.0%
(2) Alternatively, if $\overline{RM} \leq 5.0$ μg/scm, $\overline{CEM} - \overline{RM} \leq 1.0$ μg/scm

n =	3
$\overline{d}$	-0.31
$\overline{d_i^2}$ =	0.10
$\overline{RM}$ =	2.36
$\overline{CEM}$ =	2.66
S_d =	0.11
$t_{0.025}$ =	4.303
cc =	0.264
RA =	24.20%
$\overline{CEM} - \overline{RM}$ =	0.31

BAF - Bias adjustment factor
Acceptance criteria:
(1) $\overline{d} \leq |cc|$

BAF =	0.885

CONCLUSIONS

The Stack Hg-CEMS passed all performance tests conducted during this evaluation except the 3-Level System Integrity Check and the Bias Test. The Air Heater Outlet Hg-CEMS passed all applicable performance tests except the Bias Test. The IRM analyzer failed the Dynamic Spiking Test. A duplicate of the Summary of Results from Table 1 is presented below.

Summary of Results (From Table 1)

Test	Stack Hg-CEMS (downstream of ACI)	Air Heater Outlet Hg-CEMS (upstream of ACI)
Linearity Check	PASS	PASS
7-Day Calibration Error Test	PASS	PASS
Cycle Time Test	PASS	PASS
3-Level System Integrity Check	FAIL	N/A
Relative Accuracy Test Audit	PASS	PASS
IRM System Performance Tests		
Interference Check (Optional)	-	-
3-Point System Calibration Error Test	PASS	-
System Integrity Check	PASS	-
Measurement System Response	-	-
Dynamic Spiking Test	FAIL	-
Bias Test	FAIL	FAIL

This was the first of three in a series of tests to be performed at Rocky Mountain Power's Hardin Generating Station, Hardin, MT during the Long-term Test Phase of this project as specified in the test plan. The primary goal of this first round of tests was to demonstrate that the installed Hg-CEMS will comply with future established directives as well as to provide feedback of the recently approved EPA Method 30A reference method. Calibrator difficulties have been addressed and intend to be corrected prior to the next round of tests. It is believed that once these issues are corrected, the 3-Level System Integrity Check will pass performance criteria.

APPENDIX

Initial Measurement System Response Tests & Run Validations

Results from the IRM Pre-certification tests are presented in Tables 14 through 19 below.

Table 14: IRM System Calibration Error Test

System Calibration Error Test

Facility:	Hardin Generating Station	**Date(s):**	04/23/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	Sharon Sjostrom	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom
	Brian Carlton		System™
CS =	10 μg/scm	**Serial No:**	

Calibration Gas Level	C_v [μg/scm]	C_s [μg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [μg/scm]
Low-	3.00	3.42	4.20	0.42
Mid-	5.00	5.39	3.90	0.39
High-	9.00	8.97	0.30	0.03

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span value

Acceptance criteria:
(1) SCE ≤ 5.0%
(2) Alternatively, $|C_s-C_v| \leq 0.5$ μg/scm

Table 15: IRM System Integrity Check

System Integrity Check

Facility:	Hardin Generating Station	**Date(s):**	04/23/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	Sharon Sjostrom	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom
	Brian Carlton		System™
CS =	10 μg/scm	**Serial No:**	

Calibration Gas Level	C_v [μg/scm]	C_s [μg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [μg/scm]
Zero-	0.00	-0.05	0.50	0.05
Mid-	5.00	4.91	0.90	0.09

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ 5.0%
(2) Alternatively, $|C_s-C_v| \leq 0.5$ μg/scm

Table 16: IRM Measurement System Response Time Test

Measurement System Response Time Test

Facility:	Hardin Generating Station	**Date(s):**	04/22/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	Sharon Sjostrom	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom
	Brian Carlton		System™
CS =	10 μg/scm	**Serial No:**	0613917173

Calibration Gas Level	C_v [μg/scm]	Start Time	$C_{s,i}$ [μg/scm]	End Time	$C_{s,f}$ [μg/scm]	Response Time [min.]
Low-/High-	3.00/9.00	10:28	3.46	10:37	8.87	8 min.

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
(i=initial, f=final)
CS - Calibration span value

Acceptance criteria:
(1) Response Time ≤ 15.0 min.

Table 17: IRM Dynamic Spiking Test

Dynamic Spiking Test

Facility:	Hardin Generating Station	**Date(s):**	04/23/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	Sharon Sjostrom	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom
	Brian Carlton		System™
		Serial No:	0613917173

CS = 10.00 µg/scm

Est. C_{native} = 0.30 µg/scm

C_{target} = 4.27 µg/scm

DF = 10

C^*_{spike} = 40.00 µg/scm

Run	C_T [ppm]	C_{ss} [µg/scm]	DF	C^*_{ss} [µg/scm]	R [%]	$\lvert C^*_{ss} - C_{ss}\rvert$ [µg/scm]
1	3350.77	0.03				
	3037.34	2.29	10.69	3.77	60.36%	1.48
2	3450.23	0.14				
	3117.65	2.43	10.37	3.98	59.79%	1.55
3	3459.22	0.17				
	3116.55	2.34	10.09	4.12	55.15%	1.78
					$\overline{R}$ =	58.44%
					RSD =	4.89%

CS - Calibration span

C_{native} - Vapor phase Hg concentration in the source effluent

C_{target} - Target Hg concentration of the spiked sample

C_T - Measured concentration of tracer gas

C_{ss} - Measured Hg concentration of the spiked sample at the target level

DF - Dilution factor of the spike gas

C^*_{spike} - Hg concentration of the sp

Acceptance criteria:

(1) DF ≥ 5

(2) $1.5 \le C^*_{ss}/C_{native} \le 2.0$

(3) $90\% \le \overline{R} \le 110\%$

Alternatively,

$\lvert C^*_{ss} - Hg^{2+}\rvert \le 0.5$ µg/scm

(4) RSD ≤ 5.0%

Table 18: Run Validation - Stack Hg-CEMS

Run Validation

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: Sharon Sjostrom, Jim Domenico, Brian Carlton
CS = 10 μg/scm

Date(s): 04/23/2008
Unit(s) tested: Stack Hg-CEMS
Test Runs: N/A
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No:

Test Run	Time	Calibration Gas Level	C_v [μg/scm]	C_s [μg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [μg/scm]	D [%]	$\lvert C_{s,pre}-C_{s,post} \rvert$ [μg/scm]
Pre-run 1	07:52 - 08:04	Zero-	0.00	-0.05	0.50	0.05		0.45
	08:04 - 08:16	Mid-	5.00	4.91	0.90	0.09		0.81
Post-run 1	09:05 - 09:17	Zero-	0.00	-0.20	2.00	0.20	1.50	1.80
	09:17 - 09:29	Mid-	5.00	4.75	2.50	0.25	1.60	2.25
Post-run 2	10:16 - 10:28	Zero-	0.00	-0.36	3.60	0.36	1.60	3.24
	10:28 - 10:40	Mid-	5.00	4.40	6.00	0.60	3.50	5.40
Pre-run 2	11:51 - 12:03	Zero-	0.00	0.22	2.20	0.22		1.98
	12:04 - 12:16	Mid-	5.00	5.18	1.80	0.18		1.62
Post-run 3	13:09 - 13:21	Zero-	0.00	-0.35	3.50	0.35	1.30	3.15
	13:24 - 13:36	Mid-	5.00	4.81	1.90	0.19	0.10	1.71
Post-run 4	14:28 - 14:40	Zero-	0.00	-0.33	3.30	0.33	0.20	2.97
	14:40 - 14:52	Mid-	5.00	4.91	0.90	0.09	1.00	0.81
Post-run 5	15:40 - 15:52	Zero-	0.00	-0.21	2.10	0.21	1.20	1.89
	15:52 - 16:04	Mid-	5.00	5.00	0.00	0.00	0.90	0.00
Post-run 7	17:28 - 17:40	Zero-	0.00	-0.26	2.60	0.26	0.50	2.34
	17:40 - 17:52	Mid-	5.00	4.92	0.80	0.08	0.80	0.72
Post-run 10	19:52 - 20:04	Zero-	0.00	-0.23	2.30	0.23	0.30	2.07
	20:04 - 20:16	Mid-	5.00	4.98	0.20	0.02	0.60	0.18

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ 5.0%
(2) Alternatively, $|C_s-C_v| \leq 5.0$ μg/scm

D - Drift
$C_{s,pre}$ - Pre-run measured concentraion of calibration gas
$C_{s,post}$ - Post-run measured concentraion of calibration gas

Acceptance criteria:
(1) D ≤ 3.0%
(2) Alternatively, $|C_{s,\ post\text{-}run}-C_{s,\ pre\text{-}run}| \leq 0.3$ μg/scm

Table 19: Run Validation - Air Heater Outlet Hg-CEMS

Run Validation

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: Jim Domenico
Brian Carlton

CS = 10 μg/scm

Date(s): 04/24/2008
Unit(s) tested: Air Heater Outlet Hg-CEMS
Test Runs: N/A
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No:

Test Run	Time	Calibration Gas Level	C_v [μg/scm]	C_s [μg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [μg/scm]	D [%]	$\lvert C_{s,pre}-C_{s,post} \rvert$ [μg/scm]
Pre-run 1	15:26 - 15:38	Zero-	0.00	0.01	0.10	0.01		0.09
	15:38 - 15:50	Mid-	5.00	5.19	1.90	0.19		1.71
Post-run 1	16:33 - 16:45	Zero-	0.00	-0.03	0.30	0.03	0.20	0.27
	16:47 - 16:59	Mid-	5.00	5.03	0.30	0.03	1.60	0.27
Post-run 2	17:26 - 17:40	Zero-	0.00	-0.07	0.70	0.07	0.40	0.63
	17:40 - 17:52	Mid-	5.00	5.12	1.20	0.12	0.90	1.08

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ 5.0%
(2) Alternatively, $|C_s-C_v| \leq 5.0$ μg/scm

D - Drift
$C_{s,pre}$ - Pre-run measured concentraion of calibration gas
$C_{s,post}$ - Post-run measured concentraion of calibration gas

Acceptance criteria:
(1) D ≤ 3.0%
(2) Alternatively, $|C_{s,\ post\text{-}run}-C_{s,\ pre\text{-}run}| \leq 0.3$ μg/scm

ADA-ES HG CEMS: DETERMINING SPAN AND RANGE

SYSTEM ID: 84 **DATE:** 5/5/08

PROJECT # AND LOCATION: 7009 HARDIN INLET DOCUMENT REVISION: 05/2008

REFERENCE: APPENDIX A TO PART 75 - SECTION 2.1.7

DETERMINE MAXIMUM POTENTIAL CONCENTRATION (MPC): There are three options for the initial MPC determination. Check the applicable option and enter the MPC below.

MPC (UG/M3)
10

1. Default values based on coal type: ____ Bituminous (9 ug/m3), _X_ Sub-bituminous (10 ug/m3), Lignite (16 ug/m3), ____ waste coal, anthracite culm or bituminous gob (1 ug/m3). If different coals are blended, use highest MPC for any fuel in the blend.
2. ____ Site-specific emission testing upstream of add-on mercury controls or FGD and at least three runs at normal operating load: use the highest total mercury concentration from Ontario Hydro or Instrumental Reference Method.
3. ____ Historical CEMS data or sorbent trap monitoring system with at least 720 operating hours upstream of add-on mercury controls or FGD and met relative accuracy specification of less than 20%.

DETERMINE MAXIMUM EXPECTED CONCENTRATION (MEC): Determine the MEC during normal, stable operation of the unit with emission controls with the following equation, where RE is the expected average design removal efficiency of the control equipment.

$$MEC = MPC\left(\frac{100 - RE}{100}\right)$$

MEC UG/M3)
N/A

DETERMINE HIGH SPAN CONCENTRATION: Round the MPC value to the next highest multiple of 10 ug/m3. An MPC of 10 ug/m3 would round to 20 ug/m3.

HIGH SPAN, S
20

For add-on mercury controls of FGD (but not short-term, non-representative operating conditions): If the MEC value is less than 20% of the high span value and if the high span value is 20 ug/m3 or greater, define a second low-span value of 10 ug/m3.

If only a high span value is required, set the full-scale range of the mercury analyzer to be greater than or equal to the span value. If two span values are required (add-on mercury controls or FGD) then (1) use two separate (high and low) measurement scales or (2) quality-assure two segments of a single measurement scale.

DETERMINE GAS LEVEL CONCENTRATIONS: Complete the table with the appropriate mercury concentrations for calibration checks. Define a second scale if applicable.

Daily calibrations are performed at zero and either the high- or mid-level concentrations if this is closer to the actual stack gas concentrations. Linearity checks are performed at the low-, mid-, and high-level gas concentrations.

LEVEL	RANGE	SCALE	OPT SCALE
ZERO	0-20 % OF SPAN	0	N/A
LOW	20-30 % OF SPAN	5	
MID	50-60 % OF SPAN	11	
HIGH	80-100 % OF SPAN	18	

TO BE COMPLETED UPON REVIEW

COMMENTS	SUCCESSFUL COMPLETION APPROVED SIGN AND DATE
REPLACE "DETERMINING SPAN AND RANGE VALUES" DOCUMENT OF 11/1/06	5/5/08

PLEASE FILE COMPLETED PAPERWORK IN EQUIPMENT BINDER OR PROJECT FOLDER

ADA-ES HG CEMS: 3-POINT LINEARITY CHECK

SYSTEM ID: 94 **DATE:** 4/28/08

PROJECT # AND LOCATION: 7009 HARDIN OUTLET DOCUMENT REVISION: 04/2008

REFERENCE: APPENDIX A TO PART 75 - SECTION 6.2

IDENTIFICATION OF EQUIPMENT: Identify each component of the complete mercury system by serial number.

80 HG ANALYZER	81 HG CALIBRATOR	82 HG CONTROLLER	83 HG PROBE	HG UMBILICALS
0613917173	0618117697	0618117711	0618117697	28849-02-03-01

3-POINT LINEARITY CHECK: Verify that the linearity check passes the criteria below.

RUN	SCALE	DATE AND TIME	CAL VALUE, R	CEM RESPONSE, A	LIN ERROR CE = (R-A)/R × 100	ABS ERROR (R - A)
1	LOW	4/28/08 1440	3.0	2.73	9.0	0.27
	MID	1450	6.0	5.79	3.5	0.21
	HIGH	1500	9.0	8.50	5.6	0.50
2	LOW	1510	3.0	2.67	11.0	0.33
	MID	1520	6.0	5.85	2.5	0.15
	HIGH	1531	9.0	8.66	3.8	0.34
3	LOW	1541	3.0	2.65	11.7	0.35
	MID	1552	6.0	5.74	4.3	0.26
	HIGH	1602	9.0	8.54	5.1	0.46

RUN	ZERO / UPSCALE	DATE AND TIME	CAL VALUE, R	CEM RESPONSE, A	LIN ERROR LE = (R-A)/R × 100	ABS ERROR (R - A)
AVG	LOW	4/28/08	3.0	2.68	10.7	0.32
	MID		6.0	5.79	3.5	0.21
	HIGH		9.0	8.57	4.8	0.43

PASSING CRITERIA: Linearity Error (LE) ≤ 10.0% of span OR Absolute Error (R-A) ≤ 1 ug/m3.

TO BE COMPLETED UPON REVIEW

FOLLOWUP REQUIRED	SUCCESSFUL COMPLETION APPROVED SIGN AND DATE
NONE - PASSED WITH ABS ERROR	4/29/08

PLEASE FILE COMPLETED PAPERWORK IN EQUIPMENT BINDER OR PROJECT FOLDER

ADA-ES HG CEMS: 3-POINT LINEARITY CHECK

SYSTEM ID: 84
PROJECT # AND LOCATION: 7009 HARDIN INLET

DATE: 4/28/08
DOCUMENT REVISION: 04/2008

REFERENCE: APPENDIX A TO PART 75 - SECTION 6.2

IDENTIFICATION OF EQUIPMENT: Identify each component of the complete mercury system by serial number.

80 HG ANALYZER	81 HG CALIBRATOR	82 HG CONTROLLER	83 HG PROBE	HG UMBILICALS
0613917146	0613917112	0618117700	0618117719	28849-02-02-01

3-POINT LINEARITY CHECK: Verify that the linearity check passes the criteria below.

RUN	SCALE	DATE AND TIME	CAL VALUE, R	CEM RESPONSE, A	LIN ERROR CE = (R-A)/R × 100	ABS ERROR (R - A)
1	LOW	4/4/08 703	5.0	5.08	1.6	0.08
	MID	713	11.0	11.25	2.27	0.25
	HIGH	722	18.0	17.72	1.56	0.28
2	LOW	735	5.0	5.22	4.4	0.22
	MID	745	11.0	11.37	3.36	0.37
	HIGH	755	18.0	18.09	0.5	0.09
3	LOW	807	5.0	5.30	6.0	0.30
	MID	817	11.0	11.30	2.73	0.30
	HIGH	827	18.0	18.08	0.44	0.08

RUN	ZERO / UPSCALE	DATE AND TIME	CAL VALUE, R	CEM RESPONSE, A	LIN ERROR LE = (R-A)/R × 100	ABS ERROR (R - A)
AVG	LOW	4/4/08	5.0	5.20	4.0	0.20
	MID		11.0	11.31	2.82	0.31
	HIGH		18.0	17.96	0.22	0.04

PASSING CRITERIA: Linearity Error (LE) ≤ 10.0% of span OR Absolute Error (R-A) ≤ 1 ug/m3.

TO BE COMPLETED UPON REVIEW

FOLLOWUP REQUIRED	SUCCESSFUL COMPLETION APPROVED SIGN AND DATE
NONE - PASSED	4/28/08

PLEASE FILE COMPLETED PAPERWORK IN EQUIPMENT BINDER OR PROJECT FOLDER

ADA-ES HG CEMS: 7-DAY CALIBRATION ERROR TEST

SYSTEM ID: 94 **DATE:** 5/5/08

PROJECT # AND LOCATION: 7009 HARDIN OUTLET DOCUMENT REVISION: 04/2008

REFERENCE: APPENDIX A TO PART 75 - SECTION 6.3

IDENTIFICATION OF EQUIPMENT: Identify each component of the complete mercury system by serial number.

80 HG ANALYZER	81 HG CALIBRATOR	82 HG CONTROLLER	83 HG PROBE	HG UMBILICALS
06139171 73	06181176 97	06181177 11	06181176 97	28849-02-03-01

7-DAY CALIBRATION ERROR TEST: Verify that the calibration drift passes the criteria below. Span value is determined by APPENDIX A TO PART 75 - SECTION 2.1.4.2

SPAN VALUE, S
10.0

DAY	ZERO / UPSCALE	DATE AND TIME	CAL VALUE, R	CEM RESPONSE, A	CAL ERROR CE = (R-A)/S × 100	ABS ERROR (R - A)
1	ZERO	4/29 524	0.0	0.01	0.1	0.01
	UPSCALE	539	5.0	4.92	0.8	0.08
2	ZERO	4/30 524	0.0	0.01	0.1	0.01
	UPSCALE	539	5.0	4.88	1.2	0.12
3	ZERO	5/1 524	0.0	0.03	0.3	0.03
	UPSCALE	539	5.0	4.83	1.7	0.17
4	ZERO	5/2 524	0.0	0.04	0.4	0.04
	UPSCALE	539	5.0	4.86	1.4	0.14
5	ZERO	5/3 524	0.0	0.06	0.6	0.06
	UPSCALE	539	5.0	4.79	2.1	0.21
6	ZERO	5/4 524	0.0	0.03	0.3	0.03
	UPSCALE	539	5.0	4.84	1.6	0.16
7	ZERO	5/5 524	0.0	0.04	0.4	0.04
	UPSCALE	539	5.0	4.97	0.3	0.03

PASSING CRITERIA: Calibration Error (CE) ≤ 5.0% of span OR Absolute Error (R-A) ≤ 1 ug/m3.

TO BE COMPLETED UPON REVIEW

FOLLOWUP REQUIRED	SUCCESSFUL COMPLETION APPROVED SIGN AND DATE
NONE – PASSED 7-DAY DRIFT SEE ATTACHED WORKSHEET	5/5/08

PLEASE FILE COMPLETED PAPERWORK IN EQUIPMENT BINDER OR PROJECT FOLDER

ADA-ES HG CEMS: 7-DAY CALIBRATION ERROR TEST

SYSTEM ID: 84 **DATE:** 5/5/08

PROJECT # AND LOCATION: 7009 HARDIN INLET DOCUMENT REVISION: 04/2008

REFERENCE: APPENDIX A TO PART 75 - SECTION 6.3

IDENTIFICATION OF EQUIPMENT: Identify each component of the complete mercury system by serial number.

80 HG ANALYZER	81 HG CALIBRATOR	82 HG CONTROLLER	83 HG PROBE	HG UMBILICALS
0613917146	0613917112	0618117700	0618117719	28849-02-02-01

7-DAY CALIBRATION ERROR TEST: Verify that the calibration drift passes the criteria below. Span value is determined by APPENDIX A TO PART 75 - SECTION 2.1.4.2

SPAN VALUE, S
20.0

DAY	ZERO / UPSCALE	DATE AND TIME	CAL VALUE, R	CEM RESPONSE, A	CAL ERROR CE = (R-A)/S × 100	ABS ERROR (R - A)
1	ZERO	4/14 524	0.0	-0.02	0.1	0.02
	UPSCALE	539	11.0	10.86	0.7	0.14
2	ZERO	4/15 524	0.0	-0.03	0.15	0.03
	UPSCALE	539	11.0	10.79	1.05	0.21
3	ZERO	4/16 524	0.0	-0.05	0.25	0.05
	UPSCALE	539	11.0	10.84	0.8	0.16
4	ZERO	4/17 524	0.0	0.02	0.1	0.02
	UPSCALE	539	11.0	10.87	0.65	0.13
5	ZERO	4/18 524	0.0	-0.03	0.15	0.03
	UPSCALE	539	11.0	10.74	1.3	0.26
6	ZERO	4/19 524	0.0	-0.03	0.15	0.03
	UPSCALE	539	11.0	11.16	0.8	0.16
7	ZERO	4/20 524	0.0	-0.06	0.3	0.06
	UPSCALE	539	11.0	10.61	1.95	0.39

PASSING CRITERIA: Calibration Error (CE) ≤ 5.0% of span OR Absolute Error (R-A) ≤ 1 ug/m3.

TO BE COMPLETED UPON REVIEW

FOLLOWUP REQUIRED	SUCCESSFUL COMPLETION APPROVED SIGN AND DATE
NONE - PASSED 7-DAY DRIFT SEE ATTACHED WORKSHEET	5/5/08

PLEASE FILE COMPLETED PAPERWORK IN EQUIPMENT BINDER OR PROJECT FOLDER

ADA-ES HG CEMS: CYCLE TIME TEST

SYSTEM ID: 94 **DATE:** 4/29/08

PROJECT # AND LOCATION: 7009 HARDIN OUTLET DOCUMENT REVISION: 04/2008

REFERENCE: APPENDIX A TO PART 75 - SECTION 6.4

IDENTIFICATION OF EQUIPMENT: Identify each component of the complete mercury system by serial number.

80 HG ANALYZER	81 HG CALIBRATOR	82 HG CONTROLLER	83 HG PROBE	HG UMBILICALS
0613917173	0618117697	0618117711	0618117697	28849-02-03-01

CYCLE TIME TEST: Verify that the linearity check passes the criteria below.

RUN	CAL VALUE, R	DATE AND TIME	STABLE START	STABLE END	STEP CHANGE START - END	CYCLE TIME 95% STEP
ZERO	0.0	4/30/08 1055	0.36	0.02	0.34	6 MINUTES
UPSCALE	5.0	1120	0.35	4.87	4.52	6 MINUTES

PASSING CRITERIA: Cycle Time cannot exceed 15 minutes.

TO BE COMPLETED UPON REVIEW

FOLLOWUP REQUIRED	SUCCESSFUL COMPLETION APPROVED SIGN AND DATE
PASSED	4/30/08

PLEASE FILE COMPLETED PAPERWORK IN EQUIPMENT BINDER OR PROJECT FOLDER

ADA-ES HG CEMS: CYCLE TIME TEST

SYSTEM ID: 84 **DATE:** 4/29/08

PROJECT # AND LOCATION: 7009 HARDIN INLET DOCUMENT REVISION: 04/2008

REFERENCE: APPENDIX A TO PART 75 - SECTION 6.4

IDENTIFICATION OF EQUIPMENT: Identify each component of the complete mercury system by serial number.

80 HG ANALYZER	81 HG CALIBRATOR	82 HG CONTROLLER	83 HG PROBE	HG UMBILICALS
0613917146	0613917112	0618117700	0618117719	28849-02-02-01

CYCLE TIME TEST: Verify that the linearity check passes the criteria below.

RUN	CAL VALUE, R	DATE AND TIME	STABLE START	STABLE END	STEP CHANGE START - END	CYCLE TIME 95% STEP
ZERO	0.0	4/29/08 1057	4.20	0.04	4.16	6 MINUTES
UPSCALE	11.0	1123	4.65	10.90	6.25	7 MINUTES

PASSING CRITERIA: Cycle Time cannot exceed 15 minutes.

TO BE COMPLETED UPON REVIEW

FOLLOWUP REQUIRED	SUCCESSFUL COMPLETION APPROVED SIGN AND DATE
NONE - CRITERIA PASSED	4/30/08

PLEASE FILE COMPLETED PAPERWORK IN EQUIPMENT BINDER OR PROJECT FOLDER

ADA-ES HG CEMS: 3-POINT CONVERTER EFFICIENCY

SYSTEM ID: 94 **DATE:** 5/5/08

PROJECT # AND LOCATION: 7009 HARDIN OUTLET DOCUMENT REVISION: 04/2008

REFERENCE: PERFORMANCE SPECIFICATION 12A - SECTION 8.3

IDENTIFICATION OF EQUIPMENT: Identify each component of the complete mercury system by serial number.

80 HG ANALYZER	81 HG CALIBRATOR	82 HG CONTROLLER	83 HG PROBE	HG UMBILICALS
0613917173	0618117697	0618117711	0618117697	28849-02-03-01

3-POINT CONVERTER EFFICIENCY CHECK: Verify that the linearity check passes the criteria below.

RUN	SCALE	DATE AND TIME	CAL VALUE, R	CEM RESPONSE, A	EFF ERROR EE = (R-A)/R × 100	ABS ERROR (R - A)
1	LOW	4/30 1159	3.0	2.13	29.0	0.87
	MID	1247	6.0	4.49	25.2	1.51
	HIGH	1338	9.0	6.52	27.6	2.48

PASSING CRITERIA: Efficiency Error (EE) ≤ 5.0% of span OR Absolute Error (R-A) ≤ 1 ug/m3.

ALTERNATE REFERENCE: MERCURIC CHLORIDE GENERATOR INSTRUCTION MANUAL - PAGE 3-7 "CALCULATIONS" (THERMO SCIENTIFIC, JAN 28 2008, PART NUMBER 105648-00)

RUN	SCALE	CEM RESP, A1 ELEMENTAL	CEM RESP, A2 OXIDIZED	CL_2 DILUTION FACTOR, CDF	CEM RESP, B2 B2 = A2 * CDF	EFFICIENCY EFF = B2 * A1
1	LOW	2.82	2.13	1.02	2.17	77.1
	MID	5.84	4.49	1.02	4.59	78.6
	HIGH	8.74	6.52	1.03	6.70	76.6

PASSING CRITERIA: Efficiency (EFF) should be between 95% and 105%. *

TO BE COMPLETED UPON REVIEW

FOLLOWUP REQUIRED	SUCCESSFUL COMPLETION APPROVED SIGN AND DATE
EFFICIENCY IS LINEAR BUT DOES NOT PASS CONVERSION CRITERIA SEE ATTACHED WORKSHEET	5/5/08

PLEASE FILE COMPLETED PAPERWORK IN EQUIPMENT BINDER OR PROJECT FOLDER

ADA-ES HG CEMS: 3-POINT CONVERTER EFFICIENCY

SYSTEM ID: 84 **DATE:** 4/29/08

PROJECT # AND LOCATION: 7009 HARDIN INLET DOCUMENT REVISION: 04/2008

REFERENCE: PERFORMANCE SPECIFICATION 12A - SECTION 8.3

IDENTIFICATION OF EQUIPMENT: Identify each component of the complete mercury system by serial number.

80 HG ANALYZER	81 HG CALIBRATOR	82 HG CONTROLLER	83 HG PROBE	HG UMBILICALS
0613917146	0613917112	0618117700	0618117719	28849-02.02.01

3-POINT CONVERTER EFFICIENCY CHECK: Verify that the linearity check passes the criteria below.

RUN	SCALE	DATE AND TIME	CAL VALUE, R	CEM RESPONSE, A	EFF ERROR EE = (R-A)/R x 100	ABS ERROR (R - A)
1	LOW					
	MID					
	HIGH					

PASSING CRITERIA: Efficiency Error (EE) ≤ 5.0% of span OR Absolute Error (R-A) ≤ 1 ug/m3.

TO BE COMPLETED UPON REVIEW

FOLLOWUP REQUIRED	SUCCESSFUL COMPLETION APPROVED SIGN AND DATE
NO HG OXIDIZER COMPONENTS INSTALLED	4/29/08

PLEASE FILE COMPLETED PAPERWORK IN EQUIPMENT BINDER OR PROJECT FOLDER

ADA-ES SYSTEM FUNCTIONAL TEST REVIEW

SYS ID # 30 IRM — **REVIEW DATE: 4/18/08**

LOCATION: HARDIN M30A TESTING — DOCUMENT REVISION: 04/2008

80i MERCURY ANALYZER

INST ID / SN #: O613917174 (SOA 033) (ADA #30) TEST DATE: 4/10/08

PHYS	ELEC	CONFIG	TEMPS	PRES	FLOW	LEAK	LAMP	PMT	BKGS	COEFS	RESULT
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	PASS

COMMENTS:

81i MERCURY CALIBRATOR

INST ID / SN #: O613917697 (SOA 034) (ADA #31) TEST DATE: 4/15/08

PHYS	ELEC	CONFIG	FANS	VALVES	TEMPS	PRES	HG MFC	DIL MFC	LINEAR	CALC	RESULT
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	PASS

COMMENTS: LINEARITY 4% ERROR AT LOW (SUB 6.0 µG/M3) CONC - MAY HAVE ERROR WITH DIL MFC LOW FLOW. ALSO COULD NOT PASS LEAK CHECK.

82i MERCURY PROBE CONTROLLER

INST ID / SN #: IRM 30 TEST DATE: 4/15/08

PHYS	ELEC	COMM	HEAT	VALVES	RESULT
N/A	N/A	N/A	N/A	N/A	INC

MERCURY UMBILICAL

SN #: 28848-02-01-01 TEST DATE: 4/9/08

PHYS	CLEAN	AMPHEN	TUBING	HEAT	RESULT
OK	OK	OK	OK	OK	PASS

COMMENTS: NEW IRM ENCLOSURE, REWIRING PERFORMED, FORMAL FUNCTIONAL TEST ACTIVITIES NOT RECORDED

83i MERCURY PROBE

INST ID / SN #: O618117722 (SOA 022) (ADA #23) TEST DATE: 4/15/08

CLEAN	PHYS	CMPNTS	LEAK	TEMPS	PRES	SHT DN	VALVES	BB CYC	M CAL	A CAL	RESULT
OK	INC	INC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	INC

COMMENTS: FUNCTIONAL TEST OF MERCURY PROBE INCOMPLETE OR NOT RECORDED (RSQ 012)

ADDITIONAL EQUIPMENT

COMMENTS:

TO BE COMPLETED UPON REVIEW

FOLLOWUP REQUIRED	SUCCESSFUL COMPLETION APPROVED SIGN AND DATE

Relative Accuracy Test Audit (RATA) Utilizing EPA's Method 30A at Rocky Mountain Power's Hardin Generating Station, Hardin, MT

Test Dates: September 24th – 28th, 2008
Project Number 06-7008

DOE Award Number DE-FC26-06NT42774

Project Director: Sharon Sjostrom
Project Engineer: Jerry Amrhein

ADA Environmental Solutions, Inc.
8100 SouthPark Way, Unit B
Littleton, CO 80120

Executive Summary

ADA Environmental Solutions, Inc. (ADA-ES) conducted mercury continuous emissions monitoring system (Hg-CEMS) testing commencing September 24, 2008 and concluding September 28, 2008 at Rocky Mountain Power's Hardin Generating Station, Hardin, MT using regulations outlined in 40 CFR Part 75.20. Method 30A was the instrumental reference method (IRM) employed to conduct a Relative Accuracy Test Audit (RATA) of the Stack Hg-CEMS, downstream of Activated Carbon Injection (ACI). Modified Method 30A procedures were also used for a RATA on the Air Heater Outlet Hg-CEMS, upstream of ACI.

This technical report was prepared with the support of the U.S. Department of Energy under Award No. DE-FC26-06NT42774, to be included in the "Long-Term Carbon Injection Field Test for >90% Mercury Removal for a PRB Unit with a Spray Dryer and Fabric Filter" project of DOE's "Phase III Mercury Control Technology Field Testing and Related Mercury Control Research and Development" program. This was the second of three RATA tests that will be performed during the Long-term Test Phase of this project as specified in the test plan.

Method 30A requires Initial Measurement System Performance Tests described in Section 8.2 [Method 30A] in order to ascertain proper function of the instrumental analyzer. A summary of these tests and their results are presented in Table 1.

Table 1: Summary of Test Results

	Stack Hg-CEMS (downstream of ACI)	**Air Heater Outlet Hg-CEMS (upstream of ACI)**
Relative Accuracy Test Audit (RATA)	PASS	PASS
Interference Check (Optional)	-	-
3-Point System Calibration Error Test	PASS	PASS
System Integrity Check	PASS	PASS
Measurement System Response	PASS	PASS
Dynamic Spiking Test	Not Performed	Not Performed

* Note: The System Integrity Check on the CEMS installed at the Air Heater Outlet was performed with elemental mercury in lieu of oxidized because no chlorine bottle was installed to perform testing at this location.

The Dynamic Spiking Test was not performed during this RATA because it is not required until January 1, 2009. Successful completion of the Dynamic Spiking Test was not attained during previous testing during the week of April 20, 2008. Its merit will be reevaluated with direction from the EPA at a later date.

Both the Stack and the Air Heater Outlet Hg-CEMS successfully met performance criteria for RATA testing. Bias was determined and evaluated as out of specification, however bias adjustment factors were not implemented. Both of these systems are subject to the scrutiny of a well-developed QA/QC program which includes daily evaluation of potentially necessary correction factors, and, as such, implementation of any correction from this Bias Test has been deemed unnecessary.

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1. Introduction

Rocky Mountain Power's Hardin Generating Station – Hardin, MT

Figure 1: Hardin Facility View

1.1 Facility Description

Rocky Mountain Power's Hardin Generating Station is a new and relatively small plant (121 MW) that was first brought online in December of 2005. Its key operating parameters are outlined in Table 2. Firing a pulverized Powder River Basin (PRB) coal from the nearby Absaloka Mine, the Hardin plant is configured with low NO_x burners and a Selective Catalytic Reduction (SCR) for NO_x control, a Spray Dryer Absorber (SDA) for SO_2 control, and a Fabric Filter (FF) for particulate control. The coal contains approximately 0.65% sulfur, 0.04 ppm mercury and <20 ppm chlorine. A commercial-grade Activated Carbon Injection (ACI) system is integrated with a new-generation mercury analyzer to allow automated feedback control of the outlet mercury emissions.

Table 2: Key Parameters of the Hardin Power Plant

Rated Capacity	121 (MW)
Range of Operation	81 – 121 MW
Operating Levels	Low: 81-93 MW Mid: 93-105 MW High (Normal): 105-121 MW
Coal (typical)	PRB, Absaloka Mine
Boiler Type	PC Boiler Opposing wall-fired
Sulfur Control	Spray Dryer with Recycle
Nitrogen Oxide Control	Low NO_x Burners/SCR
Particulate Control	Fabric Filter
Gas Flow Rate **(ACI Location)**	~ 550,000 acfm
Flue Gas Temperature **(ACI Location)**	260-320 ^{o}F

1.2 Mercury CEMS Description

The Mercury Freedom™ System manufactured by Thermo Fisher Corporation is installed at Hardin to continuously measure the mercury emissions at the Stack and the Air Heater Outlet. Thermo Electron's Mercury Freedom™ System is comprised of a Hg Analyzer (80i), Calibrator (81i), Probe Controller (82i), Probe (83i) and related peripheral components including an umbilical and instrument rack.

1.3 Sampling Port Locations

Air Sampling Associates, Inc. previously measured and documented the sampling port locations at the Stack and Air Heater Outlet depicted in Figures 2 and 3, respectively, during stack testing:

"The sampling ports on the SDA Inlet duct [Air Heater Outlet duct] are approximately 36 feet 9 1/2 inches above the ground. The sampling ports are located 13 feet 4 inches (1.12 equivalent duct diameters) downstream from a bend in the duct and 56 feet 3 inches (4.75 equivalent duct diameters) upstream from a bend in the duct. The sampling ports on the Stack are approximately 123 feet 1 1/2 inches above the ground. The sampling ports are located 33 feet 1 1/2 inches (3.64 stack diameters) downstream from the inlet to the Stack and > 18 feet 2 3/8 inches (> 2.00 Stack diameters) upstream from the outlet to the Stack."

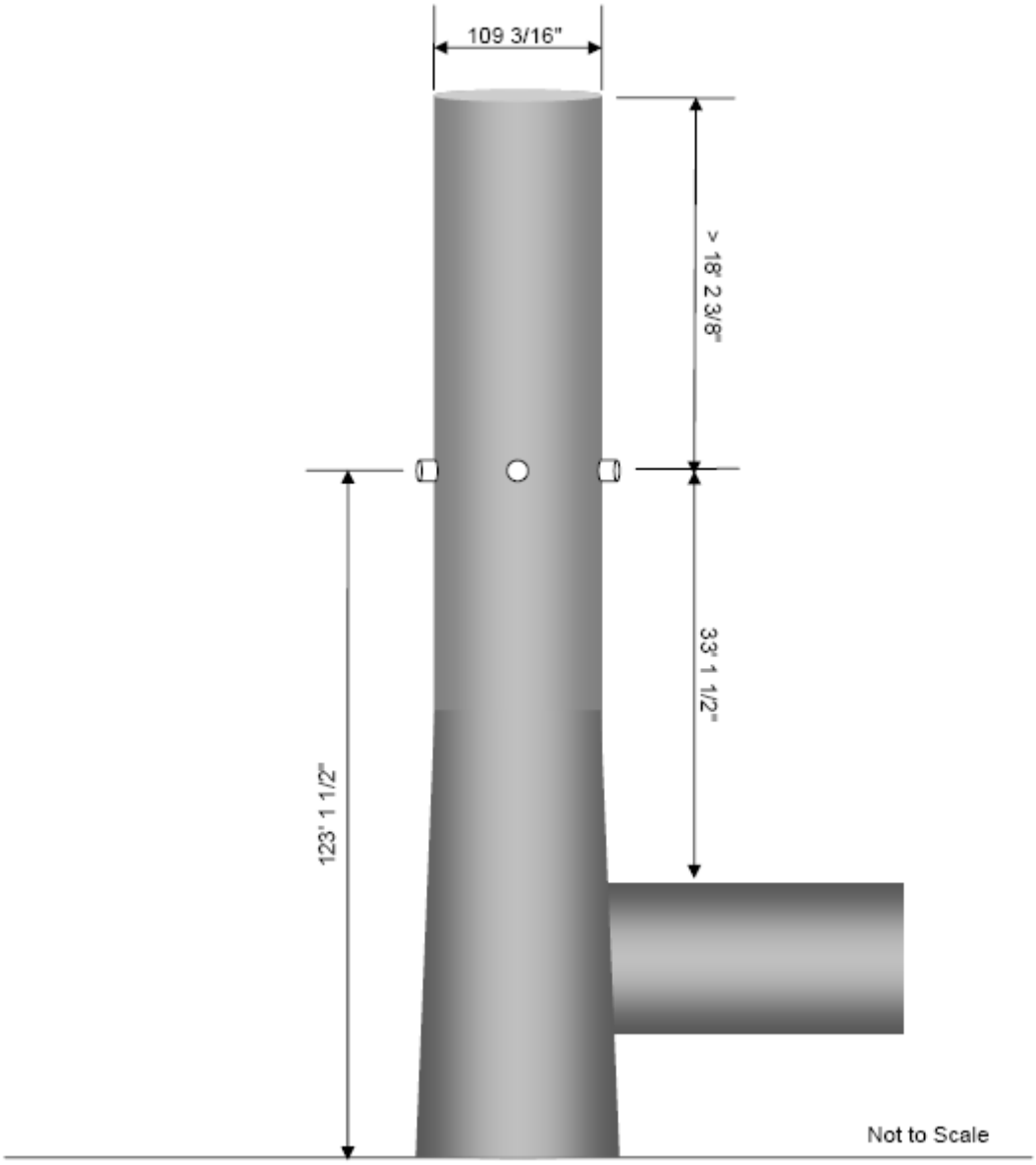

Figure 2: Stack Sampling Port Location [ASA, Inc.]

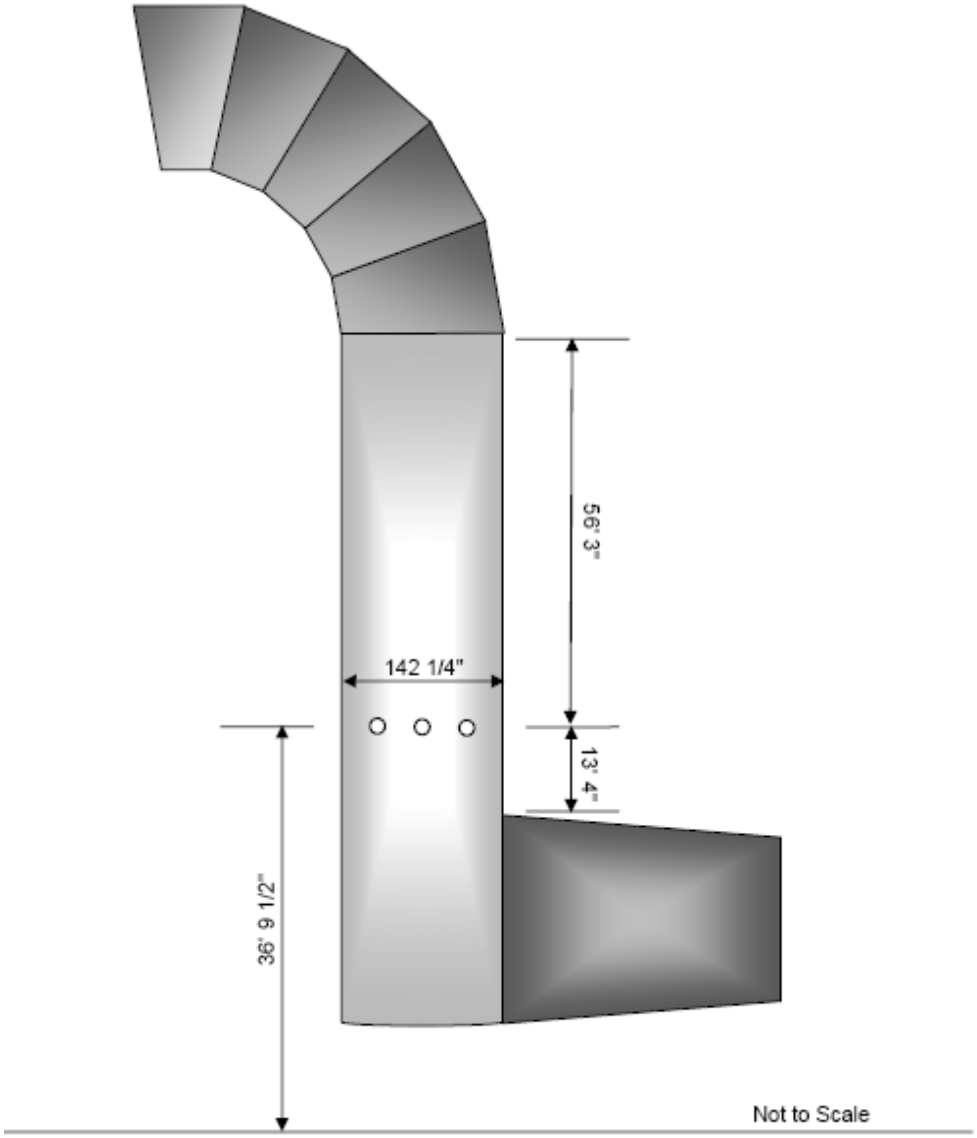

Figure 3: Air Heater Outlet Sampling Port Location [ASA, Inc.]

1.4 Method 30A Reference Analyzer Equipment & Method Description

A Thermo Mercury Freedom™ System has been configured for IRM testing. A photo of the unit is shown in Figure 4. The unit consists of a standard Model 80i Mercury Analyzer and Model 81i Mercury Calibrator installed in a temperature controlled enclosure. Probe control (temperature, flow, pressure) is achieved through analog controls installed in the environmental enclosure. A standard Model 83i Probe, shown in Figure 5, has been

modified by removing the mantle and stinger, connecting calibration gas to a port upstream of the sampling filter, and adding additional pressure monitoring capabilities to the flow measurement venturi. A modified mantle/stinger portion of the probe has been fabricated to facilitate traversing. A sketch of this component is shown in Figure 6. The mantle/stinger has been coupled to the other probe components by a 25-foot long heated umbilical. At Hardin Generating Station, the IRM enclosure was located at ground level while the probe enclosure, 25-foot heated umbilical, and mantle/stinger were located at the sampling platform.

Figure 4: Thermo CEMS Configured for an IRM

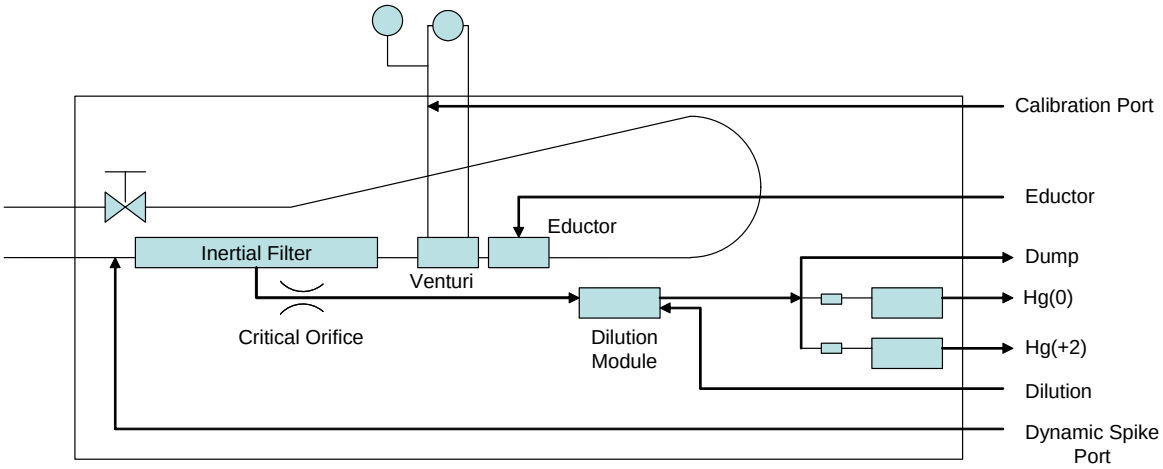

Figure 5: Thermo Model 83i Probe, Filter and Conversion Unit

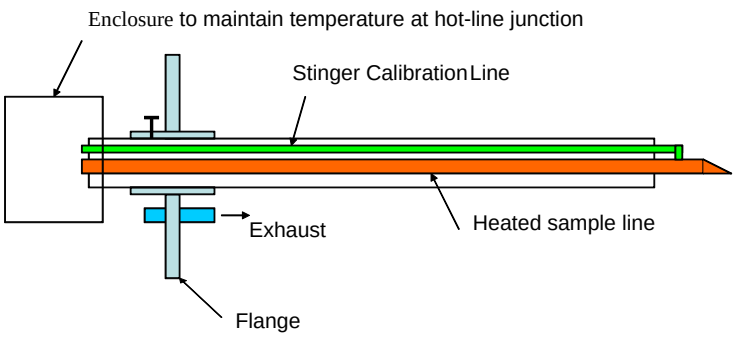

Figure 6: IRM Probe Designed for Traversing

2. Approach

2.1 Plant-Installed CEMS Parameters

System parameters for the installed Hg-CEMS are presented in Table 3. The Maximum Potential Concentration (MPC), Removal Efficiency (RE), and Maximum Expected Concentration (MEC) were determined in order to calculate the Span (S), Range, and appropriate concentration levels. These calculated values are necessary for calibration of the analyzer, and consequently the validation of measured data.

Table 3: Span and Range Value(s)

	Air Heater Outlet Hg-CEMS (Upstream of ACI)	**Stack Hg-CEMS** (Downstream of ACI)	**Reference**
MPC	10 μg/scm	10 μg/scm	Section 2.1.7.1 40 CFR Part 75 Appendix A
RE	0%	90%	Equation A-2, Section 2.1.1.2 40 CFR Part 75 Appendix A
MEC	10 μg/scm	1 μg/scm	Section 2.1.7.2 40 CFR Part 75 Appendix A
S (High : Low)	20 μg/scm	20 μg/scm : 10 μg/scm	Section 2.1.7.3 40 CFR Part 75 Appendix A
Range	20 μg/scm	10 μg/scm	Section 2.1.7.3 40 CFR Part 75 Appendix A
Zero-level Concentration (0-20% * S)	0 μg/scm (0%)	0 μg/scm (0%) : 0 μg/scm (0%)	Section 5.2 40 CFR Part 75 Appendix A
Low-level Concentration (20-30% * S)	5 μg/scm (25%)	5 μg/scm (25%) : 3 μg/scm (30%)	Section 5.2 40 CFR Part 75 Appendix A
Mid-level Concentration (50-60% * S)	11 μg/scm (55%)	11 μg/scm (55%) : 5 μg/scm (50%)	Section 5.2 40 CFR Part 75 Appendix A
High-level Concentration (80-100% * S)	18 μg/scm (90%)	18 μg/scm (90%) : 9 μg/scm (90%)	Section 5.2 40 CFR Part 75 Appendix A

* The high span value on the Outlet CEM is neglected because Hg concentrations at the stack will never exceed 2.0 μg/scm by design of emissions control.

2.2 Relative Accuracy Test Audit (RATA) & Bias Test

2.2.1 Instrumental Analyzer Configuration

2.2.1.1 Calibration Span & Gas Concentrations

To the extent practicable the measured emissions are to be between 10 and 100% of the selected calibration span. It is recommended that the calibration span be at least twice the native concentration to accommodate the dynamic spiking procedure (Section 3.4, [Method 30A]). The selected value of the calibration span is limited by the capabilities of the calibrator. The parameters used for calibration and data validation tests of the instrumental analyzer are outlined in Table 4.

Table 4: IRM Calibration Span & Gas Concentrations

	Native Concentration =	2 μg/scm
	Calibration Span (CS) =	10 μg/scm
Gas Concentration	**Allowable Range**	**Hg Concentration**
Zero-level	Non-detectable	0 μg/scm (0 %)
Low-level	10-30 % CS	3 μg/scm (30 %)
Mid-level	40-60 % CS	5 μg/scm (50 %)
High-level	100 % CS	10 μg/scm (100 %)

2.2.1.2 Sample Point Selection

When Method 30A is used for relative accuracy testing of a Hg-CEMS, the sampling site selection and sampling point layout procedures are referenced in the appropriate performance specification or applicable regulation described in Performance Specification 2, Section 8.1.3 [40 CFR Part 75 Appendix B] or Section 6.5.6 [40 CFR Part 75 Appendix A]. Alternatively, Section 8.1.3.4 [Method 30A] states that stratification testing need not be performed at a test location where it would otherwise be required to justify using fewer sample points or different sample points, if the Hg concentration in the stack gas is expected to be 3 $\mu g/m^3$ or less at the time of a Hg monitoring system RATA or an Hg emissions test. Documentation of at least one hour of Hg concentration data is required just prior to the RATA or emissions test. If a particular test location qualifies for the stratification testing exemption, sampling shall be performed at three points, as described in Section 8.1.3.2.2 [Method 30A]. Since the stack diameter (or equivalent diameter, for a rectangular stack or duct) is greater than 7.8 ft, the three Stack sampling points were therefore located at 4.4, 14.6, and 29.6 percent of the stack diameter (109 3/16”) from the stack or duct wall (see Figure 2). Since only modified Method 30A procedures were performed at the Air Heater Outlet, a single sampling point depicted in Figure 3 was selected at 78.74” from the duct wall.

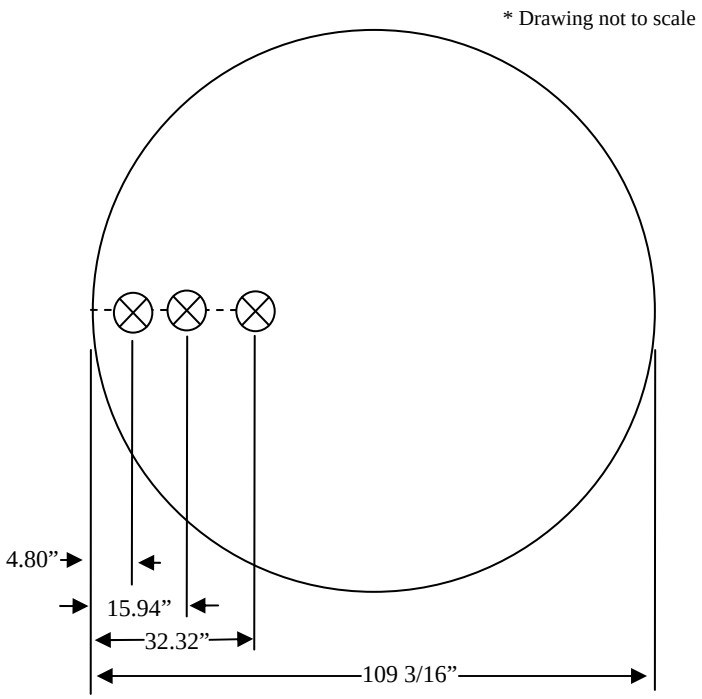

Figure 7: Stack Sampling Points

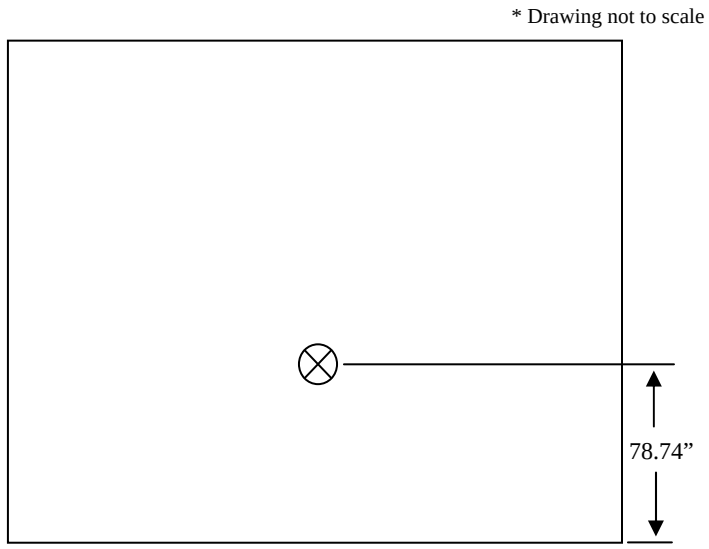

Figure 8: Air Heater Outlet Sampling Point

2.2.2 Initial Measurement System Performance Tests

Initial measurement system performance tests need to be conducted on the instrumental analyzer prior to starting the nine (9) required test runs. The performance requirements of this method must be met to validate data, and are described below:

(1) Interference Testing (Optional)
(2) Calibration Gas Verification
(3) Measurement System Preparation
(4) 3-Point System Calibration Error Test
(5) System Integrity Check

(6) Measurement System Response Time Test
(7) Dynamic Spiking (deferred until January 1, 2009)

2.2.2.1 Interference Test (Optional)
It is recommended that this test be conducted prior to the initial use of the measurement system in the field to verify that the candidate test instrument is free from inherent biases or interferences resulting from common combustion emission constituents. The interference test procedure is found in Section 8.6 [Method 30A]. This procedure was not performed during this test period.

2.2.2.2 Calibration Gas Verification
EPA Traceability Protocol for Qualification and Certification of Elemental Mercury Gas Generators and EPA Traceability Protocol for Qualification and Certification of Oxidized Mercury Gas Generators expected publication date December 2008, see www.epa.gov/ttn/emc.

2.2.2.3 Measurement System Preparation
The measurement system was assembled, prepared, and preconditioned according to standard operating procedure.

2.2.2.4 System Calibration Error Test
Using elemental mercury (Hg^0), a 3-point system calibration error test was conducted prior to the first test run. The low-, mid-, and high-level calibration gases were introduced in any order into the instrumental analyzer, and, after each gas injection, a stable response was obtained and recorded.

Acceptance criteria:

i. SCE ≤ ±5%, where

$$SCE = \frac{C_s - C_v}{CS} \times 100$$

SCE - System Calibration Error [%].
C_s - Measured concentration of the calibration gas [μg/scm].
C_v - Certified concentration of the calibration gas [μg/scm].
CS - Calibration Span [μg/scm].

ii. Alternatively, $|C_s - C_v| \leq 0.5$ μg/scm

2.2.2.5 System Integrity Check
Using oxidized mercury (Hg^{2+}), a two-point system integrity check was conducted as required before the first test run. The zero- and mid-level calibration gases were introduced into the instrumental analyzer, and, after each gas injection, a stable response was obtained and recorded.

Acceptance criteria:

i. SCE ≤ ±5%, where

$$SCE = \frac{C_s - C_v}{CS} \times 100$$

SCE - System Calibration Error [%].
C_s - Measured concentration of the calibration gas [μg/scm].
C_v - Certified concentration of the calibration gas [μg/scm].
CS - Calibration Span [μg/scm].

ii. Alternatively, $|C_s - C_v| \leq 0.5$ μg/scm

2.2.2.6 Measurement System Response Time

The measurement system response time provides the minimum sampling time for each sampling point. It is equal to the time that is required for the measured Hg concentration to increase from the stable low-level calibration gas response to a value within 5 percent of the stable high-level calibration gas response obtained during the system calibration error test in Section 8.2.4 [Method 30A], assuming the high-level calibration gas was injected immediately after the low-level.

2.2.2.7 Dynamic Spiking Test (deferred until January 1, 2009)

2.2.3 Test Runs

After the instrumental analyzer successfully met the acceptance criteria of the Initial System Performance Tests, the minimum nine (9) test runs of the RATA were performed. One test run constitutes sampling once at each of the successive sample points. The run validations listed below must be performed while sampling.

2.2.3.1 System Integrity Checks

Before and after each test run, a two-point system integrity check using the same procedure as the initial system integrity check must be conducted. No adjustments may be made to the measurement system during the checks, other than to maintain the target calibration gas flow rate and the proper dilution ratio. This check may be skipped between each run provided that a system integrity check performed on completion of runs passes the allowed specification. If a post-run integrity check is failed, all test runs since the last passed system integrity check are invalid. If a check is failed, corrective action must be taken and another 3-point Hg^0 System Calibration Error Test passed followed by another System Integrity Check before conducting any additional test runs.

2.2.3.2 Drift Check

Using the data from the successful pre- and post-run system integrity checks, calculate the zero and upscale drift. Exceeding the specification does not invalidate the run, but corrective action must be taken and a new 3-point Hg^0 System Calibration Error Test and a System Integrity Check must be passed before any more runs are made.

Acceptance criteria:

i. $D \leq 3.0\%$, where

$$D = \left| SCE_f - SCE_i \right|$$

D – Drift [%].
$SCE_{i,f}$ - System Calibration Error, pre/post-run [%].

ii. Alternatively, $|C_{s,f} - C_{s,i}| \leq 0.3$ μg/scm

$C_{s,i/f}$ – Measured concentration of the calibration gas, pre/post-run [μg/scm].

2.2.3.3 Sampling

For each sample point determined from Section 8.1, Method 30A, the system must be allowed to flush and equilibrate for at least two times the measurement system response time before recording any data. The minimum sampling time at each sampling point must be at least two times the system response time, but not less than 10 minutes.

2.2.4 Relative Accuracy Calculation

Acceptance criteria:

i. RA ≤ 20.0%, where

Arithmetic Mean:

$$d = RM - CEM$$

d – The difference between a reference method value and the corresponding continuous emission monitoring system value at a given point in time.

RM – Reference method value.

CEM – Continuous emission monitoring system value.

$$\overline{d} = \frac{\sum_{i=1}^{n} d_i}{n}$$

n – Number of data points.

Standard Deviation:

$$S_d = \sqrt{\frac{\sum_{i=1}^{n} d_i^2 - \left[\frac{\left(\sum_{i=1}^{n} d_i\right)^2}{n}\right]}{n-1}}$$

S_d – Standard deviation.

Confidence Coefficient:

$$cc = t_{0.025} \times \frac{S_d}{\sqrt{n}}$$

cc – Confidence coefficient.

$t_{0.025}$ – t-value.

Relative Accuracy:

$$RA = \frac{|\partial| + |cc|}{\overline{RM}} \times 100$$

RA – Relative accuracy of a data set.
RM – Arithmetic mean of the reference method values.
∂ – Mean difference between the reference method values and the corresponding continuous emission monitoring system values.

ii. Alternatively, if $\overline{RM} \leq 5.0$ μg/scm, $\overline{CEM} - \overline{RM} \leq \pm 1.0$ μg/scm

2.2.5 Bias Determination & Adjustment Factor Calculation

If the following criterion is met for the relative accuracy test audit data set being tested, the monitoring system has passed the bias test:

Acceptance criterion:

$$\left|\overline{d}\right| \leq \left|cc\right|$$

If the monitor or monitoring system fails to meet the bias test requirement, adjustment of the value obtained from the monitor is necessary using the following equation:

$$CEM_i^{Adjusted} = CEM_i^{Monitor} \times BAF$$

$CEM_i^{Adjusted}$ - Data value, adjusted for bias, at time i.

$CEM_i^{Monitor}$ - Data (measurement) provided by monitor at time i.

BAF – Bias Adjustment Factor.

Bias Adjustment Factor:

$$BAF = 1 + \frac{\overline{d}}{\overline{CEM}}$$

If the monitoring system meets the normal or the alternative relative accuracy specification in section 3.3.8 of 40 CFR Part 75 Appendix A but fails the bias test, the owner or operator may either use the BAF calculated above or may use a default BAF of 1.250 for reporting purposes. Each time a RATA is passed and the appropriate BAF has been determined, the BAF is to be applied prospectively to all monitoring system data, beginning with the first clock hour following the hour in which the RATA was completed.

3. Results and Discussion

A full 9-run, 3-point RATA was successfully performed on the installed CEMS at the Stack location (see Table 5). Relative Accuracy was calculated to be 30.64% (≤20% is passing), however the difference between the average installed CEMS response and Reference Method response was 0.12 μg/scm (≤1.0 μg/scm is passing alternative criteria for average Reference Method responses ≤5.0 μg/scm).

Table 5: RATA & Bias Test - Stack Hg-CEMS

Relative Accuracy Test Audit & Bias Test Summary

Facility:	Hardin Generating Station	**Date(s):**	09/24/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	David Young	**Test Method:**	Method 30A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
		Serial No:	0613917173

Test Run	Start	End	Hg^T [μg/scm] RM	Hg^T [μg/scm] CEM	d [μg/scm]	d^2 [μg/scm]
1	12:00	12:36	0.37	0.52	-0.15	0.02
2	13:12	13:48	0.49	0.55	-0.06	0.00
3	13:48	14:24	0.43	0.50	-0.07	0.00
4	14:24	15:00	0.46	0.62	-0.16	0.03
5	15:48	16:24	0.59	0.71	-0.12	0.01
6	16:24	17:00	0.62	0.77	-0.15	0.02
7	17:48	18:24	0.65	0.76	-0.11	0.01
8	18:24	19:00	0.50	0.69	-0.19	0.04
9	19:43	20:19	0.48	0.58	-0.10	0.01

RM - Reference method value
CEM - Continuous emission monitoring system value
d - Difference between RM and CEM values
n - Number of data points
S_d - Standard deviation
$t_{0.025}$ - t-value
cc - Confidence coefficient

Acceptance criteria:
(1) RA ≤ 20.0%
(2) Alternatively, if $\overline{RM} \leq 5.0$ μg/scm, $\overline{CEM} - \overline{RM} \leq \pm 1.0$ μg/scm

n =	9
$\overline{d}$ =	-0.12
$\overline{d_i^2}$ =	0.02
$\overline{RM}$ =	0.51
$\overline{CEM}$ =	0.63
S_d =	0.04
$t_{0.025}$ =	2.306
cc =	0.033
RA =	30.64%
$\overline{CEM} - \overline{RM}$ =	0.12

BAF - Bias adjustment factor
Acceptance criteria:
(1) $|\overline{d}| \leq |cc|$

BAF =	0.806

A Test Synopsis for the Stack Hg-CEMS RATA is included in Table 6. All Initial System Performance Test and Run Validation performance specifications were met.

Table 6: Test Synopsis (Stack)

Test Synopsis

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: David Young
Jim Domenico

CS = 10 µg/scm

Date(s): 09/24/2008
Unit(s) tested: Stack Hg-CEMS
Test Runs: 1-9
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No: 0613917173

Action / Sample Point	Time Start	Time End	Calibration Gas Level	C_v [µg/scm]	C_s [µg/scm]	C_{CEM} [µg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [µg/scm]	D [%]	$\lvert C_{s,pre}-C_{s,post} \rvert$ [µg/scm]
Sys Cal Error Test	10:39	10:52	Low	3.00	2.56		-4.36	0.44		
	10:52	11:02	High	10.00	9.73		-2.66	0.27		
	11:02	11:10	Mid	5.00	5.19		1.87	0.19		
Meas Sys Resp Time Test	10:52	11:02	Low	3.00	2.56	Measurement Sys Resp Time = 5 min.				
			High	10.00	9.73					
Sys Integrity Test	11:12	11:25	Zero	0.00	0.07		0.69	0.07		
	11:25	11:38	Mid	5.00	5.15		1.53	0.15		
Run 1	12:00	12:12			0.37	0.52				
	12:12	12:24			0.37	0.52				
3-2-1	12:24	12:36			0.38	0.53				
Sys Integrity Test	12:36	12:48	Zero	0.00	-0.07		-0.73	0.07	1.42	0.14
	12:48	13:00	Mid	5.00	4.94		-0.61	0.06	2.14	0.21
Run 2	13:12	13:24			0.49	0.54				
	13:24	13:36			0.54	0.54				
1-2-3	13:36	13:48			0.45	0.57				
Run 3	13:48	14:00			0.40	0.54				
	14:00	14:12			0.46	0.41				
3-2-1	14:12	14:24			0.44	0.55				
Run 4	14:24	14:36			0.47	0.62				
	14:36	14:48			0.45	0.64				
1-2-3	14:48	15:00			0.45	0.60				
Sys Integrity Test	15:00	15:12	Zero	0.00	-0.08		-0.82	0.08	0.09	0.01
	15:12	15:32	Mid	5.00	4.74		-2.61	0.26	2.00	0.20
Run 5	15:48	16:00			0.64	0.73				
	16:00	16:12			0.58	0.70				
3-2-1	16:12	16:24			0.55	0.69				
Run 6	16:24	16:36			0.58	0.73				
	16:36	16:48			0.59	0.79				
1-2-3	16:48	17:00			0.68	0.78				
Sys Integrity Test	17:00	17:13	Zero	0.00	-0.12		-1.24	0.12	0.41	0.04
	17:13	17:28	Mid	5.00	4.61		-3.95	0.39	1.34	0.13
Run 7	17:48	18:00			0.68	0.77				
	18:00	18:12			0.69	0.77				
3-2-1	18:12	18:24			0.57	0.73				
Run 8	18:24	18:36			0.53	0.71				
	18:36	18:48			0.49	0.69				
1-2-3	18:48	19:00			0.48	0.68				
Sys Integrity Test	19:00	19:15	Zero	0.00	-0.13		-1.34	0.13	0.10	0.01
	19:15	19:35	Mid	5.00	4.56		-4.38	0.44	0.43	0.04
Run 9	19:43	19:55			0.53	0.64				
	19:55	20:07			0.45	0.51				
3-2-1	20:07	20:19			0.45	0.59				
Sys Integrity Test	20:19	20:34	Zero	0.00	-0.16		-1.61	0.16	0.38	0.04
	20:34	20:49	Mid	5.00	4.59		-4.15	0.41	0.20	0.02

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ ±5.0%
(2) Alternatively, $|C_s-C_v| \leq 0.5$ µg/scm

D - Drift
$C_{s,pre}$ - Pre-run measured concentraion of calibration gas
$C_{s,post}$ - Post-run measured concentraion of calibration gas

Acceptance criteria:
(1) D ≤ 3.0%
(2) Alternatively, $|C_{s,\ post\text{-}run}-C_{s,\ pre\text{-}run}| \leq 0.3$ µg/scm

A modified 9-run, single-point RATA was successfully performed on the installed CEMS at the Air Heater Outlet location. Relative Accuracy was calculated to be 18.57% (20% is passing). It was not in the original scope of the Test Plan to perform a full RATA at this location, so the test was modified to be performed at a single sample point. This particular location lacked an installed chlorine calibration gas cylinder required to properly perform System Integrity Tests on the instrumental analyzer, so elemental mercury standards were used in lieu of oxidized mercury.

Table 7: RATA & Bias Test - Air Heater Outlet Hg-CEMS

Relative Accuracy Test Audit & Bias Test Summary

Facility:	Hardin Generating Station	**Date(s):**	09/27/2008 - 09/28/2008
Project #:	06-7008	**Unit(s) tested:**	Air Heater Outlet Hg-CEMS
Personnel:	David Young	**Test Method:**	Method 30A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
		Serial No:	0613917146

Test Run	Start	End	Hg^T [μg/scm] RM	Hg^T [μg/scm] CEM	d [μg/scm]	d^2 [μg/scm]
1	23:40	23:52	3.98	4.54	-0.56	0.31
2	23:52	00:04	3.92	4.11	-0.19	0.04
3	00:04	00:16	3.83	3.77	0.06	0.00
4	00:16	00:28	3.85	4.46	-0.61	0.38
5	00:28	00:40	3.79	4.45	-0.66	0.43
6	00:40	00:52	3.82	4.51	-0.69	0.48
7	00:52	01:04	3.74	4.49	-0.75	0.56
8	01:04	01:16	3.44	4.08	-0.64	0.41
9	01:58	02:10	3.87	4.50	-0.63	0.40
10	02:10	02:22	3.77	4.46	-0.69	0.47
11	02:22	02:34	3.73	4.31	-0.58	0.34

RM - Reference method value
CEM - Continuous emission monitoring system value
d - Difference between RM and CEM values
n - Number of data points
S_d - Standard deviation
$t_{0.025}$ - t-value
cc - Confidence coefficient

Acceptance criteria:
(1) RA ≤ 20.0%
(2) Alternatively, if $\overline{RM} \leq 5.0$ μg/scm, $\overline{CEM} - \overline{RM} \leq \pm 1.0$ μg/scm

n =	11
$\overline{d}$ =	-0.54
d_i^2 =	0.35
$\overline{RM}$ =	3.80
$\overline{CEM}$ =	4.33
S_d =	0.25
$t_{0.025}$ =	2.228
cc =	0.165
RA =	18.57%
$\overline{CEM} - \overline{RM}$ =	0.54
BAF =	0.876

BAF - Bias adjustment factor
Acceptance criteria:
(1) $|\overline{d}| \leq |cc|$

A Test Synopsis for the Air Heater Outlet Hg-CEMS RATA is included in Table 8. All Initial System Performance Test and Run Validation performance specifications were met.

Table 8: Test Synopsis (Air Heater Outlet)

Test Synopsis

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: David Young
Jim Domenico

CS = 10 μg/scm

Date(s): 09/27/2008 - 09/28/2008
Unit(s) tested: Air Heater Outlet Hg-CEMS
Test Runs: 1-11
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No: 0613917146

Action / Sample Point	Time Start	Time End	Calibration Gas Level	C_v [μg/scm]	C_s [μg/scm]	C_{CEM} [μg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [μg/scm]	D [%]	$\lvert C_{s,pre}-C_{s,post} \rvert$ [μg/scm]
Sys Cal Error Test	22:10	22:25	Low	3.00	3.02		0.24	0.02		
	22:25	22:40	High	10.00	10.30		3.03	0.30		
	22:40	22:55	Mid	5.00	4.99		-0.07	0.01		
Meas Sys Resp Time Test	22:25	22:40	Low	3.00	3.02	Measurement Sys Resp Time = 6 min.				
			High	10.00	10.30					
Sys Integrity Test	22:55	23:10	Zero	0.00	0.22		2.21	0.22		
	23:10	23:25	Mid	5.00	4.91		-0.90	0.09		
Run 1 1	23:40	23:52			3.98	4.54				
Run 2 1	23:52	00:04			3.92	4.11				
Run 3 1	00:04	00:16			3.83	3.77				
Run 4 1	00:16	00:28			3.85	4.46				
Run 5 1	00:28	00:40			3.79	4.45				
Run 6 1	00:40	00:52			3.82	4.51				
Run 7 1	00:52	01:04			3.74	4.49				
Run 8 1	01:04	01:16			3.44	4.08				
Sys Integrity Test	01:16	01:31	Zero	0.00	0.06		0.56	0.06	1.65	0.17
	01:31	01:46	Mid	5.00	4.89		-1.14	0.11	0.24	0.02
Run 9 1	01:58	02:10			3.87	4.50				
Run 10 1	02:10	02:22			3.77	4.46				
Run 11 1	02:22	02:34			3.73	4.31				
Sys Integrity Test	02:36	02:51	Zero	0.00	0.08		0.78	0.08	0.22	0.02
	02:51	03:06	Mid	5.00	4.99		-0.15	0.01	0.99	0.10

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ ±5.0%
(2) Alternatively, $|C_s-C_v| \leq 0.5$ μg/scm

D - Drift
$C_{s,pre}$ - Pre-run measured concentraion of calibration gas
$C_{s,post}$ - Post-run measured concentraion of calibration gas

Acceptance criteria:
(1) D ≤ 3.0%
(2) Alternatively, $|C_{s,\ post\text{-}run}-C_{s,\ pre\text{-}run}| \leq 0.3$ μg/scm

Bias tests on both monitoring systems failed the acceptance criterion, and bias adjustment factors were calculated but not implemented. In order to determine bias, the absolute value of the average difference between CEMS and RM values, $|\bar{d}|$, must be less than or equal to the confidence coefficient, cc, of the data. For the Stack Hg-CEMS RATA, $|\bar{d}|$ was determined to be 0.12 and cc was 0.033. For the Air Heater Outlet Hg-CEMS RATA, $|\bar{d}|$ was determined to be 0.54 and cc was 0.165. Bias Adjustment Factors were calculated but were not implemented into the installed CEMS. Both of these systems are subject to the scrutiny of a well-developed Quality Assurance/Quality Control (QA/QC) program which includes daily evaluation of potentially necessary correction factors, and, as such, implementation of any correction from this Bias Test has been deemed unnecessary.

4. Conclusions

The Relative Accuracy Test Audits conducted on both the Stack and the Air Heater Outlet Hg-CEMS passed established performance specifications. Bias was evident between responses of both systems and the instrumental analyzer; however correction factors were not implemented because this would interfere with the daily CEMS QA/QC program.

All Initial System Performance Tests required for validation of the instrumental analyzer passed performance criteria at both locations prior to commencing each first test run. Run validations were performed as described in section 2.2.3 of this report.

A duplicate of the Summary of Test Results from Table 1 is presented below.

Summary of Test Results (From Table 1)

	Stack Hg-CEMS (downstream of ACI)	**Air Heater Outlet Hg-CEMS (upstream of ACI)**
Relative Accuracy Test Audit (RATA)	PASS	PASS
Interference Check (Optional)	-	-
3-Point System Calibration Error Test	PASS	PASS
System Integrity Check	PASS	PASS
Measurement System Response	PASS	PASS
Dynamic Spiking Test	Not Performed	Not Performed

This was the second of three in a series of tests to be performed at Rocky Mountain Power's Hardin Generating Station, Hardin, MT during the Long-term Test Phase of this project as specified in the test plan. The primary goal of these tests was to demonstrate that the installed Hg-CEMS will comply with future established directives, as well as to provide feedback of the recently approved EPA Method 30A reference method.

5. Appendix

5.1 Initial Measurement System Response Tests

Results from the instrumental analyzer's pre-certification tests are presented below in Tables 9 through 14.

Table 9: IRM System Calibration Error Test (Stack)

System Calibration Error Test

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: David Young
Jim Domenico

Date(s): 09/24/2008
Unit(s) tested: Stack Hg-CEMS
Test Runs: N/A
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No: 0613917173

CS = 10 µg/scm

Time Start	Time End	Calibration Gas Level	C_v [µg/scm]	C_s [µg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [µg/scm]
10:39	10:52	Low-	3.00	2.56	-4.36	0.44
10:52	11:02	High-	10.00	9.73	-2.66	0.27
11:02	11:10	Mid-	5.00	5.19	1.87	0.19

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span value

Acceptance criteria:
(1) SCE $\leq \pm 5.0\%$
(2) Alternatively, $|C_s-C_v| \leq 0.5$ µg/scm

Table 10: IRM System Calibration Error Test (Air Heater Outlet)

System Calibration Error Test

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: David Young
Jim Domenico

Date(s): 09/27/2008 - 09/28/2008
Unit(s) tested: Air Heater Outlet Hg-CEMS
Test Runs: N/A
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No: 0613917146

CS = 10 µg/scm

Time Start	Time End	Calibration Gas Level	C_v [µg/scm]	C_s [µg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [µg/scm]
00:00	00:34	Low-	3.00	3.02	0.24	0.02
00:00	07:16	High-	10.00	10.30	3.03	0.30
00:00	23:49	Mid-	5.00	4.99	-0.07	0.01

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span value

Acceptance criteria:
(1) SCE $\leq \pm 5.0\%$
(2) Alternatively, $|C_s-C_v| \leq 0.5$ µg/scm

Table 11: IRM Measurement System Response Time (Stack)

Measurement System Response Time Test

Facility:	Hardin Generating Station	**Date(s):**	09/24/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	David Young	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
CS =	10 µg/scm	**Serial No:**	0613917173

Calibration Gas Level	C_v [µg/scm]	Start Time	$C_{s,i}$ [µg/scm]	End Time	$C_{s,f}$ [µg/scm]	Response Time [min.]
Low-/High-	3.00/10.00	10:52	2.56	11:02	9.73	05:00

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
(i=initial, f=final)
CS - Calibration span value

Acceptance criteria:
(1) Response Time ≤ 15.0 min.

Table 12: IRM Measurement System Response Time (Air Heater Outlet)

Measurement System Response Time Test

Facility:	Hardin Generating Station	**Date(s):**	09/27/2008 - 09/28/2008
Project #:	06-7008	**Unit(s) tested:**	Air Heater Outlet Hg-CEMS
Personnel:	David Young	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
CS =	10 µg/scm	**Serial No:**	0613917146

Calibration Gas Level	C_v [µg/scm]	Start Time	$C_{s,i}$ [µg/scm]	End Time	$C_{s,f}$ [µg/scm]	Response Time [min.]
Low-/High-	3.00/10.00	22:25	3.02	22:40	10.30	06:00

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
(i=initial, f=final)
CS - Calibration span value

Acceptance criteria:
(1) Response Time ≤ 15.0 min.

Table 13: IRM System Integrity Check (Stack)

System Integrity Check

Facility:	Hardin Generating Station	**Date(s):**	09/24/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	David Young	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
CS =	10 μg/scm	**Serial No:**	0613917173

Calibration Gas Level	C_v [μg/scm]	C_s [μg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [μg/scm]
Zero-	0.00	0.07	0.69	0.07
Mid-	5.00	5.15	1.53	0.15

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ ±5.0%
(2) Alternatively, $|C_s-C_v| \leq 0.5$ μg/scm

Table 14: IRM System Integrity Check (Air Heater Outlet)

System Integrity Check

Facility:	Hardin Generating Station	**Date(s):**	09/27/2008 - 09/28/2008
Project #:	06-7008	**Unit(s) tested:**	Air Heater Outlet Hg-CEMS
Personnel:	David Young	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
CS =	10 μg/scm	**Serial No:**	0613917146

Calibration Gas Level	C_v [μg/scm]	C_s [μg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [μg/scm]
Zero-	0.00	0.22	2.21	0.22
Mid-	5.00	4.91	-0.90	0.09

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ ±5.0%
(2) Alternatively, $|C_s-C_v| \leq 0.5$ μg/scm

Relative Accuracy Test Audit (RATA) Utilizing EPA's Method 30A at Rocky Mountain Power's Hardin Generating Station, Hardin, MT

Test Dates: October 15th – 18th, 2008
Project Number 06-7008

DOE Award Number DE-FC26-06NT42774

Project Director: Sharon Sjostrom
Project Engineer: Jerry Amrhein

ADA Environmental Solutions, Inc.
8100 SouthPark Way, Unit B
Littleton, CO 80120

Executive Summary

ADA Environmental Solutions, Inc. (ADA-ES) conducted mercury continuous emissions monitoring system (Hg-CEMS) testing commencing October 15, 2008 and concluding October 18, 2008 at Rocky Mountain Power's Hardin Generating Station, Hardin, MT using regulations outlined in 40 CFR Part 75.20. Method 30A was the instrumental reference method (IRM) employed to conduct a Relative Accuracy Test Audit (RATA) of the Stack Hg-CEMS, downstream of Activated Carbon Injection (ACI). Modified Method 30A procedures were also used for a RATA on the Air Heater Outlet Hg-CEMS, upstream of ACI.

This technical report was prepared with the support of the U.S. Department of Energy under Award No. DE-FC26-06NT42774, to be included in the "Long-Term Carbon Injection Field Test for >90% Mercury Removal for a PRB Unit with a Spray Dryer and Fabric Filter" project of DOE's "Phase III Mercury Control Technology Field Testing and Related Mercury Control Research and Development" program. This was the third of three RATA tests that were performed during the Long-term Test Phase of this project as specified in the test plan.

Method 30A requires Initial Measurement System Performance Tests described in Section 8.2 [Method 30A] in order to ascertain proper function of the instrumental analyzer. Challenges with successful completion of oxidized calibrations during System Integrity Tests on the instrumental analyzer necessitated substituting elemental mercury standards. Note that the Dynamic Spiking Test is not required until January 1, 2009, and was not performed as part of this RATA. A summary of the tests performed is presented in Table 1.

Table 1: Summary of Test Results

	Stack Hg-CEMS (downstream of ACI)	**Air Heater Outlet Hg-CEMS (upstream of ACI)**
Relative Accuracy Test Audit (RATA)	PASS	PASS
Interference Check (Optional)	-	-
3-Point System Calibration Error Test	PASS	PASS
System Integrity Check	PASS	PASS
Measurement System Response	PASS	PASS
Dynamic Spiking Test	Not Performed	Not Performed

* Note: The System Integrity Check on the CEMS installed at the Air Heater Outlet was performed with elemental mercury in lieu of oxidized because no chlorine bottle was installed to perform testing at this location.

Under the noted conditions, both the Stack and the Air Heater Outlet Hg-CEMS successfully met performance criteria for RATA testing using Method 30A as the reference method. Bias was determined and evaluated as out of specification at the Air Heater Outlet, however bias adjustment factors were not implemented. Both of these systems are subject to the scrutiny of a well-developed QA/QC program which includes daily evaluation of potentially necessary correction factors, and, as such, implementation of any correction from this Bias Test has been deemed unnecessary.

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1. Introduction

Rocky Mountain Power's Hardin Generating Station – Hardin, MT

Figure 1: Hardin Facility View

1.1 Facility Description

Rocky Mountain Power's Hardin Generating Station is a new and relatively small plant (121 MW) that was first brought online in December of 2005. Its key operating parameters are outlined in Table 2. Firing a pulverized Powder River Basin (PRB) coal from the nearby Absaloka Mine, the Hardin plant is configured with low NO_x burners and a Selective Catalytic Reduction (SCR) for NO_x control, a Spray Dryer Absorber (SDA) for SO_2 control, and a Fabric Filter (FF) for particulate control. The coal contains approximately 0.65% sulfur, 0.04 ppm mercury and <20 ppm chlorine. A commercial-grade Activated Carbon Injection (ACI) system is integrated with a new-generation mercury analyzer to allow automated feedback control of the outlet mercury emissions.

Table 2: Key Parameters of the Hardin Power Plant

Rated Capacity	121 (MW)
Range of Operation	81 – 121 MW
Operating Levels	Low: 81-93 MW Mid: 93-105 MW High (Normal): 105-121 MW
Coal (typical)	PRB, Absaloka Mine
Boiler Type	PC Boiler Opposing wall-fired
Sulfur Control	Spray Dryer with Recycle
Nitrogen Oxide Control	Low NO_x Burners/SCR
Particulate Control	Fabric Filter
Gas Flow Rate **(ACI Location)**	~ 550,000 acfm
Flue Gas Temperature **(ACI Location)**	260-320 ^{o}F

1.2 Mercury CEMS Description

The Mercury Freedom™ System manufactured by Thermo Fisher Corporation is installed at Hardin to continuously measure the mercury emissions at the Stack and the Air Heater Outlet. Thermo Electron's Mercury Freedom™ System is comprised of a Hg Analyzer (80i), Calibrator (81i), Probe Controller (82i), Probe (83i) and related peripheral components including an umbilical and instrument rack.

1.3 Sampling Port Locations

Air Sampling Associates, Inc. previously measured and documented the sampling port locations at the Stack and Air Heater Outlet depicted in Figures 2 and 3, respectively, during stack testing:

"The sampling ports on the SDA Inlet duct [Air Heater Outlet duct] are approximately 36 feet 9 1/2 inches above the ground. The sampling ports are located 13 feet 4 inches (1.12 equivalent duct diameters) downstream from a bend in the duct and 56 feet 3 inches (4.75 equivalent duct diameters) upstream from a bend in the duct. The sampling ports on the Stack are approximately 123 feet 1 1/2 inches above the ground. The sampling ports are located 33 feet 1 1/2 inches (3.64 stack diameters) downstream from the inlet to the Stack and > 18 feet 2 3/8 inches (> 2.00 Stack diameters) upstream from the outlet to the Stack."

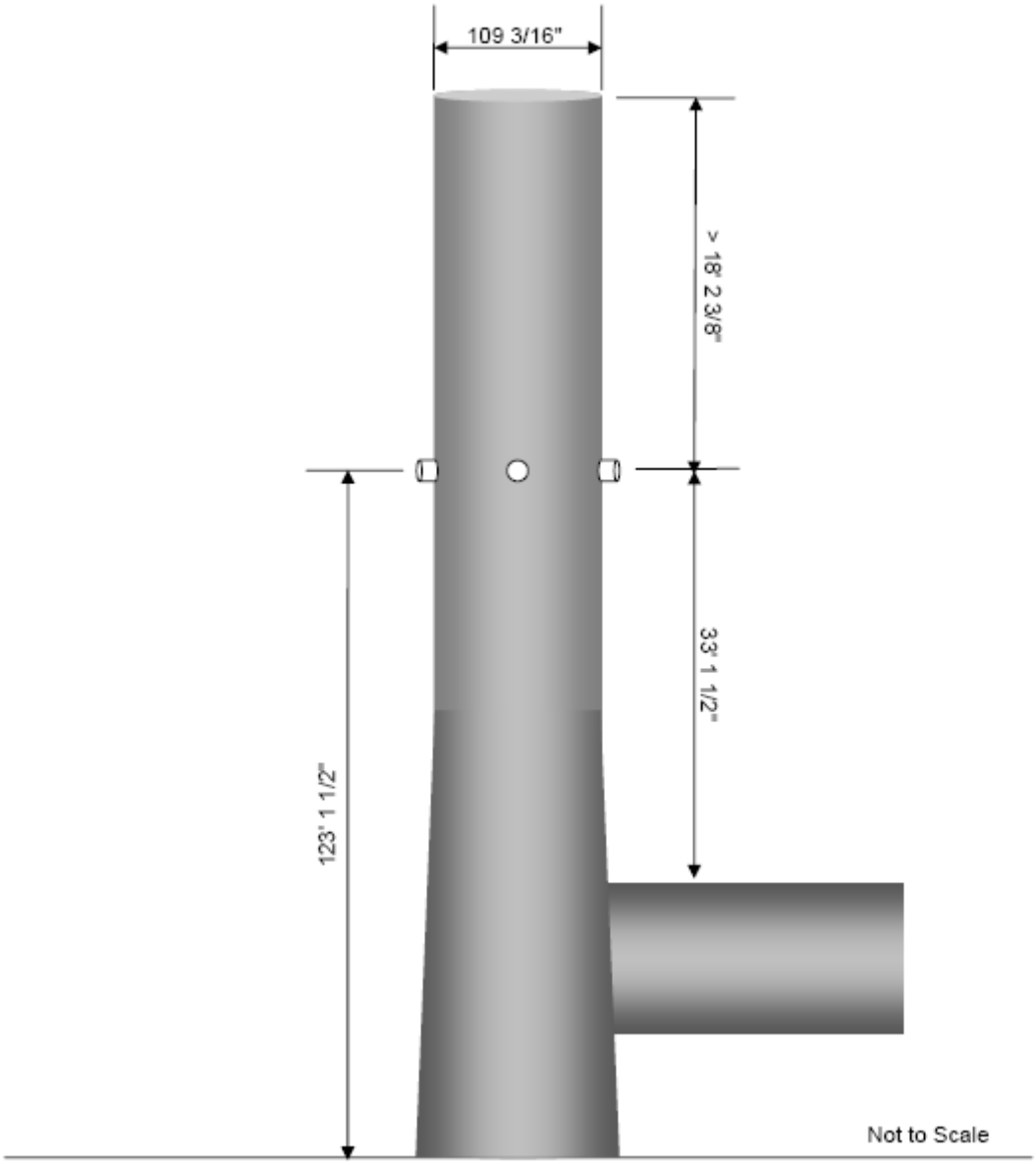

Figure 2: Stack Sampling Port Location [ASA, Inc.]

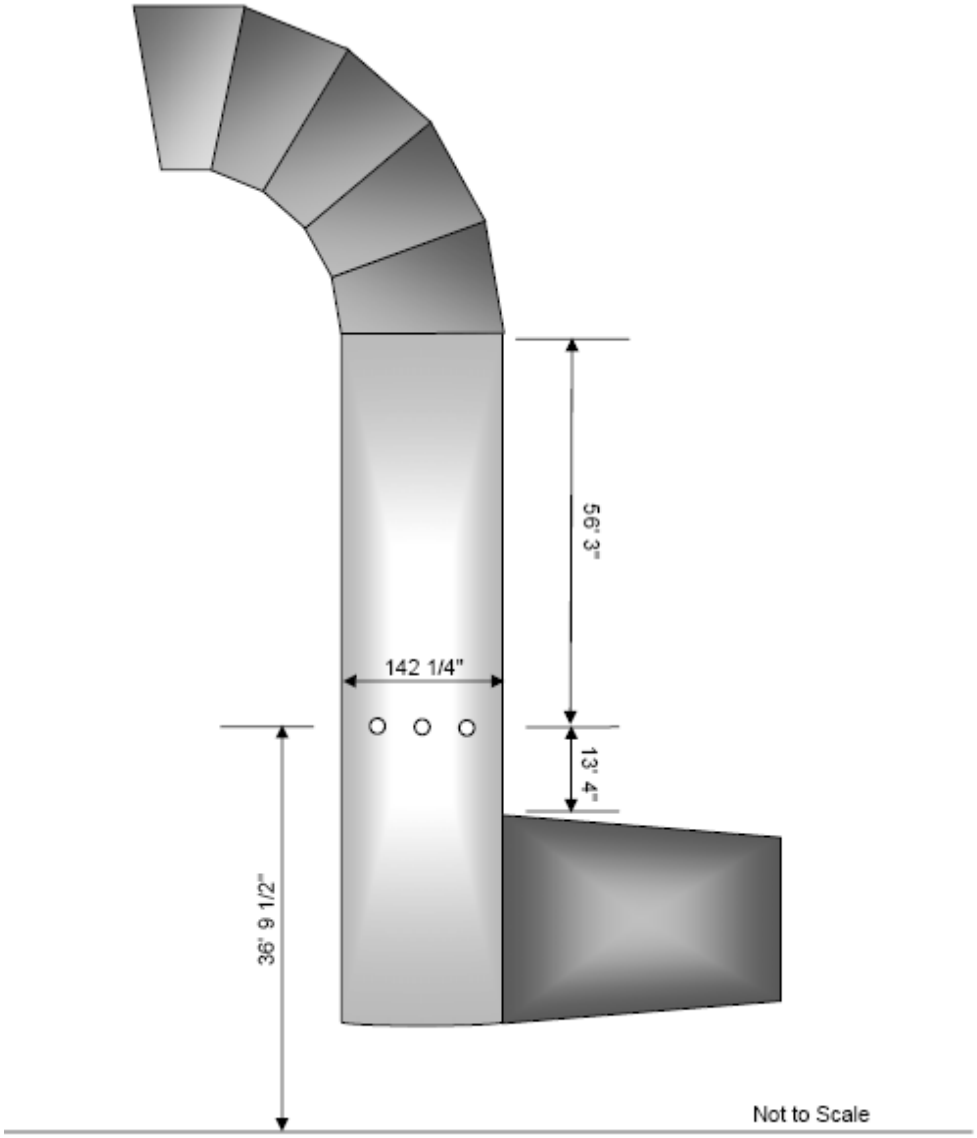

Figure 3: Air Heater Outlet Sampling Port Location [ASA, Inc.]

1.4 Method 30A Reference Analyzer Equipment & Method Description

A Thermo Mercury Freedom™ System has been configured for IRM testing. A photo of the unit is shown in Figure 4. The unit consists of a standard Model 80i Mercury Analyzer and Model 81i Mercury Calibrator installed in a temperature controlled enclosure. Probe control (temperature, flow, pressure) is achieved through analog controls installed in the environmental enclosure. A standard Model 83i Probe, shown in Figure 5, has been

modified by removing the mantle and stinger, connecting calibration gas to a port upstream of the sampling filter, and adding additional pressure monitoring capabilities to the flow measurement venturi. A modified mantle/stinger portion of the probe has been fabricated to facilitate traversing. A sketch of this component is shown in Figure 6. The mantle/stinger has been coupled to the other probe components by a 25-foot long heated umbilical. At Hardin Generating Station, the IRM enclosure was located at ground level while the probe enclosure, 25-foot heated umbilical, and mantle/stinger were located at the sampling platform.

Figure 4: Thermo CEMS Configured for an IRM

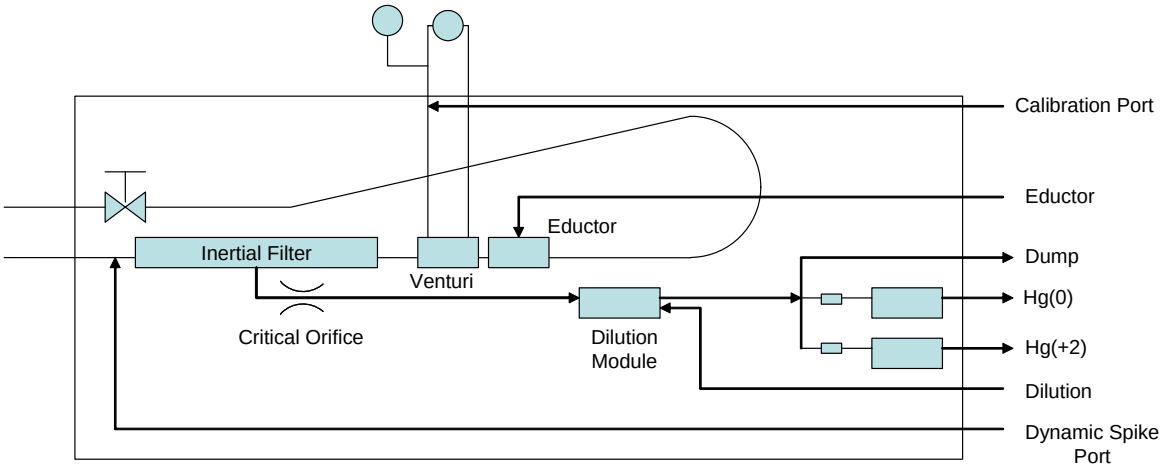

Figure 5: Thermo Model 83i Probe, Filter and Conversion Unit

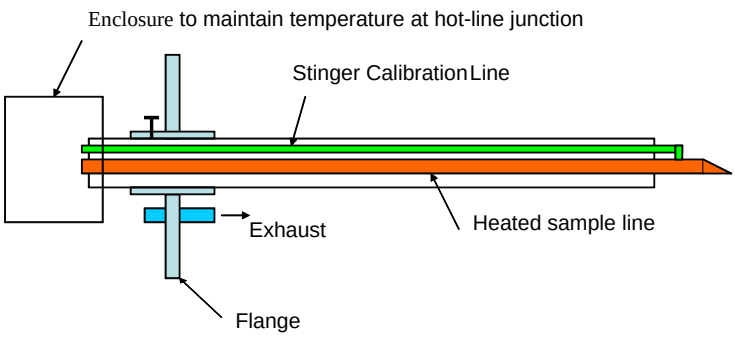

Figure 6: IRM Probe Designed for Traversing

2. Approach

2.1 Plant-Installed CEMS Parameters

System parameters for the installed Hg-CEMS are presented in Table 3. The Maximum Potential Concentration (MPC), Removal Efficiency (RE), and Maximum Expected Concentration (MEC) were determined in order to calculate the Span (S), Range, and appropriate concentration levels. These calculated values are necessary for calibration of the analyzer, and consequently the validation of measured data.

Table 3: Span and Range Value(s)

	Air Heater Outlet Hg-CEMS (Upstream of ACI)	**Stack Hg-CEMS** (Downstream of ACI)	**Reference**
MPC	10 μg/scm	10 μg/scm	Section 2.1.7.1 40 CFR Part 75 Appendix A
RE	0%	90%	Equation A-2, Section 2.1.1.2 40 CFR Part 75 Appendix A
MEC	10 μg/scm	1 μg/scm	Section 2.1.7.2 40 CFR Part 75 Appendix A
S (High : Low)	20 μg/scm	20 μg/scm : 10 μg/scm	Section 2.1.7.3 40 CFR Part 75 Appendix A
Range	20 μg/scm	10 μg/scm	Section 2.1.7.3 40 CFR Part 75 Appendix A
Zero-level Concentration (0-20% * S)	0 μg/scm (0%)	0 μg/scm (0%) : 0 μg/scm (0%)	Section 5.2 40 CFR Part 75 Appendix A
Low-level Concentration (20-30% * S)	5 μg/scm (25%)	5 μg/scm (25%) : 3 μg/scm (30%)	Section 5.2 40 CFR Part 75 Appendix A
Mid-level Concentration (50-60% * S)	11 μg/scm (55%)	11 μg/scm (55%) : 5 μg/scm (50%)	Section 5.2 40 CFR Part 75 Appendix A
High-level Concentration (80-100% * S)	18 μg/scm (90%)	18 μg/scm (90%) : 9 μg/scm (90%)	Section 5.2 40 CFR Part 75 Appendix A

* The high span value on the Outlet CEM is neglected because Hg concentrations at the stack will never exceed 2.0 μg/scm by design of emissions control.

2.2 Relative Accuracy Test Audit (RATA) & Bias Test

2.2.1 Instrumental Analyzer Configuration

2.2.1.1 Calibration Span & Gas Concentrations

To the extent practicable the measured emissions are to be between 10 and 100% of the selected calibration span. It is recommended that the calibration span be at least twice the native concentration to accommodate the dynamic spiking procedure (Section 3.4, [Method 30A]). The selected value of the calibration span is limited by the capabilities of the calibrator. The parameters used for calibration and data validation tests of the instrumental analyzer are outlined in Table 4.

Table 4: IRM Calibration Span & Gas Concentrations

	Native Concentration =	2 μg/scm
	Calibration Span (CS) =	10 μg/scm
Gas Concentration	**Allowable Range**	**Hg Concentration**
Zero-level	Non-detectable	0 μg/scm (0 %)
Low-level	10-30 % CS	3 μg/scm (30 %)
Mid-level	40-60 % CS	5 μg/scm (50 %)
High-level	100 % CS	10 μg/scm (100 %)

2.2.1.2 Sample Point Selection

When Method 30A is used for relative accuracy testing of a Hg-CEMS, the sampling site selection and sampling point layout procedures are referenced in the appropriate performance specification or applicable regulation described in Performance Specification 2, Section 8.1.3 [40 CFR Part 75 Appendix B] or Section 6.5.6 [40 CFR Part 75 Appendix A]. Alternatively, Section 8.1.3.4 [Method 30A] states that stratification testing need not be performed at a test location where it would otherwise be required to justify using fewer sample points or different sample points, if the Hg concentration in the stack gas is expected to be 3 $\mu g/m^3$ or less at the time of a Hg monitoring system RATA or an Hg emissions test. Documentation of at least one hour of Hg concentration data is required just prior to the RATA or emissions test. If a particular test location qualifies for the stratification testing exemption, sampling shall be performed at three points, as described in Section 8.1.3.2.2 [Method 30A]. Since the stack diameter (or equivalent diameter, for a rectangular stack or duct) is greater than 7.8 ft, the three Stack sampling points were therefore located at 4.4, 14.6, and 29.6 percent of the stack diameter (109 3/16”) from the stack or duct wall (see Figure 2). Since only modified Method 30A procedures were performed at the Air Heater Outlet, a single sampling point depicted in Figure 3 was selected at 78.74” from the duct wall.

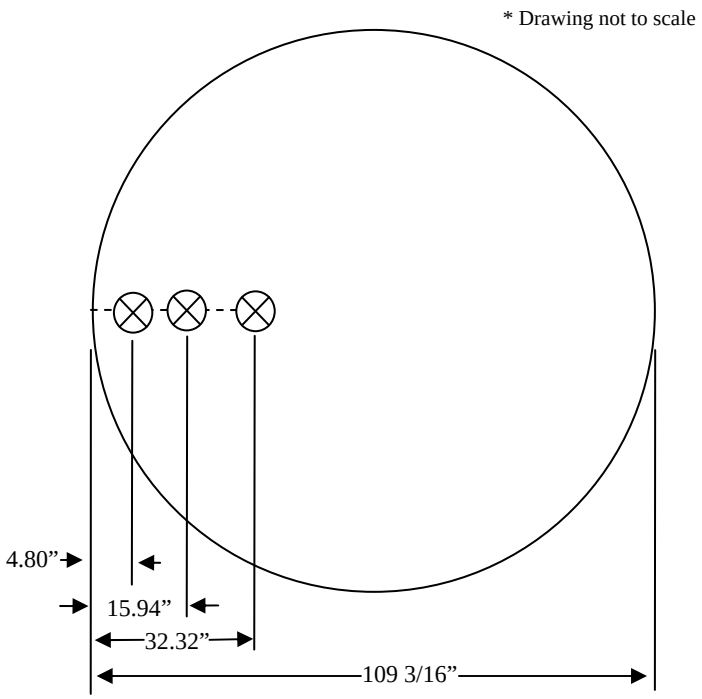

Figure 7: Stack Sampling Points

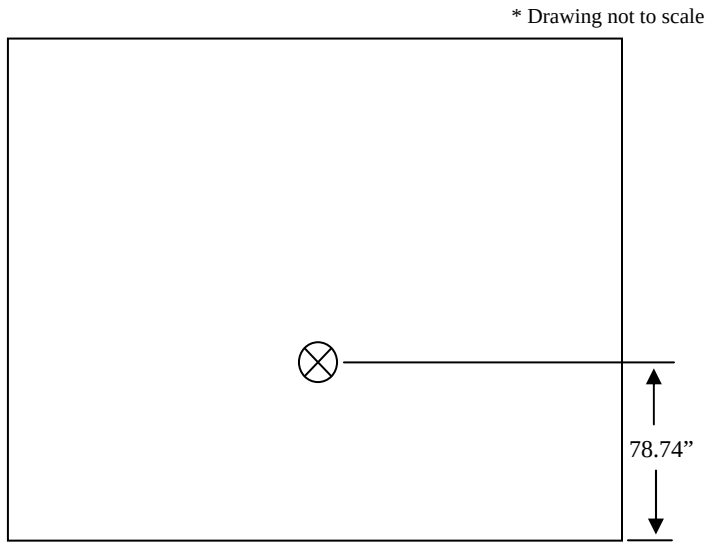

Figure 8: Air Heater Outlet Sampling Point

2.2.2 Initial Measurement System Performance Tests

Initial measurement system performance tests need to be conducted on the instrumental analyzer prior to starting the nine (9) required test runs. The performance requirements of this method must be met to validate data, and are described below:

(1) Interference Testing (Optional)
(2) Calibration Gas Verification
(3) Measurement System Preparation
(4) 3-Point System Calibration Error Test
(5) System Integrity Check

(6) Measurement System Response Time Test
(7) Dynamic Spiking (deferred until January 1, 2009)

2.2.2.1 Interference Test (Optional)
It is recommended that this test be conducted prior to the initial use of the measurement system in the field to verify that the candidate test instrument is free from inherent biases or interferences resulting from common combustion emission constituents. The interference test procedure is found in Section 8.6 [Method 30A]. This procedure was not performed during this test period.

2.2.2.2 Calibration Gas Verification
EPA Traceability Protocol for Qualification and Certification of Elemental Mercury Gas Generators and EPA Traceability Protocol for Qualification and Certification of Oxidized Mercury Gas Generators expected publication date December 2008, see www.epa.gov/ttn/emc.

2.2.2.3 Measurement System Preparation
The measurement system was assembled, prepared, and preconditioned according to standard operating procedure.

2.2.2.4 System Calibration Error Test
Using elemental mercury (Hg^0), a 3-point system calibration error test was conducted prior to the first test run. The low-, mid-, and high-level calibration gases were introduced in any order into the instrumental analyzer, and, after each gas injection, a stable response was obtained and recorded.

Acceptance criteria:

i. SCE ≤ ±5%, where

$$SCE = \frac{C_s - C_v}{CS} \times 100$$

SCE - System Calibration Error [%].
C_s - Measured concentration of the calibration gas [μg/scm].
C_v - Certified concentration of the calibration gas [μg/scm].
CS - Calibration Span [μg/scm].

ii. Alternatively, $|C_s - C_v| \leq 0.5$ μg/scm

2.2.2.5 System Integrity Check
Using oxidized mercury (Hg^{2+}), a two-point system integrity check was conducted as required before the first test run. The zero- and mid-level calibration gases were introduced into the instrumental analyzer, and, after each gas injection, a stable response was obtained and recorded.

Acceptance criteria:

i. SCE ≤ ±5%, where

$$SCE = \frac{C_s - C_v}{CS} \times 100$$

SCE - System Calibration Error [%].
C_s - Measured concentration of the calibration gas [μg/scm].
C_v - Certified concentration of the calibration gas [μg/scm].
CS - Calibration Span [μg/scm].

ii. Alternatively, $|C_s - C_v| \leq 0.5$ μg/scm

2.2.2.6 Measurement System Response Time

The measurement system response time provides the minimum sampling time for each sampling point. It is equal to the time that is required for the measured Hg concentration to increase from the stable low-level calibration gas response to a value within 5 percent of the stable high-level calibration gas response obtained during the system calibration error test in Section 8.2.4 [Method 30A], assuming the high-level calibration gas was injected immediately after the low-level.

2.2.2.7 Dynamic Spiking Test (deferred until January 1, 2009)

2.2.3 Test Runs

After the instrumental analyzer successfully met the acceptance criteria of the Initial System Performance Tests, the minimum nine (9) test runs of the RATA were performed. One test run constitutes sampling once at each of the successive sample points. The run validations listed below must be performed while sampling.

2.2.3.1 System Integrity Checks

Before and after each test run, a two-point system integrity check using the same procedure as the initial system integrity check must be conducted. No adjustments may be made to the measurement system during the checks, other than to maintain the target calibration gas flow rate and the proper dilution ratio. This check may be skipped between each run provided that a system integrity check performed on completion of runs passes the allowed specification. If a post-run integrity check is failed, all test runs since the last passed system integrity check are invalid. If a check is failed, corrective action must be taken and another 3-point Hg^0 System Calibration Error Test passed followed by another System Integrity Check before conducting any additional test runs.

2.2.3.2 Drift Check

Using the data from the successful pre- and post-run system integrity checks, calculate the zero and upscale drift. Exceeding the specification does not invalidate the run, but corrective action must be taken and a new 3-point Hg^0 System Calibration Error Test and a System Integrity Check must be passed before any more runs are made.

Acceptance criteria:

i. $D \leq 3.0\%$, where

$$D = \left| SCE_f - SCE_i \right|$$

D – Drift [%].
$SCE_{i,f}$ - System Calibration Error, pre/post-run [%].

ii. Alternatively, $|C_{s,f} - C_{s,i}| \leq 0.3$ μg/scm

$C_{s,i/f}$ – Measured concentration of the calibration gas, pre/post-run [μg/scm].

2.2.3.3 Sampling

For each sample point determined from Section 8.1, Method 30A, the system must be allowed to flush and equilibrate for at least two times the measurement system response time before recording any data. The minimum sampling time at each sampling point must be at least two times the system response time, but not less than 10 minutes.

2.2.4 Relative Accuracy Calculation

Acceptance criteria:

i. RA ≤ 20.0%, where

Arithmetic Mean:

$$d = RM - CEM$$

d – The difference between a reference method value and the corresponding continuous emission monitoring system value at a given point in time.

RM – Reference method value.

CEM – Continuous emission monitoring system value.

$$\overline{d} = \frac{\sum_{i=1}^{n} d_i}{n}$$

n – Number of data points.

Standard Deviation:

$$S_d = \sqrt{\frac{\sum_{i=1}^{n} d_i^2 - \left[\frac{\left(\sum_{i=1}^{n} d_i\right)^2}{n}\right]}{n-1}}$$

S_d – Standard deviation.

Confidence Coefficient:

$$cc = t_{0.025} \times \frac{S_d}{\sqrt{n}}$$

cc – Confidence coefficient.

$t_{0.025}$ – t-value.

Relative Accuracy:

$$RA = \frac{|\partial| + |cc|}{\overline{RM}} \times 100$$

RA – Relative accuracy of a data set.
RM – Arithmetic mean of the reference method values.
∂ – Mean difference between the reference method values and the corresponding continuous emission monitoring system values.

ii. Alternatively, if $\overline{RM} \leq 5.0$ μg/scm, $\overline{CEM} - \overline{RM} \leq \pm 1.0$ μg/scm

2.2.5 Bias Determination & Adjustment Factor Calculation

If the following criterion is met for the relative accuracy test audit data set being tested, the monitoring system has passed the bias test:

Acceptance criterion:

$$\left|\overline{d}\right| \leq \left|cc\right|$$

If the monitor or monitoring system fails to meet the bias test requirement, adjustment of the value obtained from the monitor is necessary using the following equation:

$$CEM_i^{Adjusted} = CEM_i^{Monitor} \times BAF$$

$CEM_i^{Adjusted}$ - Data value, adjusted for bias, at time i.

$CEM_i^{Monitor}$ - Data (measurement) provided by monitor at time i.

BAF – Bias Adjustment Factor.

Bias Adjustment Factor:

$$BAF = 1 + \frac{\overline{d}}{\overline{CEM}}$$

If the monitoring system meets the normal or the alternative relative accuracy specification in section 3.3.8 of 40 CFR Part 75 Appendix A but fails the bias test, the owner or operator may either use the BAF calculated above or may use a default BAF of 1.250 for reporting purposes. Each time a RATA is passed and the appropriate BAF has been determined, the BAF is to be applied prospectively to all monitoring system data, beginning with the first clock hour following the hour in which the RATA was completed.

3. Results and Discussion

Since the last two RATAs indicated no stratification at the sampling location on the Stack, a single sample point at 32.32” from the duct wall was elected in lieu of the three points previously tested. Numerous attempts were made to successfully measure the 5.0 μg/wscm oxidized mercury injections of the required System Integrity Tests on the instrumental analyzer, however all of these yielded stable responses below the 4.5 μg/wscm lower boundary of the performance specification. Due to these difficulties, a substitution of elemental mercury standards was made. Under these noted conditions, a 9-run, single-point RATA was performed on the installed Hg-CEMS (see Table 5). Relative Accuracy was calculated to be 32.86% (≤20% is passing), however the difference between the average installed CEMS response and Reference Method response was 0.06 μg/scm (≤1.0 μg/scm is passing alternative criteria for average Reference Method responses ≤5.0 μg/scm).

Table 5: RATA & Bias Test - Stack Hg-CEMS

Relative Accuracy Test Audit & Bias Test Summary

Facility:	Hardin Generating Station	**Date(s):**	10/18/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	David Young	**Test Method:**	Method 30A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
		Serial No:	0613917173

Test Run	Start	End	Hg^T [µg/scm] RM	Hg^T [µg/scm] CEM	d [µg/scm]	d^2 [µg/scm]
1	16:10	16:20	0.55	0.53	0.02	0.00
2	16:20	16:30	0.50	0.51	-0.01	0.00
3	16:30	16:40	0.48	0.53	-0.05	0.00
4	16:40	16:50	0.51	0.53	-0.02	0.00
5	16:50	17:00	0.52	0.53	-0.01	0.00
6	17:00	17:10	0.48	0.36	0.12	0.01
7	17:10	17:20	0.31	0.51	-0.20	0.04
8	17:20	17:30	0.33	0.52	-0.19	0.04
9	17:30	17:40	0.32	0.51	-0.20	0.04

RM - Reference method value
CEM - Continuous emission monitoring system value
d - Difference between RM and CEM values
n - Number of data points
S_d - Standard deviation
$t_{0.025}$ - t-value
cc - Confidence coefficient

Acceptance criteria:
(1) RA ≤ 20.0%
(2) Alternatively, if $\overline{RM} \leq 5.0$ µg/scm, $\overline{CEM} - \overline{RM} \leq \pm 1.0$ µg/scm

n =	9
$\overline{d}$ =	-0.06
$\overline{d_i^2}$ =	0.01
$\overline{RM}$ =	0.44
$\overline{CEM}$ =	0.50
S_d =	0.11
$t_{0.025}$ =	2.306
cc =	0.085
RA =	32.86%
$\overline{CEM} - \overline{RM}$ =	0.06

BAF - Bias adjustment factor
Acceptance criteria:
(1) $|\overline{d}| \leq |cc|$

BAF =	0.880

A Test Synopsis for the Stack Hg-CEMS RATA is included in Table 6. All Initial System Performance Test and Run Validation performance specifications were met; however, note that the System Integrity Tests were performed with elemental vice oxidized mercury standards.

Table 6: Test Synopsis (Stack)

Test Synopsis

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: David Young, Jim Domenico, Sharon Sjostrom
CS = 10 µg/scm

Date(s): 10/18/2008
Unit(s) tested: Stack Hg-CEMS
Test Runs: 1-9
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No: 0613917173

Action / Sample Point	Time Start	Time End	Calibration Gas Level	C_v [µg/scm]	C_s [µg/scm]	C_{CEM} [µg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [µg/scm]	D [%]	$\lvert C_{s,pre}-C_{s,post} \rvert$ [µg/scm]
Sys Cal Error Test	14:35	14:50	Low	3.00	2.70		-2.96	0.30		
	14:50	15:05	High	10.00	9.75		-2.52	0.25		
	15:05	15:20	Mid	5.00	4.75		-2.49	0.25		
Meas Sys Resp Time Test	14:50	15:05	Low	3.00	2.70	Measurement Sys Resp Time = 4 min.				
			High	10.00	9.75					
Sys Integrity Test	15:30	15:45	Zero	0.00	0.02		0.22	0.02		
	15:45	16:00	Mid	5.00	4.83		-1.66	0.17		
Run 1 1	16:10	16:20			0.55	0.53				
Run 2 1	16:20	16:30			0.50	0.51				
Run 3 1	16:30	16:40			0.48	0.53				
Run 4 1	16:40	16:50			0.51	0.53				
Run 5 1	16:50	17:00			0.52	0.53				
Run 6 1	17:00	17:10			0.48	0.36				
Run 7 1	17:10	17:20			0.31	0.51				
Run 8 1	17:20	17:30			0.33	0.52				
Run 9 1	17:30	17:40			0.32	0.51				
Sys Integrity Test	17:52	18:07	Zero	0.00	-0.19		-1.92	0.19	2.14	0.21
	18:07	18:22	Mid	5.00	4.65		-3.53	0.35	1.87	0.19

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ 5.0%
(2) Alternatively, $|C_s-C_v| \leq 5.0$ µg/scm

D - Drift
$C_{s,pre}$ - Pre-run measured concentraion of calibration gas
$C_{s,post}$ - Post-run measured concentraion of calibration gas

Acceptance criteria:
(1) D ≤ 3.0%
(2) Alternatively, $|C_{s,\ post\text{-}run}-C_{s,\ pre\text{-}run}| \leq 0.3$ µg/scm

A modified 9-run, single-point RATA was successfully performed on the installed CEMS at the Air Heater Outlet location. Relative Accuracy was calculated to be 13.55% (20% is passing). It was not in the original scope of the Test Plan to perform a full RATA at this location, so the test was modified to be performed at a single sample point. This particular location lacked an installed chlorine calibration gas cylinder required to properly perform System Integrity Tests on the instrumental analyzer, so elemental mercury standards were used in lieu of oxidized mercury.

Table 7: RATA & Bias Test - Air Heater Outlet Hg-CEMS

Relative Accuracy Test Audit & Bias Test Summary

Facility:	Hardin Generating Station	**Date(s):**	10/15/2008 - 10/16/2008
Project #:	06-7008	**Unit(s) tested:**	Air Heater Outlet Hg-CEMS
Personnel:	David Young	**Test Method:**	Method 30A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
		Serial No:	0613917146

Test Run	Start	End	Hg^T [μg/scm] RM	Hg^T [μg/scm] CEM	d [μg/scm]	d^2 [μg/scm]
1	23:50	00:00	4.08	4.76	-0.67	0.45
2	00:00	00:10	4.07	4.21	-0.14	0.02
3	00:10	00:20	4.22	4.79	-0.56	0.32
4	00:20	00:30	4.24	4.69	-0.45	0.20
5	00:30	00:40	4.35	4.85	-0.50	0.25
6	00:40	00:50	4.28	4.77	-0.50	0.25
7	00:50	01:00	4.33	4.72	-0.39	0.15
8	01:00	01:10	4.36	4.87	-0.51	0.26
9	01:10	01:20	4.45	4.92	-0.47	0.22

RM - Reference method value
CEM - Continuous emission monitoring system value
d - Difference between RM and CEM values
n - Number of data points
S_d - Standard deviation
$t_{0.025}$ - t-value
cc - Confidence coefficient

Acceptance criteria:
(1) RA ≤ 20.0%
(2) Alternatively, if $\overline{RM} \leq 5.0$ μg/scm, $\overline{CEM} - \overline{RM} \leq \pm 1.0$ μg/scm

n =	9
$\overline{d}$ =	-0.47
d_i^2 =	0.24
$\overline{RM}$ =	4.26
$\overline{CEM}$ =	4.73
S_d =	0.15
$t_{0.025}$ =	2.306
cc =	0.112
RA =	13.55%
$\overline{CEM} - \overline{RM}$ =	0.47

BAF - Bias adjustment factor
Acceptance criteria:
(1) $|\overline{d}| \leq |cc|$

BAF =	0.901

A Test Synopsis for the Air Heater Outlet Hg-CEMS RATA is included in Table 8. All Initial System Performance Test and Run Validation performance specifications were met.

Table 8: Test Synopsis (Air Heater Outlet)

Test Synopsis

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: David Young
Jim Domenico

CS = 10 µg/scm

Date(s): 10/15/2008 - 10/16/2008
Unit(s) tested: Air Heater Outlet Hg-CEMS
Test Runs: 1-9
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No: 0613917146

Action / Sample Point	Time Start	Time End	Calibration Gas Level	C_v [µg/scm]	C_s [µg/scm]	C_{CEM} [µg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [µg/scm]	D [%]	$\lvert C_{s,pre}-C_{s,post} \rvert$ [µg/scm]
Sys Cal Error Test	22:15	22:30	Low	3.00	2.90		-1.04	0.10		
	22:30	22:45	High	10.00	9.93		-0.68	0.07		
	22:45	23:00	Mid	5.00	4.74		-2.63	0.26		
Meas Sys Resp Time Test	22:30	22:45	Low	3.00	2.90	Measurement Sys Resp Time = 5 min.				
			High	10.00	9.93					
Sys Integrity Test	23:10	23:25	Zero	0.00	-0.14		-1.39	0.14		
	23:25	23:40	Mid	5.00	4.67		-3.34	0.33		
Run 1 1	23:50	00:00			4.08	4.76				
Run 2 1	00:00	00:10			4.07	4.21				
Run 3 1	00:10	00:20			4.22	4.79				
Run 4 1	00:20	00:30			4.24	4.69				
Run 5 1	00:30	00:40			4.35	4.85				
Run 6 1	00:40	00:50			4.28	4.77				
Run 7 1	00:50	01:00			4.33	4.72				
Run 8 1	01:00	01:10			4.36	4.87				
Run 9 1	01:10	01:20			4.45	4.92				
Sys Integrity Test	01:30	01:45	Zero	0.00	0.07		0.73	0.07	2.12	0.21
	01:45	02:00	Mid	5.00	4.81		-1.89	0.19	1.45	0.14

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ 5.0%
(2) Alternatively, $\lvert C_s-C_v \rvert \leq 5.0$ µg/scm

D - Drift
$C_{s,pre}$ - Pre-run measured concentraion of calibration gas
$C_{s,post}$ - Post-run measured concentraion of calibration gas

Acceptance criteria:
(1) D ≤ 3.0%
(2) Alternatively, $\lvert C_{s,\ post\text{-}run}-C_{s,\ pre\text{-}run} \rvert \leq 0.3$ µg/scm

The Bias Test performed on the Stack Hg-CEMS indicated no bias. That performed on the Air Heater Outlet Hg-CEMS, however, did reveal bias in monitor readings. In order to determine bias, the absolute value of the average difference between CEMS and RM values, $|\bar{d}|$, must be less than or equal to the confidence coefficient, cc, of the data. For the Stack Hg-CEMS RATA, $|\bar{d}|$ was determined to be 0.06 and cc was 0.085. For the Air Heater Outlet Hg-CEMS RATA, $|\bar{d}|$ was determined to be 0.47 and cc was 0.112. Bias Adjustment Factors were calculated but were not implemented into the installed CEMS. Both of these systems are subject to the scrutiny of a well-developed Quality Assurance/Quality Control (QA/QC) program which includes daily evaluation of potentially necessary correction factors, and, as such, implementation of any correction from this Bias Test has been deemed unnecessary.

4. Conclusions

The Relative Accuracy Test Audit conducted on Stack Hg-CEMS passed established performance specifications. Elemental mercury was used to perform the System Integrity Tests on the instrumental analyzer due to problems satisfying acceptance criteria using oxidized mercury. No bias was evident between the Stack Hg-CEMS and the instrumental analyzer.

The RATA conducted on the Air Heater Outlet Hg-CEMS also passed established performance specifications under modified conditions. No chlorine calibration gas bottle was installed at this location which is required for the oxidized mercury calibrations of the System Integrity Tests. It is also believed that similar problems to those observed at the Stack location would have challenged the tests. Bias was evident between responses of this system and the instrumental analyzer; however correction factors were not implemented because this would interfere with the daily CEMS QA/QC program.

All Initial System Performance Tests required for validation of the instrumental analyzer passed performance criteria at both locations prior to commencing each first test run, but the System Integrity Tests were performed with elemental vice oxidized mercury standards. Run validations were performed as described in section 2.2.3 of this report.

A duplicate of the Summary of Test Results from Table 1 is presented below.

Summary of Test Results (From Table 1)

	Stack Hg-CEMS (downstream of ACI)	**Air Heater Outlet Hg-CEMS (upstream of ACI)**
Relative Accuracy Test Audit (RATA)	PASS	PASS
Interference Check (Optional)	-	-
3-Point System Calibration Error Test	PASS	PASS
System Integrity Check	PASS	PASS
Measurement System Response	PASS	PASS
Dynamic Spiking Test	Not Performed	Not Performed

This was the third of three in a series of tests to be performed at Rocky Mountain Power's Hardin Generating Station, Hardin, MT during the Long-term Test Phase of this project as specified in the test plan. The primary goal of these tests was to demonstrate that the installed Hg-CEMS will comply with future established directives, as well as to provide feedback of the recently approved EPA Method 30A reference method.

5. Appendix

5.1 Initial Measurement System Response Tests & Run Validations

Results from the instrumental analyzer's pre-certification tests are presented below in Tables 9 through 14.

Table 9: IRM System Calibration Error Test (Stack)

System Calibration Error Test

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: David Young
Jim Domenico

Date(s): 10/18/2008
Unit(s) tested: Stack Hg-CEMS
Test Runs: N/A
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No: 0613917173

CS = 10 µg/scm

Time Start	Time End	Calibration Gas Level	C_v [µg/scm]	C_s [µg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [µg/scm]
14:35	14:50	Low-	3.00	2.70	-2.96	0.30
14:50	15:05	High-	10.00	9.75	-2.52	0.25
15:05	15:20	Mid-	5.00	4.75	-2.49	0.25

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span value

Acceptance criteria:
(1) SCE $\leq \pm 5.0\%$
(2) Alternatively, $\lvert C_s-C_v \rvert \leq 0.5$ µg/scm

Table 10: IRM System Calibration Error Test (Air Heater Outlet)

System Calibration Error Test

Facility: Hardin Generating Station
Project #: 06-7008
Personnel: David Young
Jim Domenico

Date(s): 10/15/2008 - 10/16/2008
Unit(s) tested: Air Heater Outlet Hg-CEMS
Test Runs: N/A
Analyzer Make/Model: Thermo Mercury Freedom System™
Serial No: 0613917146

CS = 10 µg/scm

Time Start	Time End	Calibration Gas Level	C_v [µg/scm]	C_s [µg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [µg/scm]
22:15	22:30	Low-	3.00	2.90	-1.04	0.10
22:30	22:45	High-	10.00	9.93	-0.68	0.07
22:45	23:00	Mid-	5.00	4.74	-2.63	0.26

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span value

Acceptance criteria:
(1) SCE $\leq \pm 5.0\%$
(2) Alternatively, $\lvert C_s-C_v \rvert \leq 0.5$ µg/scm

Table 11: IRM Measurement System Response Time (Stack)

Measurement System Response Time Test

Facility:	Hardin Generating Station	**Date(s):**	10/18/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	David Young	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
CS =	10 µg/scm	**Serial No:**	0613917173

Calibration Gas Level	C_v [µg/scm]	Start Time	$C_{s,i}$ [µg/scm]	End Time	$C_{s,f}$ [µg/scm]	Response Time [min.]
Low-/High-	3.00/10.00	14:50	2.70	15:05	9.75	04:00

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
(i=initial, f=final)
CS - Calibration span value

Acceptance criteria:
(1) Response Time ≤ 15.0 min.

Table 12: IRM Measurement System Response Time (Air Heater Outlet)

Measurement System Response Time Test

Facility:	Hardin Generating Station		**Date(s):**	10/15/2008 - 10/16/2008
Project #:	06-7008		**Unit(s) tested:**	Air Heater Outlet Hg-CEMS
Personnel:	David Young		**Test Runs:**	N/A
	Jim Domenico		**Analyzer Make/Model:**	Thermo Mercury Freedom System™
CS =	10 µg/scm	**9.4349687**	**Serial No:**	0613917146

Calibration Gas Level	C_v [µg/scm]	Start Time	$C_{s,i}$ [µg/scm]	End Time	$C_{s,f}$ [µg/scm]	Response Time [min.]
Low-/High-	3.00/10.00	22:30	2.90	22:45	9.93	05:00

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
(i=initial, f=final)
CS - Calibration span value

Acceptance criteria:
(1) Response Time ≤ 15.0 min.

Table 13: IRM System Integrity Check (Stack)

System Integrity Check

Facility:	Hardin Generating Station	**Date(s):**	10/18/2008
Project #:	06-7008	**Unit(s) tested:**	Stack Hg-CEMS
Personnel:	David Young	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
CS =	10 μg/scm	**Serial No:**	0613917173

Calibration Gas Level	C_v [μg/scm]	C_s [μg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [μg/scm]
Zero-	0.00	0.02	0.22	0.02
Mid-	5.00	4.83	-1.66	0.17

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ ±5.0%
(2) Alternatively, $|C_s-C_v| \leq 0.5$ μg/scm

Table 14: IRM System Integrity Check (Air Heater Outlet)

System Integrity Check

Facility:	Hardin Generating Station	**Date(s):**	10/15/2008 - 10/16/2008
Project #:	06-7008	**Unit(s) tested:**	Air Heater Outlet Hg-CEMS
Personnel:	David Young	**Test Runs:**	N/A
	Jim Domenico	**Analyzer Make/Model:**	Thermo Mercury Freedom System™
CS =	10 μg/scm	**Serial No:**	0613917146

Calibration Gas Level	C_v [μg/scm]	C_s [μg/scm]	SCE [%]	$\lvert C_s-C_v \rvert$ [μg/scm]
Zero-	0.00	-0.14	-1.39	0.14
Mid-	5.00	4.67	-3.34	0.33

SCE - System calibration error
C_v - Certified concentration of calibration gas
C_s - Measured concentration of calibration gas
CS - Calibration span

Acceptance criteria:
(1) SCE ≤ ±5.0%
(2) Alternatively, $|C_s-C_v| \leq 0.5$ μg/scm

APPENDIX E: MANUAL GAS SAMPLING RESULTS

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STACK SAMPLING REPORT
FOR
PARTICULATE MATTER, HYDROGEN HALIDE & HALOGEN, AMMONIA, MERCURY SPECIATION, AND SULFUR TRIOXIDE TESTING
ON THE
ROCKY MOUNTAIN POWER
HARDIN POWER PLANT
SDA INLET DUCT AND STACK
HARDIN, MONTANA

PROJECT NO. 06-057

NOVEMBER AND DECEMBER, 2006

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AIR SAMPLING ASSOCIATES, INC.

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EXECUTIVE SUMMARY

Air Sampling Associates, Inc. of Lewisville, Texas conducted stack testing at the Rocky Mountain Power, Hardin Power Plant, located in Hardin, Montana. The purpose of the stack testing was to determine particulate matter emissions, hydrogen halide and halogen emissions, ammonia emissions, speciated mercury emissions, and sulfur trioxide emissions at the SDA Inlet Duct; and to determine particulate matter emissions, hydrogen halide and halogen emissions, and speciated mercury emissions at the Stack. The testing was conducted on November 27 through December 3, 2006.

The sampling team consisted of Mr. Bill Mullins, Mr. Bill Hefley, Mr. Gary Goldman, Mr. Patrick Selakovich, and Mr. Scot Jackson. Mr. Mullins was the test team leader.

Mr. Jerry Amrhein of ADA-ES was the project manager.

The procedures set forth in Title 40 of the Code of Federal Regulations, Part 60 (40CFR60), Appendix A, Test Methods 1, 2, 3, 4, 5, 5B, 17, 26A, 202, and Conditional Test Method CTM027; ASTM D6784-02 (Ontario Hydro) Mercury Speciation Method; and the National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI) Method 8A were followed during testing.

Triplicate samples for particulate matter collected at the SDA Inlet Duct according to EPA Test Method 17, in conjunction with EPA Test Methods 26A and CTM027, indicated an average of 10,640.09 pounds per hour, based on the 'front half' analysis of the sampling train.

Triplicate samples for hydrogen halides & halogens collected at the SDA Inlet Duct according to EPA Test Method 26A, in conjunction with EPA Test Method 17 and Conditional Test Method CTM027, indicated an average concentration of hydrogen

bromide and an average concentration of bromine that were below the detectable limit of the sampling procedure. The sampling results indicated an average concentration of hydrogen chloride that was below the detectable limit of the sampling procedure and an average concentration of chlorine that was equal to 0.263 mg/dscm. The sampling results indicated an average concentration of hydrogen fluoride and an average concentration of fluoride that were below the detectable limit of the sampling procedure.

Triplicate samples for ammonia collected at the SDA Inlet Duct according to EPA Conditional Test Method CTM027, in conjunction with EPA Test Methods 17 and 26A, indicated an average concentration of ammonia equal to 3.2 ppm.

Triplicate samples for speciated mercury collected at the SDA Inlet Duct according to the ASTM D6784-02 (Ontario Hydro) Mercury Speciation Method indicated that the average total mercury was equal to 3.965 lbs/10^{12} Btu. The average total mercury was 14.25% particulate mercury, 39.23% oxidized mercury, and 46.53% elemental mercury. Samples for particulate matter collected using the optional test procedures in the ASTM D6784-02 (Ontario Hydro) Mercury Speciation Method indicated an average of 8,837.89 pounds per hour, based on the analysis of the 'front half' of the sampling trains.

Triplicate samples for sulfur trioxide were collected at the SDA Inlet Duct according to NCASI Method 8A indicated an average concentration of sulfur trioxide was equal to 3.50 ppm.

Triplicate samples for particulate matter collected at the Stack according to EPA Test Methods 5 and 202 indicated an average of 32.22 pounds per hour, based on the analysis of the 'front half' and 'back half' of the sampling trains.

Triplicate samples for hydrogen halides & halogens collected at the Stack indicated an average concentration of hydrogen bromide and an average concentration of bromine that were below the detectable limit of the sampling procedure. The sampling results

indicated an average concentration of hydrogen chloride that was below the detectable limit of the sampling procedure and an average concentration of chlorine that was equal to 0.384 mg/dscm. The sampling results indicated an average concentration of hydrogen fluoride and an average concentration of fluoride that were below the detectable limit of the sampling procedure. Samples for particulate matter collected using the optional test procedures in EPA Test Method 26A indicated an average of 22.09 pounds per hour, based on the analysis of the 'front half' of the sampling trains.

Triplicate samples for speciated mercury collected at the Stack according to the ASTM D6784-02 (Ontario Hydro) Mercury Speciation Method indicated that the average total mercury was equal to 3.745 lbs/10^{12} Btu. The average total mercury was 98.84% elemental mercury. Samples for particulate matter collected using the optional test procedures in the ASTM D6784-02 (Ontario Hydro) Mercury Speciation Method indicated an average of 20.49 pounds per hour, based on the analysis of the 'front half' of the sampling trains.

Billy J. Mullins, Jr. P.E., Q.E.P., D.E.E.

SUMMARY OF RESULTS

Table 1: Summary of Sampling Results

Sampling Trains - Parameters	SDA Inlet Duct Average	Stack Average
EPA 5B		
- Moisture (%)	NA	14.80
- Flow Rate (DSCFM)	NA	294,956
- Particulate Matter (lbs/hr – total)	NA	32.22
EPA 5 / 17 / 26A / CTM027		
- Moisture (%)	10.69	15.07
- Flow Rate (DSCFM)	292,800	293,809
- Particulate Matter (lbs/hr – front half)	10,640.09	22.09
- Chlorine (mg/dscm)	0.263	0.384
- Ammonia (ppm)	3.2	NA
EPA 5 / 17 / ASTM D6784-02		
- Moisture (%)	10.18	14.72
- Flow Rate (DSCFM)	291,987	295,482
- Particulate Matter (lbs/hr – front half)	8,837.89	20.49
- Total Mercury (lbs/10^{12} Btu)	3.965	3.745
NCASI 8A		
- Moisture (%)	10.47	NA
- Sulfur Trioxide (ppm)	3.50	NA

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 2: SDA Inlet Duct Particulate Matter, Hydrogen Halides & Halogens, and Ammonia Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	11/30/06	12/01/06	12/01/06	-----
Test Time	1454-1559	1203-1305	1647-1749	-----
*Flow Rate – DSCFM**	290,174	294,636	293,589	292,800
Stack Temp. - ˚F	319	316	322	319
O_2 - %Vol. (dry)	5.2	6.0	5.7	5.6
CO_2 - %Vol. (dry)	14.3	13.3	13.8	13.8
Percent Excess Air	32.2	39.0	36.5	35.9
Moisture Content - %	10.85	10.76	10.47	10.69
Percent Isokinetic	89.3	95.3	96.4	93.7
Sample Volume – DSCM	0.634	0.687	0.693	0.671
Particulate Matter				
– gr/dscf (Front Half)	4.1271	4.5853	4.0059	4.2394
– lbs/hr (Front Half)	10,263.30	11,578.01	10,078.95	10,640.09
Hydrogen Bromide				
– mg	ND	ND	ND	ND
– mg/dscm	ND	ND	ND	ND
Bromine				
– mg	ND	ND	ND	ND
– mg/dscm	ND	ND	ND	ND
Hydrogen Chloride				
– mg	ND	ND	ND	ND
– mg/dscm	ND	ND	ND	ND
Chlorine				
– mg	0.216	0.151	0.159	0.175
– mg/dscm	0.341	0.220	0.229	0.263
Hydrogen Fluoride				
– mg	ND	ND	ND	ND
– mg/dscm	ND	ND	ND	ND
Fluorine				
– mg	ND	ND	ND	ND
– mg/dscm	ND	ND	ND	ND
Ammonia - ppm	4.8	1.6	3.3	3.2

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 3: SDA Inlet Duct Particulate Matter and Speciated Mercury

Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	12/01/06	12/02/06	12/02/06	-----
Test Time	0857-1059	0919-1121	1712-1914	-----
*Flow Rate – DSCFM**	288,573	292,703	294,686	291,987
Stack Temp. - °F	315	317	320	317
O_2 - %Vol. (dry)	6.4	6.1	6.2	6.2
CO_2 - %Vol. (dry)	14.2	13.9	13.1	13.7
Percent Excess Air	43.7	40.4	40.8	41.6
Moisture Content - %	10.24	10.26	10.04	10.18
Percent Isokinetic	96.0	95.3	96.9	96.1
Sample Volume – DSCM	1.343	1.352	1.383	1.359
Particulate Matter				
– gr/dscf (Front Half)	3.4560	3.8851	3.2552	3.5321
– lbs/hr (Front Half)	8,546.94	9,745.73	8,220.99	8,837.89
Particle Bound Mercury				
– µg	0.6100	1.5000	0.6400	0.9167
– µg/dscm	0.4542	1.1095	0.4628	0.6755
*– lbs/10^{12} Btu***	0.400	0.957	0.402	0.586
Oxidized Mercury				
– µg	1.6000	1.7000	3.3000	2.2000
– µg/dscm	1.1914	1.2574	2.3861	1.6116
*– lbs/10^{12} Btu***	1.049	1.085	2.072	1.402
Elemental Mercury				
– µg	3.6640	4.7000	0.8480	3.0707
– µg/dscm	2.7282	3.4763	0.6132	2.2726
*– lbs/10^{12} Btu***	2.402	2.999	0.532	1.978
Total Mercury				
– µg	5.8740	7.9000	4.7880	6.1873
– µg/dscm	4.3738	5.8432	3.4620	4.5597
*– lbs/10^{12} Btu***	3.850	5.040	3.006	3.965

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

** Calculated using an F_d Factor of 9,780

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 4: SDA Inlet Duct Sulfur Trioxide

Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	11/30/06	11/30/06	12/01/06	-----
Test Time	1323-1423	1648-1748	1401-1501	-----
*Sample Volume – DSCM**	0.549	0.558	0.557	0.555
Moisture Content - %	10.06	10.70	10.67	10.48
Sulfur Trioxide - ppm	3.69	4.20	2.60	3.50

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 5: Stack Particulate Matter

Summary of Sampling Results

Run No.	*4*	*5*	*6*	*Average*
Test Date	11/30/06	11/30/06	11/30/06	-----
Test Time	1334-1542	1204-1409	1215-1419	-----
*Flow Rate – DSCFM**	297,911	290,628	296,329	294,956
Stack Temperature - ˚F	210	206	205	207
O_2 – % Volume dry	7.9	6.2	6.2	6.8
CO_2 – % Volume dry	12.1	13.0	13.3	12.8
Percent Excess Air	59.4	40.8	41.0	47.1
Moisture Content - %	14.69	15.13	14.59	14.80
Percent Isokinetic	99.6	99.5	98.2	99.1
Particulate Matter				
- gr/dscf (Front Half)	0.0058	0.0074	0.0078	0.0070
*- lbs/mmBtu (Front Half)***	0.0130	0.0147	0.0155	0.0144
- lbs/hr (Front Half)	14.83	18.40	19.83	17.69
Particulate Matter				
- gr/dscf (Total)	0.0135	0.0148	0.0100	0.0128
*- lbs/mmBtu (Total)***	0.0580	0.0294	0.0199	0.0358
- lbs/hr (Total)	34.44	36.81	25.42	32.22

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

** Calculated using an F_d Factor of 9,780

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 6: Stack Particulate Matter and Hydrogen Halides & Halogens

Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	11/30/06	12/01/06	12/02/06	-----
Test Time	1642-1759	1509-1626	2025-2141	-----
*Flow Rate – DSCFM**	294,798	297,054	289,575	293,809
Stack Temp. - °F	211	204	213	209
O_2 - %Vol. (dry)	7.6	6.7	6.3	6.9
CO_2 - %Vol. (dry)	11.6	12.8	13.2	12.5
Percent Excess Air	55.0	45.8	41.9	47.6
Moisture Content - %	15.31	14.98	14.93	15.07
Percent Isokinetic	104.0	99.7	100.4	101.4
Sample Volume – DSCM	1.239	1.197	1.175	1.204
Particulate Matter				
– gr/dscf (Front Half)	0.0084	0.0091	0.0088	0.0088
– lbs/hr (Front Half)	21.17	23.27	21.83	22.09
Hydrogen Bromide				
– mg	ND	ND	ND	ND
– mg/dscm	ND	ND	ND	ND
Bromine				
– mg	ND	ND	ND	ND
– mg/dscm	ND	ND	ND	ND
Hydrogen Chloride				
– mg	ND	ND	ND	ND
– mg/dscm	ND	ND	ND	ND
Chlorine				
– mg	0.440	0.480	0.483	0.468
– mg/dscm	0.355	0.387	0.411	0.384
Hydrogen Fluoride				
– mg	ND	ND	ND	ND
– mg/dscm	ND	ND	ND	ND
Fluorine				
– mg	ND	ND	ND	ND
– mg/dscm	ND	ND	ND	ND

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 7: Stack Particulate Matter and Speciated Mercury

Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	12/01/06	12/02/06	12/02/06	-----
Test Time	0857-1105	0919-1124	1712-1917	-----
*Flow Rate – DSCFM**	295,083	299,743	291,619	295,482
Stack Temp. - °F	212	207	212	210
O_2 - %Vol. (dry)	6.2	6.4	6.2	6.3
CO_2 - %Vol. (dry)	12.8	13.2	13.3	13.1
Percent Excess Air	40.6	42.9	41.0	41.5
Moisture Content - %	14.77	14.88	14.52	14.72
Percent Isokinetic	99.8	100.5	99.1	99.8
Sample Volume – DSCM	1.983	2.028	1.945	1.985
Particulate Matter				
– gr/dscf (Front Half)	0.0085	0.0072	0.0086	0.0081
– lbs/hr (Front Half)	21.57	18.39	21.51	20.49
Particle Bound Mercury				
- µg	0.0380	ND	0.0090	<0.0157
- µg/dscm	0.0192	ND	0.0046	<0.0079
*- lbs/10^{12} Btu***	0.017	ND	0.004	<0.007
Oxidized Mercury				
- µg	0.1100	ND	0.0800	<0.0633
- µg/dscm	0.0555	ND	0.0411	<0.0322
*- lbs/10^{12} Btu***	0.048	ND	0.036	<0.028
Elemental Mercury				
- µg	6.8410	12.1000	6.4640	8.4683
- µg/dscm	3.4498	5.9665	3.3234	4.2466
*- lbs/10^{12} Btu***	2.995	5.251	2.885	3.710
Total Mercury				
- µg	6.9890	12.1000	6.5530	8.5473
- µg/dscm	3.5245	5.9665	3.3692	4.2867
*- lbs/10^{12} Btu***	3.059	5.251	2.924	3.745

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

** Calculated using an F_d Factor of 9,780

DISCUSSION OF SAMPLING RESULTS

SDA Inlet Duct

Particulate Matter, Hydrogen Halides & Halogens, and Ammonia

The three tests for particulate matter, hydrogen halides & halogens, and ammonia taken at the SDA Inlet Duct appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train and pitot tubes showed no leaks before or after testing. The indicative parameters of the tests were in close agreement. The measured moisture contents (%M) were within 2.09% of the mean value. The measured flow rates (DSCFM) were within 0.90% of the mean value. Run No. 1 exceeded the specified rates of sampling for the test. The specified rates of sampling are 90% to 110% isokinetic. The greatest deviation from 100% isokinetic, Run No. 1, was 10.7%. Any effect on the data would be a slightly high bias.

The concentrations (gr/dscf – front Half) of particulate matter for the three tests showed a range of -5.51 percent to +8.16 percent variation from the mean value of 4.2394 gr/dscf – front half.

The concentrations (mg/dscm) of hydrogen bromide and bromine for the three tests were below the minimum reporting limit of the reference method.

The concentrations (mg/dscm) of hydrogen chloride for the three tests were below the minimum reporting limit of the reference method. The concentrations of chlorine (mg/dscm) of for the three tests showed a range of -16.46% to +29.49% variation from the mean value of 0.263 mg/dscm.

The concentrations (mg/dscm) of hydrogen fluoride and fluorine for the three tests were below the minimum reporting limit of the reference method.

The concentrations (ppm) of ammonia for the three tests showed a range of -50.52% to +48.45% variation from the mean value of 3.2 ppm. The high variation is due to the low concentrations of ammonia measured.

Particulate Matter and Speciated Mercury

The three tests for particulate matter and speciated mercury taken at the SDA Inlet Duct appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the sampling train and the pitot tubes indicated no leaks before or after each test. The indicative parameters calculated from the field data were in reasonable agreement. The measured moisture contents for the three runs were within 1.37% of the mean value. The measured flow rates (DSCFM) for the tests were within 1.17% of the mean value. The rates of sampling for the three tests were within the specified limits (90 to 110 percent isokinetic). The greatest deviation from 100% isokinetic was 4.7%.

The concentrations (gr/dscf – front Half) of particulate matter for the three tests showed a range of -7.84 percent to +9.99 percent variation from the mean value of 3.5321 gr/dscf – front half.

The calculated emissions (lbs/10^{12} Btu) of total mercury for the three tests showed a range of -24.19% to +27.10% deviation from the mean value of 3.965 lbs/10^{12} Btu.

Sulfur Trioxide

The three tests for sulfur trioxide taken at the SDA Inlet Duct appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train and pitot tubes showed no leaks before or after testing. The indicative parameters of the tests were in close agreement. The measured moisture contents (%M) were within 3.98% of the mean value.

The concentrations (ppm) of sulfur dioxide for the three tests showed a range of -25.64 percent to +20.11 percent variation from the mean value of 3.50 ppm.

Stack

Particulate Matter

The three tests for particulate matter at the Stack appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train and pitot tubes showed no leaks before or after testing. The indicative parameters of the tests were in close agreement. The measured moisture contents (%M) were within 2.21% of the mean value. The measured flow rates (DSCFM) were within 1.47% of the mean value. The rates of sampling for the tests were within the specified limits (90% to 110% isokinetic). The greatest deviation from 100% isokinetic was 1.8%.

The concentrations (gr/dscf – total) of particulate matter for the three tests showed a range of -21.88 percent to +15.63 percent variation from the mean value of 0.0128 gr/dscf – total.

Particulate Matter and Hydrogen Halides & Halogens

The three tests for particulate matter and hydrogen halides & halogens taken at the Stack appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train and pitot tubes showed no leaks before or after testing. The indicative parameters of the tests were in close agreement. The measured moisture contents (%M) were within 1.57% of the mean value. The measured flow rates (DSCFM) were within 1.44% of the mean value. The rates of sampling for the tests were within the specified limits (90% to 110% isokinetic). The greatest deviation from 100% isokinetic was 4.0%.

The concentrations (gr/dscf – Front Half) of particulate matter for the three tests showed a range of -4.55 percent to +3.41 percent variation from the mean value of 0.0088 gr/dscf – front half.

The concentrations (mg/dscm) of hydrogen bromide and bromine for the three tests were below the minimum reporting limit of the reference method.

The concentrations (mg/dscm) of hydrogen chloride for the three tests were below the minimum reporting limit of the reference method. The concentrations of chlorine (mg/dscm) for the three tests showed a range of -7.63% to +6.94% variation from the mean value of 0.384 mg/dscm.

The concentrations (mg/dscm) of hydrogen fluoride and fluorine for the three tests were below the minimum reporting limit of the reference method.

Particulate Matter and Speciated Mercury

The three tests for particulate matter and speciated mercury on the Stack appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the sampling train and the pitot tubes indicated no leaks before or after each test. The indicative parameters calculated from the field data were in reasonable agreement. The measured moisture contents for the three runs were within 1.38% of the mean value. The measured flow rates (DSCFM) for the tests were within 1.44% of the mean value. The rates of sampling for the three tests were within the specified limits (90 to 110 percent isokinetic). The greatest deviation from 100% isokinetic was 0.9%.

The concentrations (gr/dscf – front Half) of particulate matter for the three tests showed a range of -11.11 percent to +6.17 percent variation from the mean value of 0.0081 gr/dscf – front half.

The calculated emissions (lbs/10^{12} Btu) of total mercury for the three tests showed a range of -21.92% to +40.21% deviation from the mean value of 3.745 lbs/10^{12} Btu.

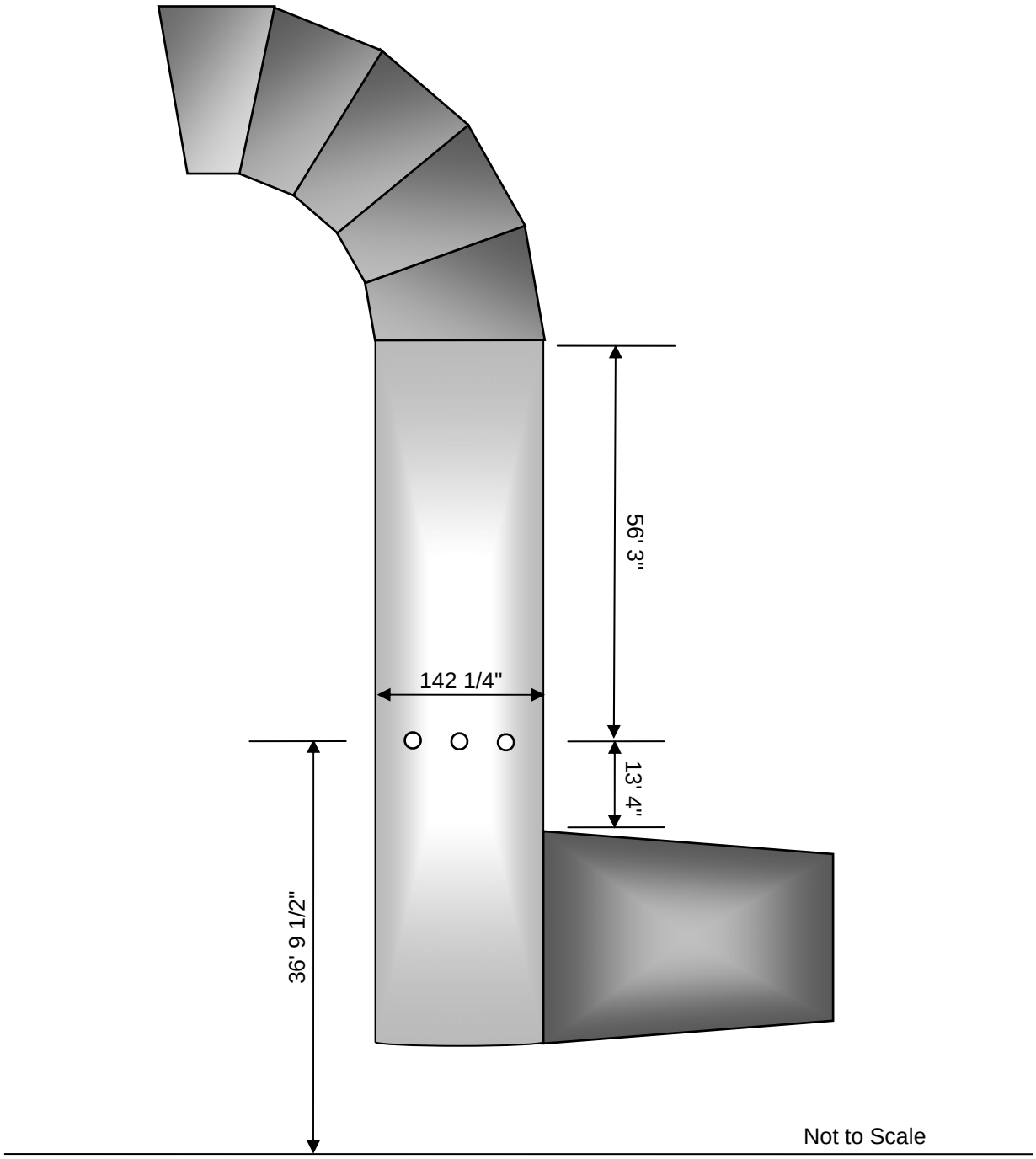
DESCRIPTION OF SAMPLING LOCATIONS

The sampling ports on the SDA Inlet Duct are approximately 36 feet 9 1/2 inches above the ground. The sampling ports are located 13 feet 4 inches (1.12 equivalent duct diameters) downstream from a bend in the bend in the duct and 56 feet 3 inches (4.75 equivalent duct diameters) upstream from a bend in the duct.

The sampling ports on the Stack are approximately 123 feet 1 1/2 inches above the ground. The sampling ports are located 33 feet 1 1/2 inches (3.64 stack diameters) downstream from the inlet to the stack and > 18 feet 2 3/8 inches (> 2.00 stack diameters) upstream from the outlet to the stack.

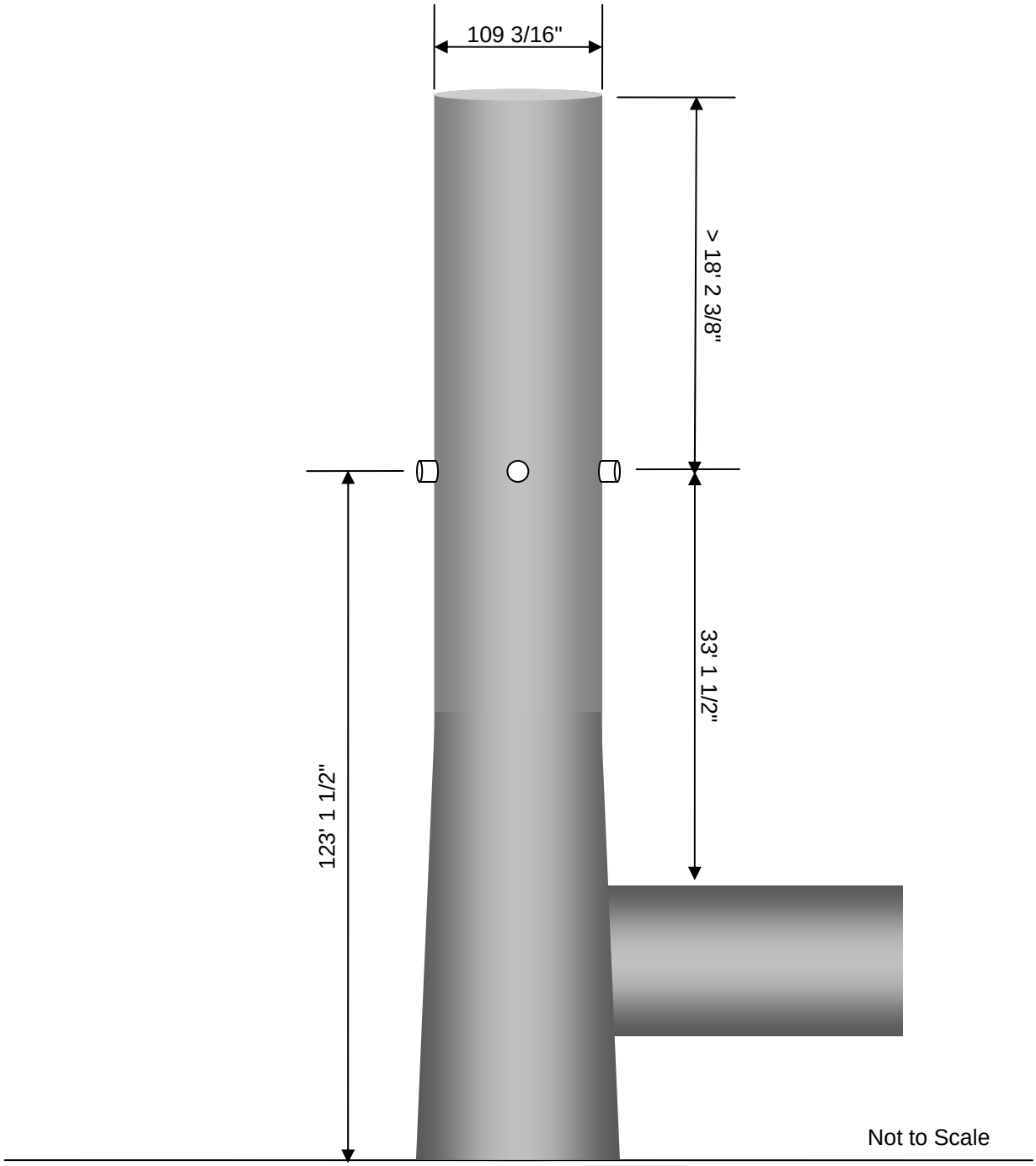
SAMPLING LOCATION

Figure 1: SDA Inlet Duct



SAMPLING LOCATION

Figure 2: Stack



SAMPLING AND ANALYTICAL PROCEDURES

The procedures set forth in 40CFR60, Appendix A, Test Methods 1, 2, 3, 4, 5, 5B, 17, 26A, 202, and Conditional Test Method CTM027; ASTM D6784-02 (Ontario Hydro) Mercury Speciation Test Method; and the National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI) Method 8A were followed during testing.

Four Traverse points were sampled from three ports on the SDA Inlet Duct for a total of twelve traverse points. All traverse points were checked for cyclonic flow and the average angle was equal to 2.4 degrees. The pitot tube lines were checked for leaks before and after each test under a vacuum and a pressure. The lines were also checked for clearance and the manometer was zeroed before each test.

Twelve traverse points were sampled from two ports on the Stack for a total of twenty four traverse points. All traverse points were checked for cyclonic flow and the average angle was equal to 6.0 degrees. The pitot tube lines were checked for leaks before and after each test under a vacuum and a pressure. The lines were also checked for clearance and the manometer was zeroed before each test.

Particulate Matter

Particulate matter samples were taken at the Stack sampling location according to EPA Test Methods 5B and 202. For each run, samples of five minute duration were taken at each of the twenty-four traverse points for a total sampling time of 120 minutes. Data was recorded at five minute intervals.

The sampling train was leak checked at the end of the sampling probe at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest

vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The "front half" of the sampling train at the Stack sampling location contained the following components:

Stainless steel nozzle
Heated glass lined probe@ 320°F ± 25°F
Heated glass fiber filter @ 320°F ± 25°F
Heated Teflon line @ 248°F ± 25°F

The "back half" of the sampling train at the Stack sampling location contained the following components:

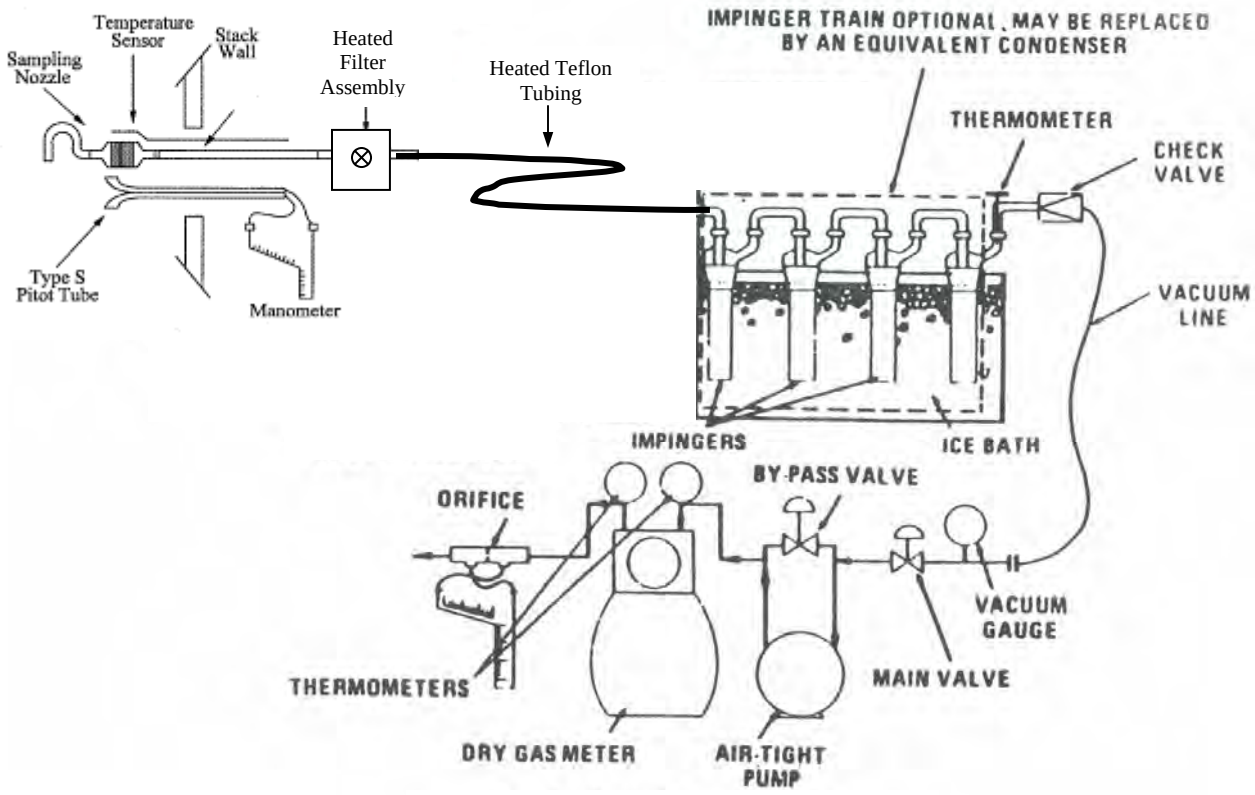
Table 8: EPA Test Methods 5B and 202 Sampling Train
Condenser/Absorbing System

Impinger No.	Impinger Type	Impinger Contents	Amount	Parameter Collected
1	Modified	H.P.L.C. H_2O	100 ml	H_2O
2	Greenburg-Smith	H.P.L.C. H_2O	100 ml	H_2O
3	Modified	Empty	-----	H_2O
4	Modified	Silica Gel	250 g	H_2O

At the completion of each run, the "back half" of the sampling train was purged with nitrogen for 60 minutes at a rate of 20 liters per minute.

Integrated Orsat samples were collected during each test. The samples were analyzed according to EPA Method 3 to determine the stack gas molecular weight.

Figure 3: EPA Test Methods 5B and 202 Sampling Train



Particulate Matter, Hydrogen Halides & Halogens, and Ammonia

Particulate matter, hydrogen halides & halogens, and ammonia samples were taken at the SDA Inlet Duct and Stack sampling locations according to EPA Test Methods 1, 2, 3, 4, 5, 17, 26A, and CTM027. For each run at the SDA Inlet Duct, samples of five minute duration were taken at each of twelve traverse points for a total test time of 60 minutes. Data was recorded at five minute intervals. For each run at the Stack, samples of three minute duration were taken at each of twenty-four traverse points for a total test time of 72 minutes. Data was recorded at three minute intervals.

The sampling trains were leak checked at the end of the sampling probe at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The 'front half' of the sampling train at the SDA Inlet Duct contained the following components:

Glass nozzle
Fiberglass Thimble
Heated glass lined probe @ 248°F ± 25°F
Heated glass filter bypass @ 248°F ± 25°F

The 'front half' of the sampling train at the Stack contained the following components:

Glass nozzle
Heated glass lined probe @ 248°F ± 25°F
Heated fiberglass filter @ 248°F ± 25°F
Heated Teflon line @ 248°F ± 25°F

The ‘back half’ of the sampling trains at both sampling locations contained the following components:

Table 9: EPA Test Method 26A Condenser/Absorbing System

Impinger No.	Impinger Type	Absorbing Solution
1	Greenburg-Smith	100 ml 0.1N H_2SO_4
2	Greenburg-Smith	100 ml 0.1N H_2SO_4
3	Modified	100 ml 0.1N NaOH
4	Modified	100 ml 0.1N NaOH
5	Modified	~200 g silica gel

A 100 milliliter aliquot of the Impinger No. 1 and No. 2 contents was taken from each run at the SDA Inlet Duct for Ion Chromatograph analysis to determine the concentrations of ammonia.

Integrated Orsat samples were collected at each sampling location during each test. The samples were analyzed according to EPA Method 3 to determine the stack gas molecular weight.

Figure 4: EPA Test Methods 17, 26A, and CTM027 SDA Inlet Duct Sampling Train

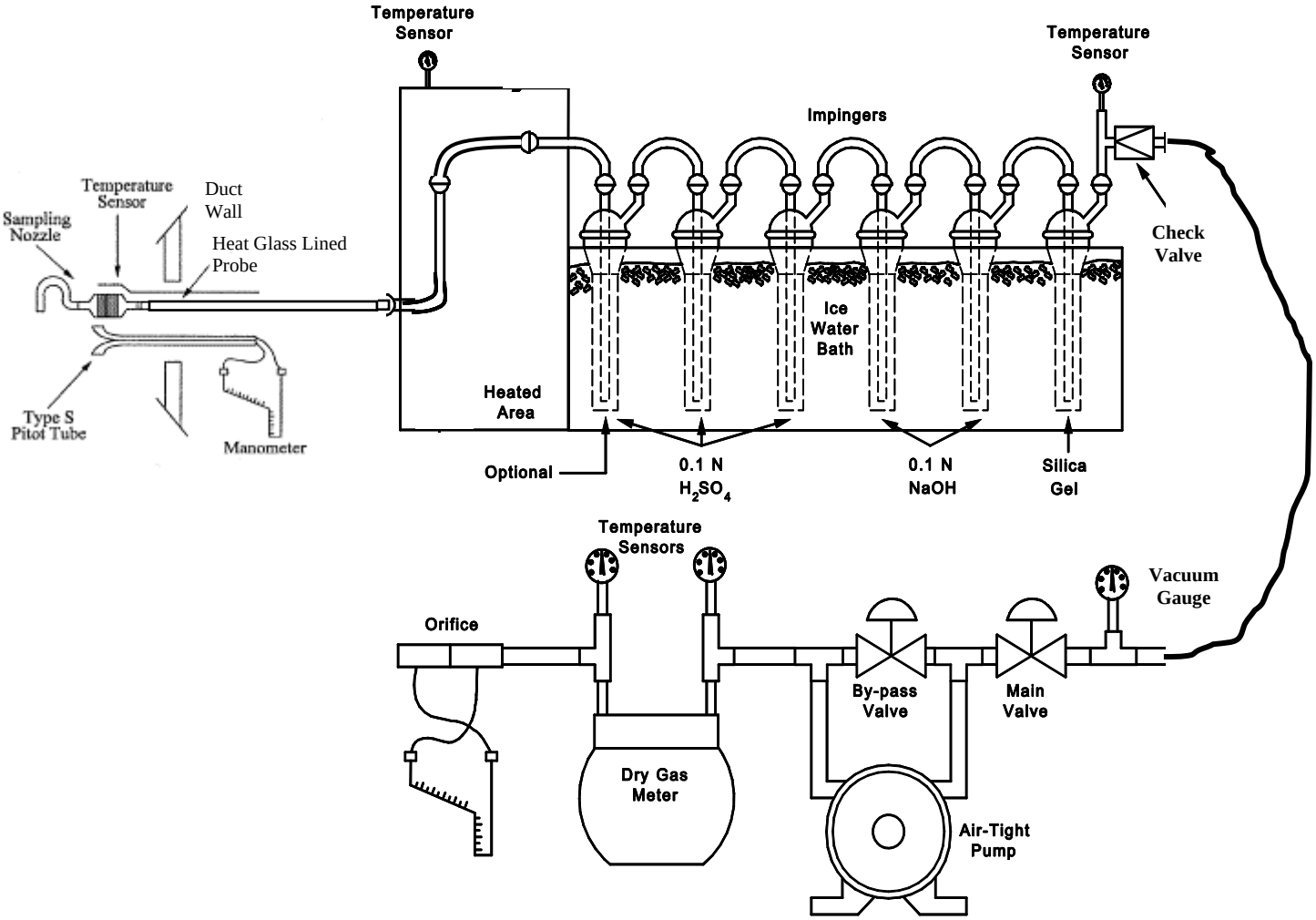
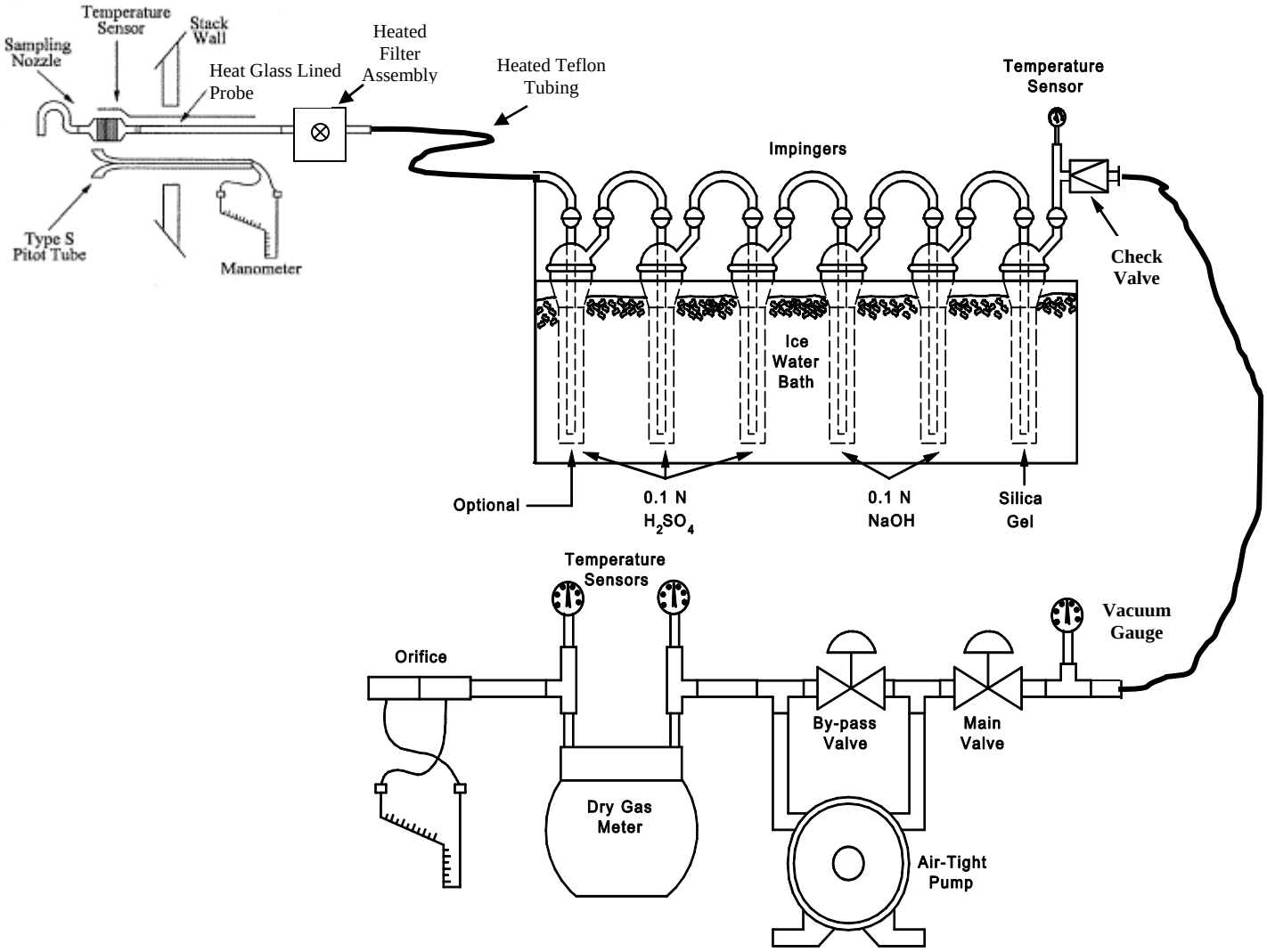


Figure 5: EPA Test Methods 5 and 26A Stack Sampling Train



Particulate Matter and Speciated Mercury

Speciated mercury and particulate matter samples were taken at the SDA Inlet Duct and Stack sampling locations according to EPA Test Methods 1, 2, 3, 4, 5, and 17; and ASTM D6784-02 (Ontario Hydro) Mercury Speciation Test Method. For each run at the SDA Inlet Duct, samples of ten minute duration were taken at each of twelve traverse points for a total test time of 120 minutes. Data was recorded at five minute intervals. For each run at the Stack, samples of five minute duration were taken at each of twenty-four traverse points for a total test time of 120 minutes. Data was recorded at five minute intervals.

The sampling trains were leak checked at the end of the sampling probe at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The ‘front half’ of the sampling train at the SDA Inlet Duct contained the following components:

Glass nozzle
Fiberglass Thimble
Heated glass lined probe @ 248°F ± 25°F
Heated glass filter bypass @ 248°F ± 25°F

The ‘front half’ of the sampling train at the Stack contained the following components:

Glass nozzle
Heated glass lined probe @ 248°F ± 25°F
Heated fiberglass filter @ 248°F ± 25°F
Heated Teflon line @ 248°F ± 25°F

The ‘back half’ of the sampling trains, contained the following components:

Table 10: ASTM D6784-02 (Ontario Hydro) Speciated Mercury Test Method Condenser/Absorbing System

Impinger No.	Impinger Type	Absorbing Solution
1	Modified	100 ml 1 N KCl
2	Modified	100 ml 1 N KCl
3	Greenburg-Smith	100 ml 1 N KCl
4	Modified	100 ml 5% $^{v}/_{v}$ HNO_3, 10% $^{v}/_{v}$ H_2O_2
5	Modified	100 ml 4% $^{w}/_{v}$ H_2SO_4, 10% $^{v}/_{v}$ KM_nO_4
6	Modified	100 ml 4% $^{w}/_{v}$ H_2SO_4, 10% $^{v}/_{v}$ KM_nO_4
7	Greenburg-Smith	100 ml 4% $^{w}/_{v}$ H_2SO_4, 10% $^{v}/_{v}$ KM_nO_4
8	Modified	~200 g silica gel

Integrated Orsat samples were collected at each sampling location during each test. The samples were analyzed according to EPA Method 3 to determine the stack gas molecular weight.

Figure 6: ASTM D6784-02 (Ontario Hydro) Mercury Speciation Test Method Sampling Train - SDA Inlet Duct

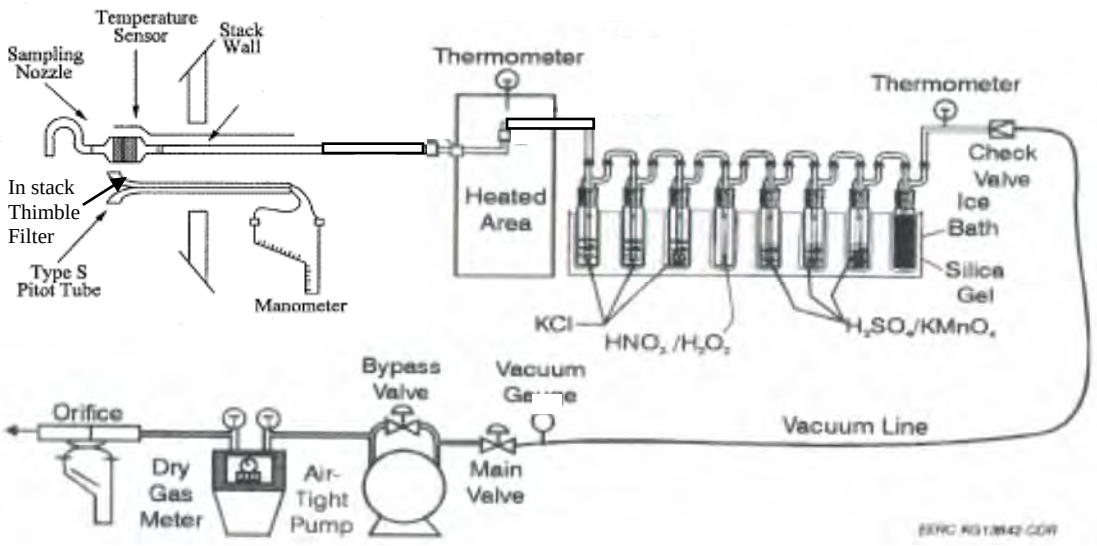
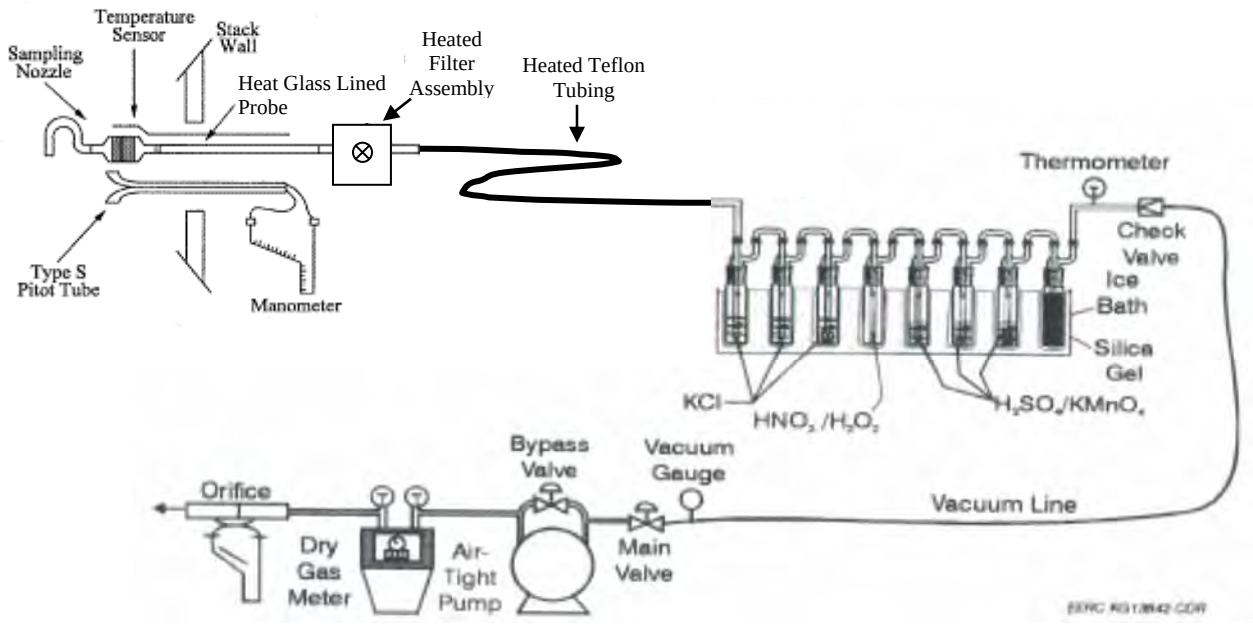


Figure 7: ASTM D6784-02 (Ontario Hydro) Mercury Speciation Test Method Sampling Train - Stack



Sulfur Trioxide

Triplicate samples for sulfur trioxide were taken at the SDA Inlet Duct sampling location according to NCASI Method 8A. For each run, samples of 60 minute duration were taken at a single traverse point. Data was recorded at five minute intervals.

The sampling train was leak checked at the end of the sampling probe at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The 'front half' of the sampling train contained the following components:

Glass Sample Probe heated to 500˚ F
Quartz Filter heated to 500˚ F
Glass Condenser cooled to 140˚ F
Teflon tubing connected to Impingers

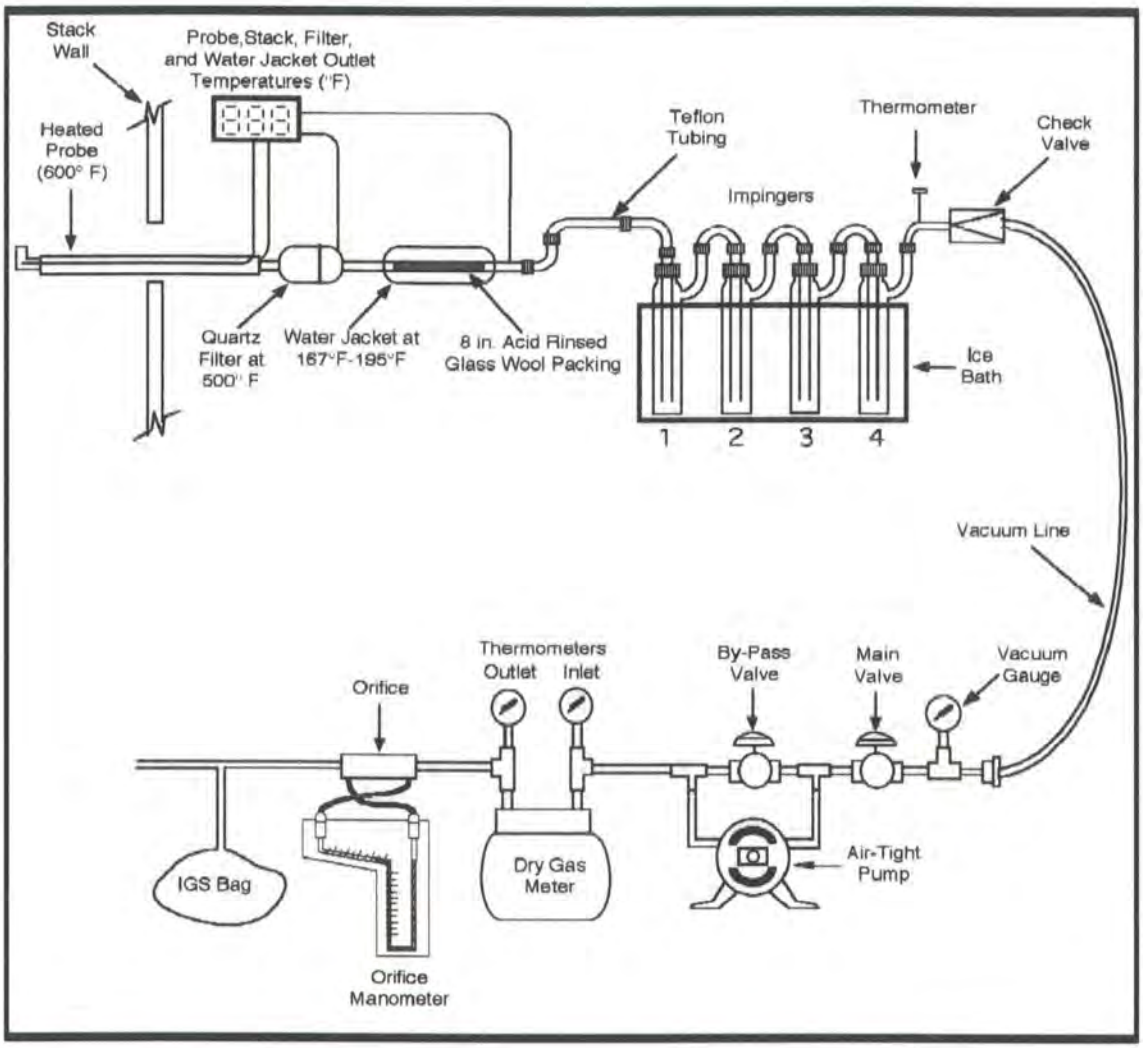
The 'back half' of the sampling train contained the following components:

Table 11: NCASI Method 8A Condenser/Absorbing System

Impinger No.	Impinger Type	Absorbing Solution
1	Greenburg-Smith	100 ml 3% H_2O_2
2	Modified	100 ml 3% H_2O_2
3	Greenburg-Smith	100 ml DI H_2O
4	Modified	~200 g silica gel

The sampling train was purged from the inlet of the condenser with clean ambient air for 15 minutes at the completion of each test run.

Figure 8: NCASI Method 8A SDA Inlet Duct Sampling Train



TEST NARRATIVE

Personnel from Air Sampling Associates, Inc. arrived at the Rocky Mountain Power, Hardin Power Plant, located in Hardin, Montana at 8:30 a.m. on Monday, November 27, 2006. The sampling trailer was placed into position and electrical power was established. The sampling equipment was moved onto the SDA Inlet Duct and the Stack before securing the equipment for the night at 6:30 p.m.

On Tuesday, November 28, 2006, personnel returned to the plant at 7:00 a.m. The preliminary data was collected before the plant ceased to operate at the desired level. Personnel prepared for the next day's testing before departing the plant at 4:15 p.m.

On Wednesday, November 29, 2006, personnel returned to the plant at 7:00 a.m. The sampling equipment was prepared for testing but personnel was informed that the plant was not operating at the desired level. Personnel departed the plant at 9:00 a.m. Personnel returned to the plant at 1:30 p.m. At that time, personnel was informed that the plant was still not operating at the desired level and testing would be postponed until the next day. Personnel departed the plant at 2:45 p.m.

On Thursday, November 30, 2006, personnel returned to the plant at 7:00 a.m. Personnel was informed that the plant was not operating at the desired level. Personnel waited until 10:30 a.m. and then departed the plant. Personnel returned to the plant at 1:00 p.m. The sampling equipment was prepared for testing and the first test on the SDA Inlet Duct using NCASI Method 8A was taken from 1:23 p.m. until 2:23 p.m. The first test on the Stack using EPA Test Methods 5 and 202 began at 1:34 p.m. and was completed at 3:42 p.m. The first test on the SDA Inlet Duct using EPA Test Methods 17, 26A, and CTM027 was taken from 2:54 p.m. until 3:59 p.m. The first test on the Stack using EPA Test Method 26A was taken from 4:42 p.m. until 5:59 p.m. The

second test on the SDA Inlet Duct using NCASI Method 8A was taken from 4:48 p.m. until 5:48 p.m. The samples were recovered and personnel departed the plant at 8:00 p.m.

On Friday, December 1, personnel returned to the plant at 7:00 a.m. The sampling equipment was prepared for testing and the first simultaneous test on the SDA Inlet Duct and the Stack using the ASTM D6784-02 (Ontario Hydro) Speciated Mercury Test Method began at 8:57 a.m. Testing continued until the completion of the test on the stack at 11:05 a.m. The second test on the SDA Inlet Duct using EPA Test Methods 17, 26A, and CTM027 was taken from 12:03 p.m. until 1:05 p.m. The third test on the SDA Inlet Duct using NCASI Method 8A was taken from 2:01 p.m. until 3:01 p.m. The second test on the Stack using EPA Test Method 26A was taken from 3:09 p.m. until 4:26 p.m. The third test on the SDA Inlet Duct using EPA Test Methods 17, 26A, and CTM027 was taken from 4:47 p.m. until 5:49 p.m. The samples were recovered and personnel departed the plant at 6:30 p.m.

On Saturday, December 2, personnel returned to the plant at 7:00 a.m. The sampling equipment was prepared for testing and the second simultaneous test on the SDA Inlet Duct and the Stack using the ASTM D6784-02 (Ontario Hydro) Speciated Mercury Test Method began at 9:19 a.m. Testing continued until the completion of the test on the stack at 11:24 a.m. The third test on the Stack using EPA Test Methods 5 and 202 was taken from 12:15 p.m. until 2:19 p.m. The third simultaneous test on the SDA Inlet Duct and Stack using the ASTM D6784-02 (Ontario Hydro) Speciated Mercury Test Method was delayed due to plant operations. The test began at 5:12 p.m. Testing continued until the completion of the test on the Stack at 7:17 p.m. The third test on the Stack using EPA Test Method 26A was taken from 8:25 p.m. until 9:41 p.m. The samples were recovered and personnel departed the plant at 10:45 p.m.

On Sunday, December 3, 2006, personnel returned to the plant at 7:00 a.m. The sampling equipment was moved off of the SDA Inlet Duct and the Stack and loaded into the sampling trailer. The samples were taken to Air Sampling Associates, Inc.'s office in Lewisville, Texas for analysis and shipment to the subcontracted laboratories.

Operations at the Rocky Mountain Power, Hardin Power Plant, SDA Inlet Duct and Stack, located in Hardin, Montana, were completed at 9:30 a.m. on Sunday, December 3, 2006.

APPENDICES

Appendix A:	**Location of Traverse Points**
Appendix B:	**Nomenclature and Equations for Calculation of Source Emissions**
Appendix C:	**Calibration Data**
Appendix D:	**Field Data**
Appendix E:	**EPA Test Methods 5B and 202 (Particulate Matter) Analytical Data**
Appendix F:	**EPA Test Methods 17, 26A and CTM027 (Particulate Matter, Hydrogen Halides & Halogens, and Ammonia) Analytical Data – SDA Inlet Duct**
Appendix G:	**EPA Conditional Test Methods 5 and 26A (Particulate Matter and Hydrogen Halides & Halogens) Analytical Data – Stack**
Appendix H:	**EPA Test Methods 5, 17 (Particulate Matter), and ASTM D6784-02 (Ontario Hydro) Mercury Speciation Test Method Analytical Data**
Appendix I:	**NCASI Method 8A (Sulfur Trioxide) Analytical Data**
Appendix J:	**Chain of Custodies**
Appendix K:	**Resumes of Test Personnel**

Appendix A:

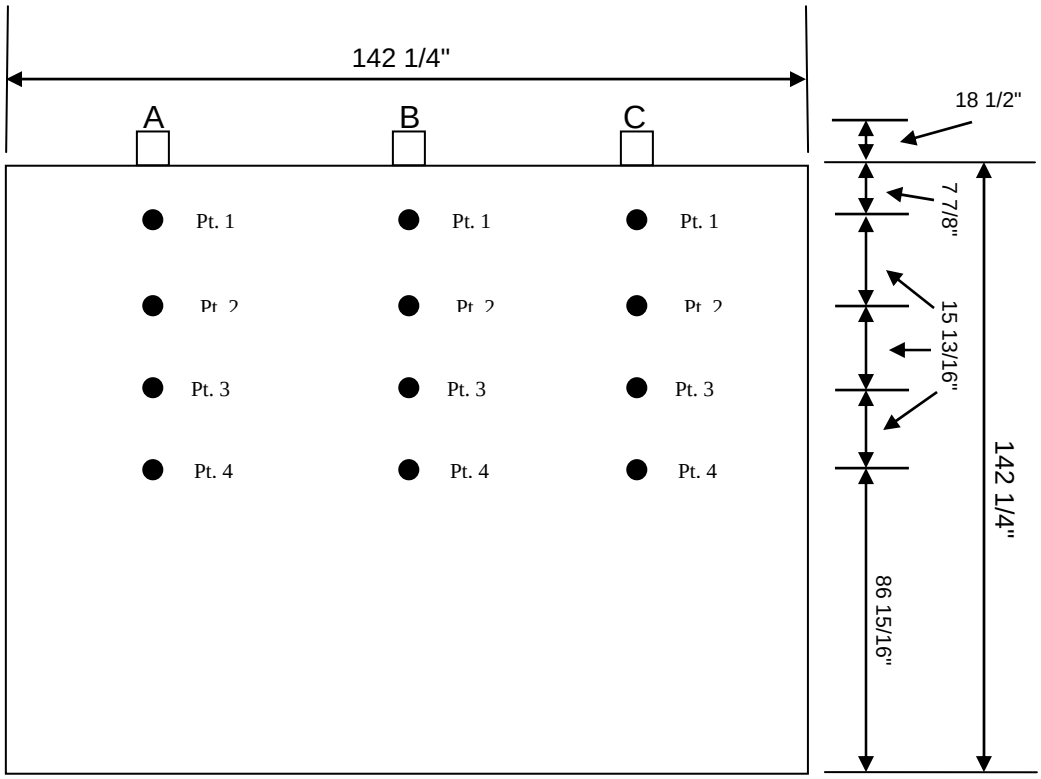
Location of Traverse Points

Appendix A

Location of Traverse Points SDA Inlet Duct

The sampling ports are located 13 feet 4 inches (1.12 equivalent duct diameters) downstream from a bend in the bend in the duct and 56 feet 3 inches (4.75 equivalent duct diameters) upstream from a bend in the duct. The locations of the traverse points were calculated as follows:

Figure 9: Location of Traverse Points - SDA Inlet Duct



Note: Physical limitations prevented the complete traversing of the SDA Inlet Duct.

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Appendix A

Location of Traverse Points Stack

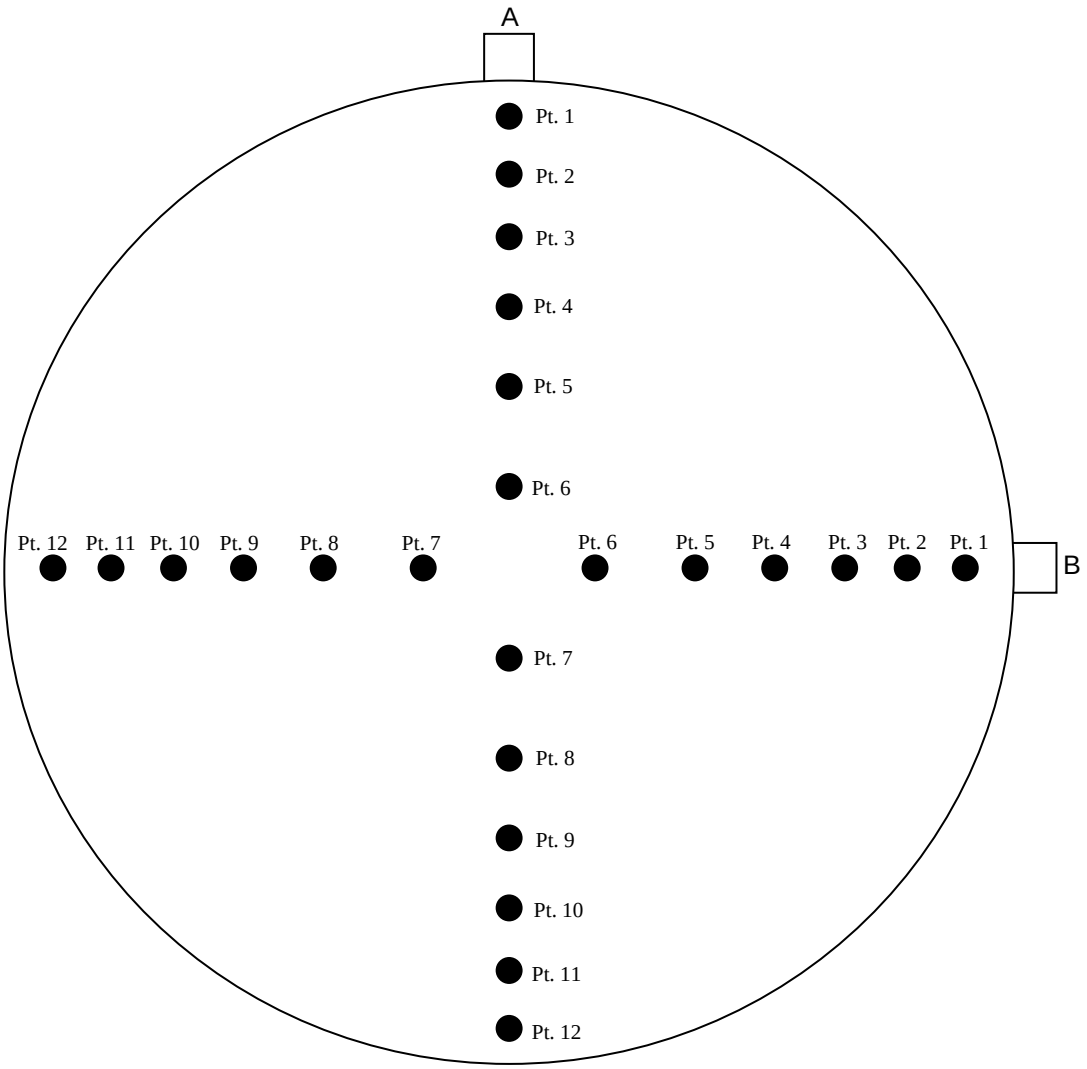
The sampling ports are located 33 feet 1 1/2 inches (3.64 stack diameters) downstream from the inlet to the stack and > 18 feet 2 3/8 inches (> 2.00 stack diameters) upstream from the outlet to the stack. The locations of the traverse points were calculated as follows:

Table 12: Location Traverse Points - Stack

Port & Wall Thickness = 15 1/8 inches		
Inside Stack Diameter = 109 3/16 inches		
Point Number	**Percent of Stack Diameter**	**Distance from Wall**
1	2.1	2 5/16"
2	6.7	7 5/16"
3	11.8	12 7/8"
4	17.7	19 5/16"
5	25.0	27 5/16"
6	35.6	38 7/8"
7	64.4	70 5/16"
8	75.0	81 7/8"
9	82.3	89 7/8"
10	88.2	96 5/16"
11	93.3	101 7/8"
12	97.9	106 7/8"

Appendix A

Figure 10: Location of Traverse Points - Stack



Not to scale.

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Appendix B:

Nomenclature and Equations for Calculation of Source Emissions

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Nomenclature For Flow Rate and Moisture Calculations

Symbol	English Units	Metric Units	Description
A_s	in.^{2}	m^2	Stack Area
C_{an}	gr/dscf*	g/dscm*	Particulate – probe, cyclone, and filter
C_{ao}	gr/dscf*	g/dscm*	Particulate –total
C_{at}	gr/CF @ stack conditions	g/m3	Particulate – probe, cyclone, and filter
C_{au}	gr/CF @ stack conditions	g/m3	Particulate – total
C_{aw}	lbs/hr	kg/hr	Particulate – probe, cyclone, and filter
C_{ax}	lbs/hr	kg/hr	Particulate - total
C_p			Pitot Tube Calibration Factor
D_n	in.	m	Sampling Nozzle Diameter
%EA			Percent Excess Air at Sampling Point
g	32.2 ft/sec^2		Acceleration of gravity
%I			Percent Isokinetic
%M			Percent Moisture in the Stack Gas by Volume
M_d			Mole Fraction of Dry Gas
m_f	mg	mg	Particulate – probe, cyclone, and filter
mt	mg	mg	Particulate -total
M_{water}	18 lb/lb-mole		Molecular Weight of Water
MW	lb/lb-mole	g/g-mole	Molecular Weight of Stack Gas
MW_{air}	28.84 lb/lb-mole		Molecular Weight of Air
MW_d	lb/lb-mole	g/g-mole	Molecular Weight of Dry Stack Gas

Symbol	English Units	Metric Units	Description
P_b	"Hg Absolute	mm Hg	Barometric Pressure
P_m	"H_2O	mm H_2O	Orifice Pressure drop
Ps	"Hg Absolute	mm Hg	Stack Pressure
ΔP	"H_2O	mm H_2O	Velocity Head of Stack Gas
P_{std}	29.92" Hg	760 mm Hg	Standard Barometric Pressure
Q_a	ACFM	m^3/hr	Stack Gas Volume at Actual Stack Conditions
Q_s	DSCFM*	dscm/hr*	Stack Gas Volume at 29.92" Hg, 528° R, dry
R	21.83" Hg-ft^3/lb-mole °R		Universal Gas Constant
T_m	°F	°C	Average Gas Meter Temperature
T_t	min	min	Net Time of Test
T_s	°F	°C	Stack Temperature
T_{std}	528 °R	293 °K	Standard Temperature
V_m	ft^3	m^3	Volume of Dry Gas Sampled @ Meter Conditions
Vm_{std}	dscf*	dscm*	Volume of Dry Gas Sampled @ Standard Conditions
V_s	fpm	m/sec	Stack Velocity @ Stack Conditions
V_w	ml	ml	Total Water Collected in Impingers and Silica Gel
Vw_{gas}	scf*	scm*	Volume of Water Vapor Collected @ Standard Conditions

Symbol	English Units	Metric Units	Description
ρ_{air}	0.0748 lbs/ft^3		Density of Air
ρ_{water}	1 g/ml		Density of Water
ρ_{man}	62.32 lbs/ft^3		Density of Manometer Oil (Inches of Water)

Standard Conditions: 29.92" Hg, 68° F (760 mm Hg, 20 °C)

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EXAMPLE CALCULATIONS

1. Volume of dry gas sampled at standard conditions. *

$$V_{m_{std}} = V_m \left(\frac{T_{std}}{T_m + 460} \right) \left[\frac{P_b + \frac{P_m}{13.6}}{P_{std}} \right]$$

$$V_{m_{std}} = 17.65\ V_m \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460} \right] = \text{dscf}$$

$$V_{m_{std}} = \text{dscf} \times 0.028317 = \text{dscm}$$

2. Volume of water vapor collected at standard conditions. *

$$V_{w_{gas}} = \frac{(V_w - gms\ SO_2 - gms\ H_2S)\ \rho_{water}\ RT_{std}}{P_{std}\ M_{water}\ 453.6}$$

$$V_{w_{gas}} = 0.0472\ (V_w - gms\ SO_2 - gms\ H_2S) = scf$$

$$V_{w_{gas}} = scf \times 0.028317 = scm$$

3. Percent moisture in stack gas.

$$\%M = \frac{V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} \times 100 = \%$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

4. Mole fraction of dry gas.

$$M_d = \frac{100 - \%M}{100}$$

5. Average molecular weight of dry stack gas.

$$MW_d = \left[\%CO_2 \times \frac{44}{100}\right] + \left[\%O_2 \times \frac{32}{100}\right] + \left[\%N_2 \times \frac{28}{100}\right] + \left[\%CO \times \frac{28}{100}\right] = lb/lb\text{-}mole$$

$$= g/g\text{-}mole$$

6. Molecular weight of stack gas.

$$MW = MW_d \times M_d + 18\,(1 - M_d) = \frac{lb}{lb\text{-}mole} = g/g\text{-}mole$$

7. Percent excess air at sampling point.

$$\%EA = \frac{100\,[\%O_2 - (0.5\,\%CO)]}{0.265\,(\%N_2) - [\%O_2 - (0.5\,\%CO)]}$$

8. Stack Pressure.

$$P_s = P_b + \frac{Stack\ Pressure\ "H_2O}{13.6} = "Hg\ Absolute$$

$$P_s = "Hg\ Abs. \times 25.4 = mm\ Hg$$

9. Stack velocity at stack conditions.

$$V_s = C_p\,60\left[\frac{2g \times \rho_{man} \times P_{std} \times MW_{air} \times (T_s + 460) \times \Delta P}{12 \times \rho_{air} \times P_s \times MW \times T_{std}}\right]^{1/2}$$

$$V_s = 5{,}123.8\,C_p\left[\frac{(T_s + 460)}{P_s \times MW}\right]^{1/2} \sqrt{\Delta P}\ \text{average} = \text{fpm}$$

$$V_s = \text{fpm} \times 0.00508 = \text{m/sec}$$

10. Dry stack gas volume at standard conditions. *

$$Q_s = \frac{1}{144} V_s \text{ x } A_s \text{ x } M_d \text{ x } \frac{T_{std}}{T_s + 460} \text{ x } \frac{P_s}{P_{std}}$$

$$Q_s = \frac{0.123\, V_s \text{ x } A_s \text{ x } M_d \text{ x } P_s}{T_s + 460} = DSCFM$$

$$Q_s = DSCFM \text{ x } 1.6990 = dscm/hr$$

11. Actual stack gas volume at stack conditions.

$$Q_a = \frac{V_s \text{ x } A_s}{144} = ACFM$$

$$Q_a = ACFM \text{ x } 1.6990 = m^3/hr$$

12. Percent Isokinetic

$$\%I = \frac{V_{mstd} \text{ x } (T_s + 460) \text{ x } P_{std} \text{ x } 100 \text{ x } 144\, in.^2/ft^2}{M_d \text{ x } T_{std} \text{ x } P_s \text{ x } T_t \text{ x } V_s \left(\frac{\Pi \text{ x } D_n^2}{4} \right)}$$

$$\%I = \frac{1039 \text{ x } V_{mstd} \text{ x } (T_s + 460)}{M_d \text{ x } P_s \text{ x } T_t \text{ x } V_s \text{ x } D_n^2}$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

13. Particulate – Probe, cyclone, and filter.

$$C_{an} = \frac{m_f}{V_{m_{std}}} x \frac{1\,gr}{64.8\,mg}$$

$$C_{an} = 0.0154 \text{ x } \frac{mf}{V_{m_{std}}} \text{ gr/dscf } *$$

$$C_{an} = \text{gr/dscf x } 2.290 = \text{g/dscm } *$$

14. Particulate total.

$$C_{ao} = 0.0154 \text{ x } \frac{m_t}{V_{m_{std}}} = gr\,/\,dscf\ *$$

$$C_{ao} = \text{gr/dscf x } 2.290 = \text{g/dscm } *$$

15. Particulate – probe, cyclone, and filter at stack conditions.

$$C_{at} = C_{an} \text{ x } \frac{P_s}{P_{std}} \text{ x } \frac{(T_{std})}{(T_s + 460)} \text{ x } M_d$$

$$C_{at} = \frac{17.65 \text{ x } C_{an} \text{ x } Ps \text{ x } Md}{Tx + 460} = \text{gr/CF}$$

$$C_{at} = \text{gr/CF x } 2.290 = \text{g/m}^3$$

16. Particulate – total, at stack conditions.

$$C_{au} = \frac{17.65 \text{ x } C_{ao} \text{ x } P_s \text{ x } M_d}{T_s + 460} = \text{gr/CF}$$

$$C_{au} = \text{gr/CF x } 2.290 = \text{g/m}^3$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

17. Particulate – probe, cyclone, and filter.

$$C_{aw} = C_{an} \text{ x } Q_s \text{ x } \frac{60 \text{ min.}}{1 \text{hr}} x \frac{1 \text{lb}}{7{,}000 \text{ gr}}$$

$$C_{aw} = 0.00857 \text{ x } C_{an} \text{ x } Q_s = \text{lbs/hr}$$

$$C_{aw} = \text{lbs/hr x } 0.4536 = \text{kg/hr}$$

18. Particulate – total.

$$C_{ax} = 0.00857 \text{ x } C_{ao} \text{ x } Q_s = \text{lbs/hr}$$

$$C_{ax} = \text{lbs/hr x } 0.4536 = \text{kg/hr}$$

19. Mercury - µg/dscm

µg/dscm = µg ÷ (V_{mstd} x 0.028317 m^3/ft^3)

*29.92" Hg, 68° F (760 mm Hg, 20 °C)

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Summary of Results
Mercury Speciation Results
Rocky Mountain Power - Hardin Power Plant
SDA Inlet Duct

Run No.	1	2	3	
Test Date:	12/1/2006	12/2/2006	12/2/2006	
Test Time:	0857-1059	0919-1121	1712-1914	Average
Volume of Dry Gas Sampled @ Standard Conditions				
dscm	1.343	1.352	1.383	1.359
dscf	47.420	47.730	48.842	47.997
Oxygen				
% volume	6.4	6.1	6.2	6.2
Particulate Mercury				
µg	0.6100	1.5000	0.6400	0.9167
µg/dscf	0.0129	0.0314	0.0131	0.0191
µg/dscm	0.4542	1.1095	0.4628	0.6755
lbs/10^{12} Btu	0.400	0.957	0.402	0.586
% of total Hg	10.38%	18.99%	13.37%	14.25%
Oxidized Mercury				
µg	1.6000	1.7000	3.3000	2.2000
µg/dscf	0.0337	0.0356	0.0676	0.0456
µg/dscm	1.1914	1.2574	2.3861	1.6116
lbs/10^{12} Btu	1.049	1.085	2.072	1.402
% of total Hg	27.24%	21.52%	68.92%	39.23%
Elemental Mercury				
µg	3.6640	4.7000	0.8480	3.0707
µg/dscf	0.0773	0.0985	0.0174	0.0644
µg/dscm	2.7282	3.4763	0.6132	2.2726
lbs/10^{12} Btu	2.402	2.999	0.532	1.978
% of total Hg	62.38%	59.49%	17.71%	46.53%
Total Mercury				
µg	5.8740	7.9000	4.7880	6.1873
µg/dscf	0.1239	0.1655	0.0980	0.1291
µg/dscm	4.3738	5.8432	3.4620	4.5597
lbs/10^{12} Btu	3.850	5.040	3.006	3.965
Oxygen based F factor	9,780	9,780	9,780	9,780

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Summary of Results
Mercury Speciation Results
Rocky Mountain Power - Hardin Power Plant
Stack

Run No.	1	2	3	
Test Date:	12/1/2006	12/2/2006	12/2/2006	
Test Time:	0857-1105	0919-1124	1712-1917	Average
Volume of Dry Gas Sampled @ Standard Conditions				
dscm	1.983	2.028	1.945	1.985
dscf	70.043	71.627	68.704	70.125
Oxygen				
% volume	6.2	6.4	6.2	6.3
Particulate Mercury				
µg	0.0380	ND	0.0090	<0.0157
µg/dscf	0.0005	ND	0.0001	<0.0002
µg/dscm	0.0192	ND	0.0046	<0.0079
lbs/10^{12} Btu	0.017	ND	0.004	<0.007
% of total Hg	0.54%	ND	0.14%	0.34%
Oxidized Mercury				
µg	0.1100	ND	0.0800	<0.0633
µg/dscf	0.0016	ND	0.0012	<0.0009
µg/dscm	0.0555	ND	0.0411	<0.0322
lbs/10^{12} Btu	0.048	ND	0.036	<0.028
% of total Hg	1.57%	ND	1.22%	1.40%
Elemental Mercury				
µg	6.8410	12.1000	6.4640	8.4683
µg/dscf	0.0977	0.1689	0.0941	0.1202
µg/dscm	3.4498	5.9665	3.3234	4.2466
lbs/10^{12} Btu	2.995	5.251	2.885	3.710
% of total Hg	97.88%	100.00%	98.64%	98.84%
Total Mercury				
µg	6.9890	12.1000	6.5530	8.5473
µg/dscf	0.0998	0.1689	0.0954	0.1214
µg/dscm	3.5245	5.9665	3.3692	4.2867
lbs/10^{12} Btu	3.059	5.251	2.924	3.745
Oxygen based F factor	9,780	9,780	9,780	9,780

AIR SAMPLING ASSOCIATES, INC.

Appendix C:

Calibration Data

AIR SAMPLING ASSOCIATES, INC.

Appendix C

Table 13: Calibration Data

Pre-Test Calibrations:

Equipment	Calibration Factor	Calibration Date
Dry Gas Meter 1-1	0.985	09/19/06
Digital Temperature Indicator 1-1		09/19/06
Dry Gas Meter 1-1 Orifice		09/19/06
Dry Gas Meter 2-2	0.999	10/24/06
Digital Temperature Indicator 2-2		10/23/06
Dry Gas Meter 2-2 Orifice		10/24/06
Pitot Tube 3-1	0.823	11/21/06
Pitot Tube 3-2	0.824	11/21/06
Pitot Tube 3-3	0.823	10/20/06
Pitot Tube 3-4	0.823	10/20/06
Pitot Tube 4-1	0.824	01/24/06
Nozzle 4-2	0.171	01/25/06
Nozzle 5-2	0.193	11/28/06
Nozzle 5-8	0.154	01/25/06
Nozzle 7-2	0.192	10/27/06
Nozzle 7-8	0.154	09/19/06

AIR SAMPLING ASSOCIATES, INC.

Post-Test Calibrations:

Equipment	Calibration Factor	Calibration Date
Dry Gas Meter 1-1	0.984	12/07/06
Digital Temperature Indicator 1-1		12/07/06
Dry Gas Meter 2-2	0.989	12/07/06
Digital Temperature Indicator 2-2		12/07/06
Pitot Tube 3-1	0.825	12/07/06
Pitot Tube 3-2	0.826	12/07/06
Pitot Tube 3-3	0.826	12/07/06
Pitot Tube 3-4	0.826	12/07/06
Pitot Tube 4-1	0.827	12/07/06
Nozzle 4-2	0.171	12/07/06
Nozzle 5-2	0.193	12/07/06
Nozzle 5-8	0.154	12/07/06
Nozzle 7-2	0.192	12/07/06
Nozzle 7-8	0.154	12/07/06

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/19/06

ΔH Setting (" H_2O)	C_{DG}
0.50	0.984
1.00	0.986
1.50	0.985
2.00	0.987
3.00	0.984
4.00	0.983
Average	0.985

Variation +: 0.20%

Variation -: -0.20%

Certified by: Gary B. Goldman 09/19/06

Calibrator (Signature / Date)

Bill Hefley 09/19/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/19/06

Run 1 at 0.5" ΔH Pb = 29.80 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	13:27	5.238	cf	83	°F	-0.1	" H_2O		913.384	cf	82	°F	83	°F	0.50	" H_2O
Start	13:14	0.000	cf	83	°F	-0.1	" H_2O		907.982	cf	82	°F	81	°F	0.50	" H_2O
Average		5.238	cf	83	°F	-0.1	" H_2O		5.402	cf	82	°F	82	°F	0.50	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.164} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.249} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{0.984}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/19/06

Run 1 at 1.0" ΔH Pb = 29.80 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	13:40	5.015	cf	83	°F	-0.4	" H_2O		918.875	cf	86	°F	83	°F	1.00	" H_2O
Start	13:31	0.000	cf	83	°F	-0.4	" H_2O		913.712	cf	83	°F	82	°F	1.00	" H_2O
Average		5.015	cf	83	°F	-0.4	" H_2O		5.163	cf	85	°F	83	°F	1.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{4.940} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.009} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{0.986}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/19/06

Run 1 at 1.5" ΔH Pb = 29.80 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	14:00	10.038	cf	83	°F	-0.6	" H_2O		930.182	cf	91	°F	84	°F	1.50	" H_2O
Start	13:45	0.000	cf	83	°F	-0.6	" H_2O		919.804	cf	86	°F	83	°F	1.50	" H_2O
Average		10.038	cf	83	°F	-0.6	" H_2O		10.378	cf	89	°F	84	°F	1.50	" H_2O

$$\textit{Wet Test Meter } V_{msid} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{9.884} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{msid} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.034} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{msid}}{\textit{Dry Gas Meter } V_{msid}} = \underline{0.985}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/19/06

Run 1 at 2.0" ΔH Pb = 29.80 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	14:16	10.020	cf	83	°F	-0.7	" H_2O		940.927	cf	94	°F	86	°F	2.00	" H_2O
Start	14:03	0.000	cf	83	°F	-0.7	" H_2O		930.552	cf	90	°F	85	°F	2.00	" H_2O
Average		10.020	cf	83	°F	-0.7	" H_2O		10.375	cf	92	°F	86	°F	2.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{9.863} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{9.993} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{0.987}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/19/06

Run 1 at 3.0" ΔH Pb = 29.80 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	14:29	10.407	cf	84	°F	-1.0	" H_2O		952.083	cf	97	°F	87	°F	3.00	" H_2O
Start	14:18	0.000	cf	84	°F	-1.0	" H_2O		941.298	cf	92	°F	86	°F	3.00	" H_2O
Average		10.407	cf	84	°F	-1.0	" H_2O		10.785	cf	95	°F	87	°F	3.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.218} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.381} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{0.984}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/19/06

Run 1 at 4.0" ΔH Pb = 29.80 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	14:42	10.864	cf	84	°F	-1.3	" H_2O		963.826	cf	98	°F	88	°F	4.00	" H_2O
Start	14:32	0.000	cf	84	°F	-1.3	" H_2O		952.552	cf	87	°F	96	°F	4.00	" H_2O
Average		10.864	cf	84	°F	-1.3	" H_2O		11.274	cf	93	°F	92	°F	4.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.659} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.843} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{0.983}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 1-1

Date Calibration Performed: 09/19/06

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	11:43	33° F	32° F
Ambient Air	11:39	82° F	82° F
Boiling Water	12:10	210° F	210° F
Oven	11:55	251° F	252° F
Oven	11:58	298° F	299° F
Oven	12:08	348° F	348° F
Oven	12:02	389° F	389° F

Meter Adjusted? No

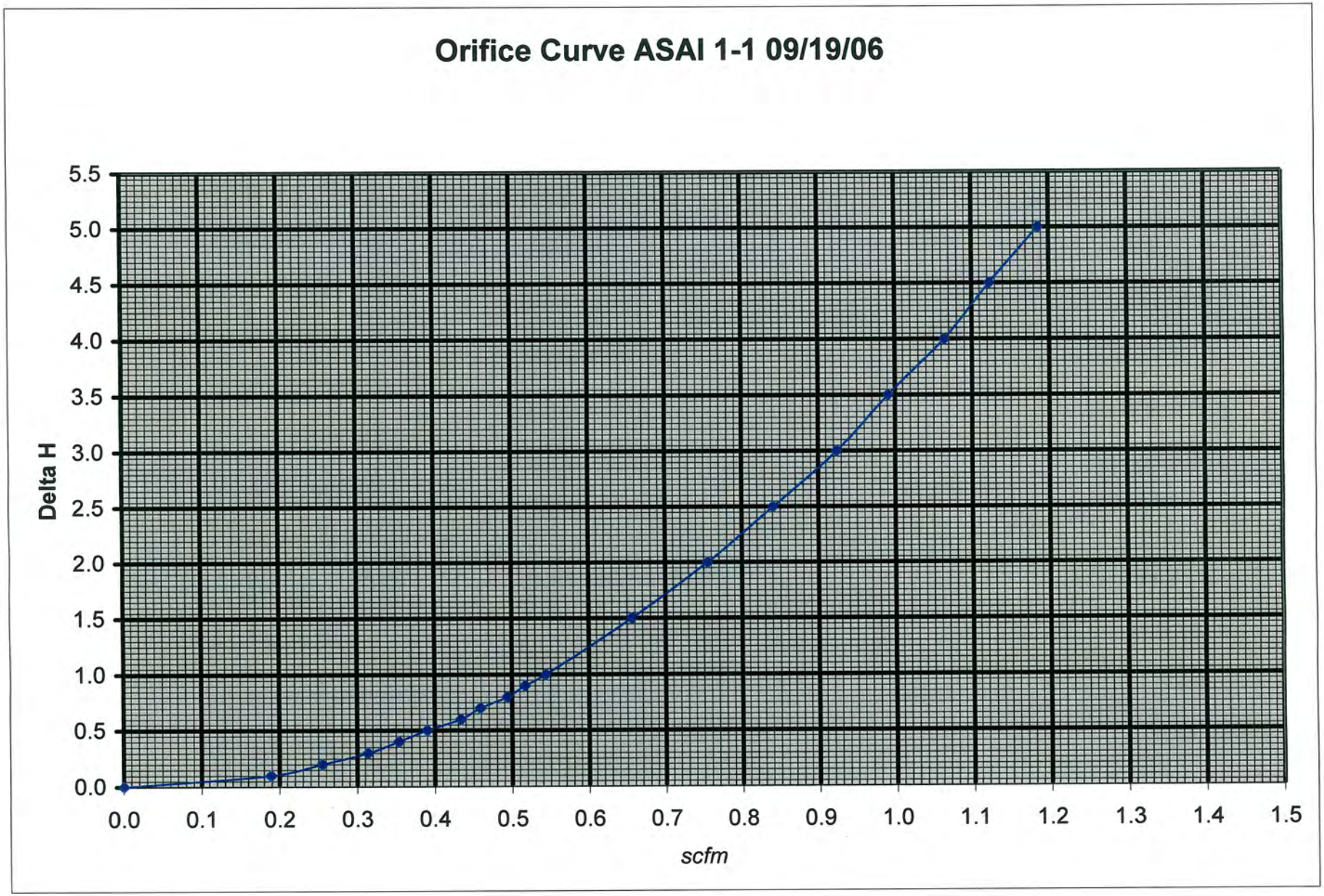
ASTM Reference Thermometer:			
	SN: 5963	Range:	+18+89°F
	SN: 1853	Range:	+205+310°F
	SN: 992	Range:	+295+400°F

Certified by: Gary B. Goldman 09/19/06

Calibrator (Signature / Date)

Bill Hefley 09/19/06

QA Officer (Signature / Date)


Orifice Curve ASAI 1-1 09/19/06
Delta H
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
scfm

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 10/24/06

ΔH Setting (" H_2O)	C_{DG}
0.50	1.003
1.00	1.000
1.50	0.996
2.00	0.998
3.00	0.997
4.00	0.997
Average	0.999

Variation +: 0.40%

Variation -: -0.30%

Certified by: Patrick Selakovich 10/24/06

Calibrator (Signature / Date)

Bill Hefley 10/24/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 10/24/06

Run 1 at 0.5" ΔH Pb = 29.79 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	10:50	5.315	cf	67	°F	-0.2	" H_2O	613.712	cf	72	°F	67	°F	0.50	" H_2O
Start	10:37	0.000	cf	67	°F	-0.2	" H_2O	608.301	cf	72	°F	67	°F	0.50	" H_2O
Average		5.315	cf	67	°F	-0.2	" H_2O	5.411	cf	72	°F	67	°F	0.50	" H_2O

$$\textit{Wet Test Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.396} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.380} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{msd}}{\textit{Dry Gas Meter } V_{msd}} = \underline{1.003}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 10/24/06

Run 1 at 1.0" ΔH Pb = 29.79 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	11:02	5.175	cf	67	°F	-0.3	" H_2O	619.692	cf	74	°F	68	°F	1.00	" H_2O
Start	10:53	0.000	cf	67	°F	-0.3	" H_2O	614.407	cf	72	°F	68	°F	1.00	" H_2O
Average		5.175	cf	67	°F	-0.3	" H_2O	5.285	cf	73	°F	68	°F	1.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.252} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.251} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{1.000}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 10/24/06

Run 1 at 1.5" ΔH Pb = 29.79 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	11:39	10.245	cf	69	°F	-0.5	" H_2O		631.080	cf	76	°F	70	°F	1.50	" H_2O
Start	11:24	0.000	cf	69	°F	-0.5	" H_2O		620.606	cf	71	°F	69	°F	1.50	" H_2O
Average		10.245	cf	69	°F	-0.5	" H_2O		10.474	cf	74	°F	70	°F	1.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.353} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.400} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.996}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 10/24/06

Run 1 at 2.0" ΔH Pb = 29.77 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	11:55	10.205	cf	69	°F	-0.7	" H_2O		641.943	cf	79	°F	71	°F	2.00	" H_2O
Start	11:42	0.000	cf	69	°F	-0.7	" H_2O		631.509	cf	75	°F	70	°F	2.00	" H_2O
Average		10.205	cf	69	°F	-0.7	" H_2O		10.434	cf	77	°F	71	°F	2.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.301} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.322} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.998}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 10/24/06

Run 1 at 3.0" ΔH Pb = 29.77 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	12:09	10.579	cf	69	°F	-0.9	" H_2O	653.948	cf	82	°F	72	°F	3.00	" H_2O
Start	11:58	0.000	cf	69	°F	-0.9	" H_2O	643.109	cf	79	°F	71	°F	3.00	" H_2O
Average		10.579	cf	69	°F	-0.9	" H_2O	10.839	cf	81	°F	72	°F	3.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.673} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.704} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.997}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 10/24/06

Run 1 at 4.0" ΔH Pb = 29.77 " Hg

Wet Test Meter C_f = 1.018 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	12:21	11.051	cf	70	°F	-1.1	" H_2O	666.213	cf	84	°F	73	°F	4.00	" H_2O
Start	12:11	0.000	cf	70	°F	-1.1	" H_2O	654.913	cf	81	°F	72	°F	4.00	" H_2O
Average		11.051	cf	70	°F	-1.1	" H_2O	11.300	cf	83	°F	73	°F	4.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{11.123} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{11.156} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.997}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 2-2

Date Calibration Performed: 10/23/06

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	10:04	32° F	32° F
Ambient Air	8:20	60° F	59° F
Boiling Water	9:52	212° F	214° F
Oven	9:20	252° F	258° F
Oven	9:12	302° F	305° F
Oven	9:00	353° F	356° F
Oven	8:45	401° F	404° F

Meter Adjusted? No

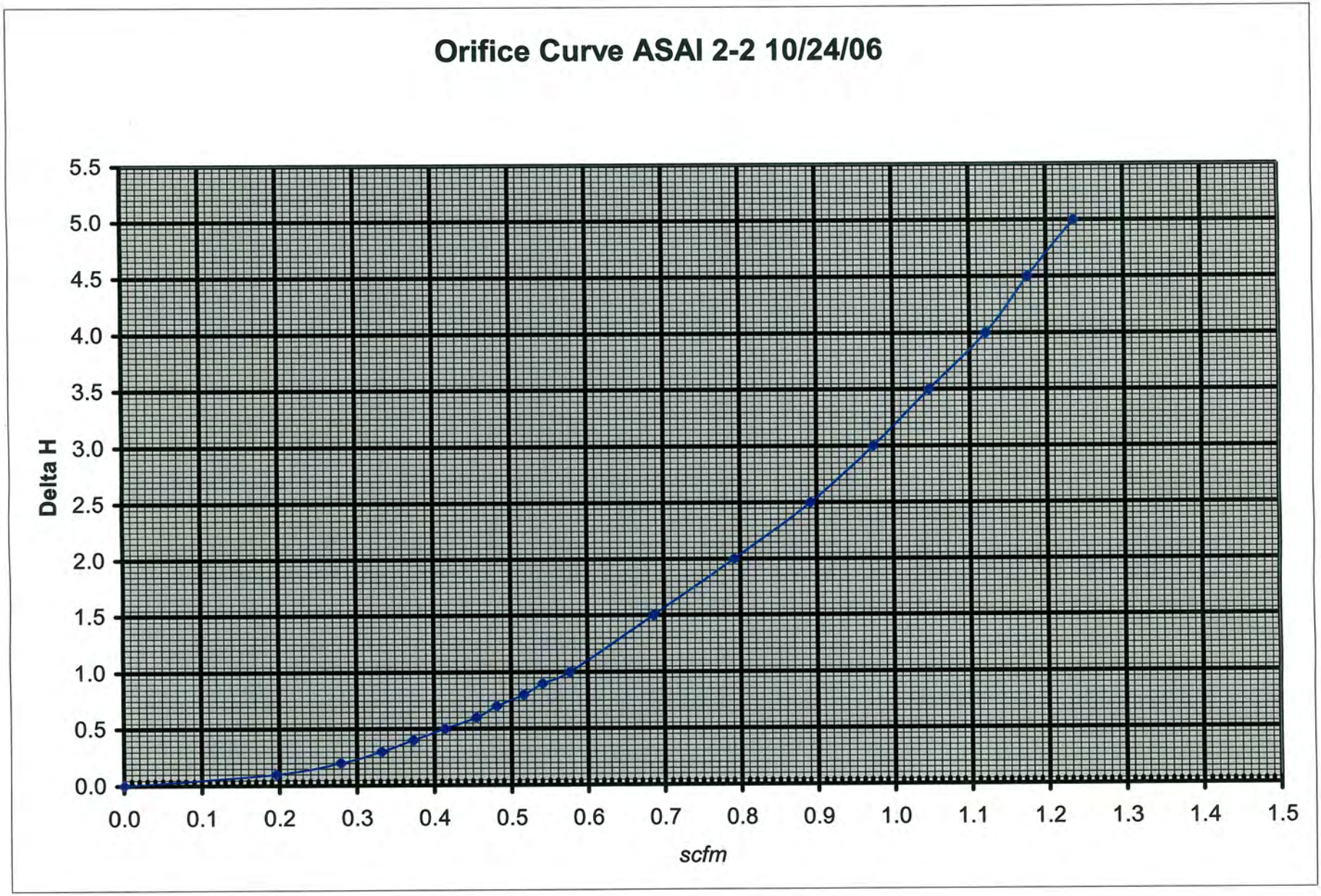
ASTM Reference Thermometer:			
	SN: 5963	Range:	+18+89°F
	SN: 1853	Range:	+205+310°F
	SN: 992	Range:	+295+400°F

Certified by: Patrick Selakovich 10/23/06

Calibrator (Signature / Date)

Bill Hefley 10/23/06

QA Officer (Signature / Date)


Orifice Curve ASAI 2-2 10/24/06
Delta H
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
scfm

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 11/21/06
I.D. # ASAI 3-1
C_{pstd}: 0.990

Time: 14:45
T_s: 68 °F
Pb: 29.92 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.21	0.21	0.21	0.458	0.30	0.548	0.828	0.30	0.548	0.828
40	0.37	0.37	0.37	0.608	0.54	0.735	0.819	0.54	0.735	0.819
50	0.57	0.57	0.57	0.755	0.83	0.911	0.820	0.83	0.911	0.820
60	0.82	0.82	0.82	0.906	1.20	1.095	0.818	1.20	1.095	0.818
70	1.12	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.46	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.85	1.85	1.85	1.360	2.65	1.628	0.827	2.65	1.628	0.827
50	0.57	0.57	0.57	0.755	0.83	0.911	0.820	0.83	0.911	0.820
50	0.57	0.57	0.57	0.755	0.83	0.911	0.820	0.83	0.911	0.820
Average							0.823			0.823

Summary of Results:

Normal high side calibraiton factor: 0.823
variation +: 0.61%
variation -: -0.61%
Normal low side calibration factor: 0.823
variation +: 0.61%
variation -: -0.61%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.823

Certified by: *Patrick Selakovich 11/21/06*
Calibrator (Signature/Date)

Bill Hefley 11/21/06
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 11/21/06
I.D. # ASAI 3-2
C_{pstd}: 0.990

Time: 15:15
T_s: 68 °F
Pb: 29.89 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.21	0.21	0.21	0.458	0.30	0.548	0.828	0.30	0.548	0.828
40	0.37	0.37	0.37	0.608	0.53	0.728	0.827	0.53	0.728	0.827
50	0.57	0.57	0.57	0.755	0.82	0.906	0.825	0.82	0.906	0.825
60	0.82	0.82	0.82	0.906	1.20	1.095	0.818	1.20	1.095	0.818
70	1.12	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.46	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.85	1.85	1.85	1.360	2.65	1.628	0.827	2.65	1.628	0.827
50	0.57	0.57	0.57	0.755	0.82	0.906	0.825	0.82	0.906	0.825
50	0.57	0.57	0.57	0.755	0.82	0.906	0.825	0.82	0.906	0.825
Average							0.824			0.824

Summary of Results:

Normal high side calibraiton factor: 0.824
variation +: 0.49%
variation -: -0.73%
Normal low side calibration factor: 0.824
variation +: 0.49%
variation -: -0.73%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.824

Certified by: *Patrick Selakovich 11/21/06*
Calibrator (Signature/Date)

Bill Hefley 11/21/06
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 10/20/06
I.D. # ASAI 3-3
C_{pstd}: 0.990

Time: 14:50
T_s: 76 °F
Pb: 29.52 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.36	0.36	0.36	0.600	0.52	0.721	0.824	0.52	0.721	0.824
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
60	0.80	0.80	0.80	0.894	1.15	1.072	0.826	1.15	1.072	0.826
70	1.09	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.42	1.40	1.40	1.183	2.05	1.432	0.818	2.05	1.432	0.818
90	1.80	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.56	0.56	0.56	0.748	0.84	0.917	0.808	0.84	0.917	0.808
50	0.56	0.56	0.56	0.748	0.84	0.917	0.808	0.84	0.917	0.808
Average							0.823			0.823

Summary of Results:

Normal high side calibraiton factor: 0.823
variation +: 0.36%
variation -: -0.61%
Normal low side calibration factor: 0.823
variation +: 0.36%
variation -: -0.61%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.823

Certified by: *Patrick Selakovich 10/20/06*
Calibrator (Signature/Date)

Bill Hefley 10/20/06
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 10/20/06
I.D. # ASAI 3-4
C_{pstd}: 0.990

Time: 15:15
T_s: 76 °F
Pb: 29.52 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.36	0.36	0.36	0.600	0.52	0.721	0.824	0.52	0.721	0.824
50	0.56	0.56	0.56	0.748	0.82	0.906	0.818	0.82	0.906	0.818
60	0.80	0.80	0.80	0.894	1.15	1.072	0.826	1.15	1.072	0.826
70	1.09	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.42	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.80	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.56	0.56	0.56	0.748	0.82	0.906	0.818	0.82	0.906	0.818
50	0.56	0.56	0.56	0.748	0.82	0.906	0.818	0.82	0.906	0.818
Average							0.823			0.823

Summary of Results:

Normal high side calibraiton factor: 0.823
variation +: 0.36%
variation -: -0.61%
Normal low side calibration factor: 0.823
variation +: 0.36%
variation -: -0.61%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.823

Certified by: *Patrick Selakovich 10/20/06*
Calibrator (Signature/Date)

Bill Hefley 10/20/06
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 01/24/06
I.D. # ASAI 4-1
C_{pstd}: 0.990

Time: 13:55
T_s: 68 °F
Pb: 29.92 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.21	0.21	0.21	0.458	0.30	0.548	0.828	0.30	0.548	0.828
40	0.37	0.37	0.37	0.608	0.53	0.728	0.827	0.53	0.728	0.827
50	0.57	0.57	0.57	0.755	0.82	0.906	0.825	0.82	0.906	0.825
60	0.82	0.82	0.82	0.906	1.20	1.095	0.818	1.20	1.095	0.818
70	1.12	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.46	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.85	1.85	1.85	1.360	2.65	1.628	0.827	2.65	1.628	0.827
50	0.57	0.57	0.57	0.755	0.82	0.906	0.825	0.82	0.906	0.825
50	0.57	0.57	0.57	0.755	0.82	0.906	0.825	0.82	0.906	0.825
Average							0.824			0.824

Summary of Results:

Normal high side calibraiton factor: 0.824
variation +: 0.49%
variation -: -0.73%
Normal low side calibration factor: 0.824
variation +: 0.49%
variation -: -0.73%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.824

Certified by: *Patrick Selakovich 01/24/06*
Calibrator (Signature/Date)

Bill Hefley 01/24/06
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 4
Date Calibration Performed: 01/25/06

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.119	0.171	0.232	0.319	0.365	0.399	0.496	0.238
Measurement 2	0.119	0.172	0.233	0.318	0.366	0.399	0.496	0.237
Measurement 3	0.119	0.171	0.234	0.318	0.365	0.399	0.496	0.238
Measurement 4	0.120	0.171	0.233	0.318	0.366	0.398	0.494	0.239
Measurement 5	0.121	0.171	0.233	0.319	0.365	0.399	0.494	0.239
Measurement 6	0.119	0.171	0.235	0.318	0.365	0.399	0.495	0.238
Measurement 7	0.120	0.171	0.233	0.317	0.366	0.399	0.494	0.238
Measurement 8	0.119	0.171	0.233	0.317	0.366	0.399	0.495	0.237
Measurement 9	0.119	0.172	0.233	0.317	0.366	0.398	0.495	0.238
Measurement 10	0.119	0.171	0.235	0.318	0.366	0.400	0.494	0.238
Average	0.119	0.171	0.233	0.318	0.366	0.399	0.495	0.238

Gary B. Goldman 1/25/06
Calibrator (Signature / Date)

Bill Hefley 1/25/06
QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 5
Date Calibration Performed: 11/28/06

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1		0.195						
Measurement 2		0.194						
Measurement 3		0.192						
Measurement 4		0.192						
Measurement 5		0.193						
Measurement 6		0.194						
Measurement 7		0.193						
Measurement 8		0.194						
Measurement 9		0.193						
Measurement 10		0.194						
Average		0.193						

Bill Mullins 11/28/06
Calibrator (Signature / Date)

Bill Hefley 11/28/06
QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 5
Date Calibration Performed: 01/25/06

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1		0.193	0.255	0.309		0.437	0.488	0.155
Measurement 2		0.192	0.254	0.309		0.437	0.488	0.154
Measurement 3		0.192	0.256	0.310		0.439	0.488	0.153
Measurement 4		0.191	0.254	0.309		0.437	0.490	0.154
Measurement 5		0.193	0.255	0.311		0.437	0.490	0.154
Measurement 6		0.194	0.255	0.312		0.437	0.490	0.153
Measurement 7		0.192	0.254	0.312		0.437	0.489	0.153
Measurement 8		0.193	0.256	0.309		0.438	0.489	0.155
Measurement 9		0.193	0.256	0.310		0.438	0.491	0.154
Measurement 10		0.193	0.253	0.309		0.438	0.489	0.154
Average		0.193	0.255	0.310		0.438	0.489	0.154

Gary B. Goldman 1/25/06

Calibrator (Signature / Date)

Bill Hefley 1/25/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 7
Date Calibration Performed: 10/27/06

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1		0.191						
Measurement 2		0.190						
Measurement 3		0.192						
Measurement 4		0.193						
Measurement 5		0.191						
Measurement 6		0.193						
Measurement 7		0.193						
Measurement 8		0.192						
Measurement 9		0.192						
Measurement 10		0.192						
Average		0.192						

Patrick Selakovich 10/27/06

Calibrator (Signature / Date)

Bill Hefley 10/27/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 7
Date Calibration Performed: 09/19/06

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.114	0.192	0.255	0.308	0.375	0.426		0.154
Measurement 2	0.115	0.193	0.253	0.307	0.378	0.424		0.155
Measurement 3	0.114	0.192	0.254	0.308	0.375	0.425		0.155
Measurement 4	0.113	0.194	0.252	0.306	0.375	0.424		0.155
Measurement 5	0.115	0.193	0.254	0.308	0.377	0.426		0.153
Measurement 6	0.113	0.192	0.254	0.310	0.376	0.427		0.153
Measurement 7	0.113	0.193	0.253	0.307	0.375	0.424		0.152
Measurement 8	0.115	0.192	0.254	0.308	0.377	0.426		0.153
Measurement 9	0.114	0.193	0.254	0.309	0.376	0.426		0.155
Measurement 10	0.112	0.192	0.252	0.307	0.377	0.426		0.153
Average	0.114	0.193	0.254	0.308	0.376	0.425		0.154

Gary B. Goldman 9/19/06

Calibrator (Signature / Date)

Bill Hefley 9/19/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Post-test Calibration Data

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

ENVIRONMENTAL SUPPLY COMPANY

Quality - Service - Reliability

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the **GREEN** cells, YELLOW cells are calculated.

ASAI 1-1 12-07-2006

DATE: 12/7/2006

METER PART #: C-5000-SO

METER SERIAL #: 1508

CRITICAL ORIFICE SET SERIAL #: 1426s

BAROMETRIC PRESSURE (in Hg): INITIAL 30.29 | FINAL 30.30 | AVG (P_{bar}) 30.30

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
17	1	0.4656	18	458.217	463.731	5.514	65	66	66	62	63	64.25	9.00	1.20	5.6405	5.5421	0.983		1.82
	2	0.4656	18	463.731	469.250	5.519	65	66	66	63	63	64.5	9.00	1.20	5.6429	5.5421	0.982		1.82
	3	0.4656	18	469.253	474.765	5.512	65	66	66	63	64	64.75	9.00	1.20	5.6331	5.5421	0.984		1.82
																AVG =	0.983	-0.08	
24	1	0.6583	15	475.802	480.980	5.178	65	66	67	64	65	65.5	6.00	2.40	5.2995	5.2239	0.986		1.82
	2	0.6583	15	480.980	486.190	5.210	65	67	68	65	65	66.25	6.00	2.40	5.3247	5.2239	0.981		1.82
	3	0.6583	15	486.190	491.377	5.187	65	68	69	65	65	66.75	6.00	2.40	5.2961	5.2239	0.986		1.82
																AVG =	0.984	0.08	
	1					.0						0							
	2					.0						0							
	3					.0						0							
																AVG =			

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.984

AVERAGE $\Delta H_@$ = 1.82

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H \left(\frac{V_m(std)}{V_m}\right)$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 1-1

Date Calibration Performed: 12/07/06

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	11:22	32° F	32° F
Ambient Air	11:23	68° F	67° F
Boiling Water	11:24	212° F	215° F
Oven	11:25	250° F	254° F
Oven	11:26	300° F	305° F
Oven	11:27	350° F	355° F
Oven	11:28	400° F	405° F

Meter Adjusted? No

NIST Reference Calibrator: SN: 06000047 Range: -0.2°C to 1,360.6°

Range:

Range:

Certified by: Patrick Selakovich 12/07/06

Calibrator (Signature / Date)

Bill Hefley 12/07/06

QA Officer (Signature / Date)

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Quality - Service - Reliability

ENVIRONMENTAL SUPPLY COMPANY

ASAI 2-2 12/07/06

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the **GREEN** cells, YELLOW cells are calculated.

DATE: 12/07/2006

METER PART #: C-5000-SO

METER SERIAL #: 1509

CRITICAL ORIFICE SET SERIAL #: 1427s

BAROMETRIC PRESSURE (in Hg): INITIAL 30.28 | FINAL 30.3 | AVG (P_{bar}) 30.29

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	TEMPERATURES °F DGM INLET INITIAL	TEMPERATURES °F DGM INLET FINAL	TEMPERATURES °F DGM OUTLET INITIAL	TEMPERATURES °F DGM OUTLET FINAL	TEMPERATURES °F DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
	1																		
	2																		
	3																		
																AVG =			
15	1	0.4202	18	235.304	240.827	5.523	64	68	68	67	67	67.5	10.00	0.9	5.6099	5.5618	0.991		1.66
	2	0.4202	18	240.827	246.344	5.517	64	68	69	67	67	67.75	10.00	0.92	5.6014	5.5618	0.993		1.70
	3	0.4202	18	246.344	251.878	5.534	65	69	69	67	68	68.25	10.00	0.9	5.6131	5.5565	0.990		1.66
																AVG =	0.991	0.26	
12	1	0.3194	19	219.701	224.755	5.054	64	67	67	66	66	66.5	12.00	0.52	5.1385	5.0732	0.987		1.66
	2	0.3194	19	224.755	229.825	5.070	64	67	68	66	67	67	12.00	0.52	5.1499	5.0732	0.985		1.66
	3	0.3194	19	229.825	234.892	5.067	64	68	68	67	67	67.5	12.00	0.52	5.1420	5.0732	0.987		1.66
																AVG =	0.986	-0.26	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.989

AVERAGE $\Delta H_@$ = 1.67

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H \left(\frac{V_m(std)}{V_m}\right)$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 2-2

Date Calibration Performed: 12/07/06

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	11:49	32° F	31° F
Ambient Air	11:48	68° F	67° F
Boiling Water	11:47	212° F	214° F
Oven	11:46	250° F	253° F
Oven	11:45	300° F	303° F
Oven	11:44	350° F	353° F
Oven	11:43	400° F	404° F

Meter Adjusted? No

ASTM Reference Thermometer: SN: 06000047 Range: -0.1°C to 1,360.6°

Range:

Range:

Certified by: Patrick Selakovich 12/07/06

Calibrator (Signature / Date)

Bill Hefley 12/07/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 12/07/06
I.D. # ASAI 3-1
C_{pstd}: 0.990

Time: 15:15
T_s: 64 °F
Pb: 30.29 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.21	0.21	0.21	0.458	0.30	0.548	0.828	0.30	0.548	0.828
40	0.37	0.37	0.37	0.608	0.54	0.735	0.819	0.54	0.735	0.819
50	0.58	0.58	0.58	0.762	0.84	0.917	0.823	0.84	0.917	0.823
60	0.84	0.84	0.84	0.917	1.20	1.095	0.828	1.20	1.095	0.828
70	1.14	1.15	1.15	1.072	1.65	1.285	0.826	1.65	1.285	0.826
80	1.49	1.50	1.50	1.225	2.15	1.466	0.827	2.15	1.466	0.827
90	1.89	1.90	1.90	1.378	2.75	1.658	0.823	2.75	1.658	0.823
50	0.58	0.58	0.58	0.762	0.84	0.917	0.823	0.84	0.917	0.823
50	0.58	0.58	0.58	0.762	0.84	0.917	0.823	0.84	0.917	0.823
Average							0.825			0.825

Summary of Results:

Normal high side calibraiton factor: 0.825
variation +: 0.36%
variation -: -0.73%
Normal low side calibration factor: 0.825
variation +: 0.36%
variation -: -0.73%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.825

Certified by: *Patrick Selakovich 12/07/06*
Calibrator (Signature/Date)

Bill Hefley 12/07/06
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 12/07/06
I.D. # ASAI 3-2
C_{pstd}: 0.990

Time: 15:30
T_s: 65 °F
Pb: 30.29 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.21	0.21	0.21	0.458	0.30	0.548	0.828	0.30	0.548	0.828
40	0.37	0.37	0.37	0.608	0.53	0.728	0.827	0.53	0.728	0.827
50	0.58	0.58	0.58	0.762	0.83	0.911	0.828	0.83	0.911	0.828
60	0.84	0.84	0.84	0.917	1.20	1.095	0.828	1.20	1.095	0.828
70	1.14	1.15	1.15	1.072	1.65	1.285	0.826	1.65	1.285	0.826
80	1.49	1.50	1.50	1.225	2.15	1.466	0.827	2.15	1.466	0.827
90	1.89	1.90	1.90	1.378	2.75	1.658	0.823	2.75	1.658	0.823
50	0.58	0.58	0.58	0.762	0.83	0.911	0.828	0.83	0.911	0.828
50	0.58	0.58	0.58	0.762	0.83	0.911	0.828	0.83	0.911	0.828
Average							0.826			0.826

Summary of Results:

Normal high side calibraiton factor: 0.826
variation +: 0.24%
variation -: -0.36%
Normal low side calibration factor: 0.826
variation +: 0.24%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.826

Certified by: *Patrick Selakovich 12/07/06*
Calibrator (Signature/Date)

Bill Hefley 12/07/06
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 12/07/06
I.D. # ASAI 3-3
C_{pstd}: 0.990

Time: 15:45
T_s: 64 °F
Pb: 30.29 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.21	0.21	0.21	0.458	0.30	0.548	0.828	0.30	0.548	0.828
40	0.37	0.37	0.37	0.608	0.53	0.728	0.827	0.53	0.728	0.827
50	0.58	0.58	0.58	0.762	0.84	0.917	0.823	0.84	0.917	0.823
60	0.84	0.84	0.84	0.917	1.20	1.095	0.828	1.20	1.095	0.828
70	1.14	1.15	1.15	1.072	1.65	1.285	0.826	1.65	1.285	0.826
80	1.49	1.50	1.50	1.225	2.15	1.466	0.827	2.15	1.466	0.827
90	1.89	1.90	1.90	1.378	2.75	1.658	0.823	2.75	1.658	0.823
50	0.58	0.58	0.58	0.762	0.84	0.917	0.823	0.84	0.917	0.823
50	0.58	0.58	0.58	0.762	0.84	0.917	0.823	0.84	0.917	0.823
Average							0.826			0.826

Summary of Results:

Normal high side calibraiton factor: 0.826
variation +: 0.24%
variation -: -0.36%
Normal low side calibration factor: 0.826
variation +: 0.24%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.826

Certified by: *Patrick Selakovich 12/07/06*
Calibrator (Signature/Date)

Bill Hefley 12/07/06
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 12/07/06
I.D. # ASAI 3-4
C_{pstd}: 0.990

Time: 16:00
T_s: 65 °F
Pb: 30.30 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.21	0.21	0.21	0.458	0.30	0.548	0.828	0.30	0.548	0.828
40	0.37	0.37	0.37	0.608	0.53	0.728	0.827	0.53	0.728	0.827
50	0.58	0.58	0.58	0.762	0.84	0.917	0.823	0.83	0.911	0.828
60	0.84	0.84	0.84	0.917	1.20	1.095	0.828	1.20	1.095	0.828
70	1.14	1.15	1.15	1.072	1.65	1.285	0.826	1.65	1.285	0.826
80	1.49	1.50	1.50	1.225	2.15	1.466	0.827	2.15	1.466	0.827
90	1.89	1.90	1.90	1.378	2.75	1.658	0.823	2.75	1.658	0.823
50	0.58	0.58	0.58	0.762	0.84	0.917	0.823	0.83	0.911	0.828
50	0.58	0.58	0.58	0.762	0.84	0.917	0.823	0.83	0.911	0.828
Average							0.826			0.826

Summary of Results:

Normal high side calibraiton factor: 0.826
variation +: 0.24%
variation -: -0.36%
Normal low side calibration factor: 0.826
variation +: 0.24%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.826

Certified by: Patrick Selakovich 12/07/06
Calibrator (Signature/Date)

Bill Hefley 12/07/06
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 12/07/06
I.D. # ASAI 4-1
C_{pstd}: 0.990

Time: 14:50
T_s: 66 °F
Pb: 30.28 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.21	0.21	0.21	0.458	0.30	0.548	0.828	0.30	0.548	0.828
40	0.37	0.37	0.37	0.608	0.53	0.728	0.827	0.53	0.728	0.827
50	0.58	0.58	0.58	0.762	0.83	0.911	0.828	0.83	0.911	0.828
60	0.84	0.84	0.84	0.917	1.20	1.095	0.828	1.20	1.095	0.828
70	1.14	1.15	1.15	1.072	1.65	1.285	0.826	1.65	1.285	0.826
80	1.49	1.50	1.50	1.225	2.15	1.466	0.827	2.15	1.466	0.827
90	1.88	1.90	1.90	1.378	2.70	1.643	0.830	2.70	1.643	0.830
50	0.58	0.58	0.58	0.762	0.83	0.911	0.828	0.83	0.911	0.828
50	0.58	0.58	0.58	0.762	0.83	0.911	0.828	0.83	0.911	0.828
Average							0.827			0.827

Summary of Results:

Normal high side calibraiton factor: 0.827
variation +: 0.36%
variation -: -0.36%
Normal low side calibration factor: 0.827
variation +: 0.36%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.827

Certified by: *Patrick Selakovich 12/07/06*
Calibrator (Signature/Date)

Bill Hefley 12/07/06
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 4
Date Calibration Performed: 12/07/06

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.119	0.171	0.232	0.319	0.365	0.399	0.496	0.238
Measurement 2	0.119	0.172	0.233	0.318	0.366	0.399	0.496	0.237
Measurement 3	0.119	0.171	0.234	0.318	0.365	0.399	0.496	0.238
Measurement 4	0.120	0.171	0.233	0.318	0.366	0.398	0.494	0.239
Measurement 5	0.121	0.172	0.233	0.319	0.365	0.399	0.494	0.239
Measurement 6	0.119	0.171	0.235	0.318	0.365	0.399	0.495	0.238
Measurement 7	0.120	0.171	0.233	0.317	0.366	0.399	0.494	0.238
Measurement 8	0.119	0.172	0.233	0.317	0.366	0.399	0.495	0.237
Measurement 9	0.119	0.172	0.233	0.317	0.366	0.398	0.495	0.238
Measurement 10	0.119	0.171	0.235	0.318	0.366	0.400	0.494	0.238
Average	0.119	0.171	0.233	0.318	0.366	0.399	0.495	0.238

Patrick Selakovich 12/07/06

Calibrator (Signature / Date)

Bill Hefley 12/07/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 5
Date Calibration Performed: 12/07/06

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1		0.192						
Measurement 2		0.193						
Measurement 3		0.194						
Measurement 4		0.192						
Measurement 5		0.192						
Measurement 6		0.193						
Measurement 7		0.193						
Measurement 8		0.194						
Measurement 9		0.192						
Measurement 10		0.193						
Average		0.193						

Patrick Selakovich 12/07/06

Calibrator (Signature / Date)

Bill Hefley 12/07/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 5
Date Calibration Performed: 12/07/06

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1		0.193	0.255	0.309		0.437	0.488	0.153
Measurement 2		0.192	0.254	0.309		0.437	0.488	0.155
Measurement 3		0.192	0.256	0.310		0.439	0.488	0.153
Measurement 4		0.191	0.254	0.309		0.437	0.490	0.155
Measurement 5		0.193	0.255	0.311		0.437	0.490	0.154
Measurement 6		0.194	0.255	0.312		0.437	0.490	0.156
Measurement 7		0.192	0.254	0.312		0.437	0.489	0.153
Measurement 8		0.193	0.256	0.309		0.438	0.489	0.154
Measurement 9		0.193	0.256	0.310		0.438	0.491	0.154
Measurement 10		0.193	0.253	0.309		0.438	0.489	0.154
Average		0.193	0.255	0.310		0.438	0.489	0.154

Patrick Sebakovich 12/07/06

Calibrator (Signature / Date)

Bill Hefley 12/07/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 7
Date Calibration Performed: 12/07/06

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1		0.192						
Measurement 2		0.190						
Measurement 3		0.192						
Measurement 4		0.190						
Measurement 5		0.191						
Measurement 6		0.191						
Measurement 7		0.193						
Measurement 8		0.192						
Measurement 9		0.192						
Measurement 10		0.192						
Average		0.192						

Patrick Selakovich 12/07/06

Calibrator (Signature / Date)

Bill Hefley 12/07/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 7
Date Calibration Performed: 12/07/06

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.114	0.192	0.255	0.308	0.375	0.426		0.154
Measurement 2	0.115	0.193	0.253	0.307	0.378	0.424		0.155
Measurement 3	0.114	0.192	0.254	0.308	0.375	0.425		0.156
Measurement 4	0.113	0.194	0.252	0.306	0.375	0.424		0.155
Measurement 5	0.115	0.193	0.254	0.308	0.377	0.426		0.153
Measurement 6	0.113	0.192	0.254	0.310	0.376	0.427		0.153
Measurement 7	0.113	0.193	0.253	0.307	0.375	0.424		0.155
Measurement 8	0.115	0.192	0.254	0.308	0.377	0.426		0.155
Measurement 9	0.114	0.193	0.254	0.309	0.376	0.426		0.154
Measurement 10	0.112	0.192	0.252	0.307	0.377	0.426		0.153
Average	0.114	0.193	0.254	0.308	0.376	0.425		0.154

Patrick Selakovich 12/07/06

Calibrator (Signature / Date)

Bill Hefley 12/07/06

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Appendix D:

Field Data

Job Number 06-057
Job Name ADA- ES (HARDIN, MT)
Run Number 1
Unit SDA INLET
Date 11/30/06
Operator SELAKOVICH / JACKSON
Sample Box No. 2-2 Meter Box No. 2-2

17/26A / CTM027 Field Data 3

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 44
Assumed Moisture % 12
Probe Length 6'
C Factor 5.37 to reference
Initial Leak @ 15.0 "Hg = 0.001 cfm
Final Leak @ 5.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
A-4	1454	914.838	0.90	0.48	0.48	2.0	326	249	230	75	74	72	
3	1459	916.85	0.90	0.48	0.48	2.0	324	248	238	73	74	72	
2	1504	918.96	0.78	0.42	0.42	2.0	321	251	240	61	75	72	
1	1509	920.95	0.48	0.26	0.26	2.0	319	253	241	55	75	72	
END	1514	922.696	—	—	—	—	—	—	—	—	—	—	
B-4	1515	922.696	1.10	0.58	0.58	2.5	320	246	238	45	76	72	
3	1520	925.05	1.05	0.56	0.56	2.5	318	246	239	43	77	73	
2	1525	927.28	0.96	0.52	0.52	3.0	315	250	237	40	78	73	
1	1530	929.44	0.63	0.34	0.34	2.5	313	251	239	38	78	73	
END	1535	931.548	—	—	—	—	—	—	—	—	—	—	
C-4	1539	931.548	0.96	0.52	0.52	3.0	319	240	234	36	77	73	
3	1544	933.90	0.94	0.50	0.50	3.0	318	238	238	36	78	73	
2	1549	936.05	0.88	0.47	0.47	3.0	318	249	235	35	78	74	
1	1554	938.14	0.68	0.36	0.36	3.0	317	248	237	34	79	74	
END	1559	940.051	—	—	—	—	—	—	—	—	—	—	
All													

Pitot Tube Calibration Factor C_p (P5) ~~[illegible]~~ 0.823
Volume Collected V_m 25.188 ft³
Water Collected V_w 57.8 ml
Time of Test T_t 60 min.
Stack Pressure P_s -14.7 "H₂O

Pitot Tube No. 3-4
Baro. Press. P_b 26.93 "Hg
Probe Tip Dia. D_n 0.193 in.
% CO_2 14.3 % CO 0.0
% O_2 5.2 % N_2 80.5
Area Stack A_s 20,235 in²

Barometer No. —
Probe Tip No. 5-2
Total Volume of Leak Checks After Start: — ft³
V_m X Dry Gas Meter Calibration Factor 25.213 X 0.999 ✓

[Dry Gas Meter Reading — ft³ - (T_t — min. X Leak Rate — cfm)]

Impinger Box No. 2-2

			Water Weight Gain		
Impinger 1	Final Weight	783.5		Impinger 1	42.1
	Initial Weight	741.4			
	Increase	42.1		Impinger 2	5.3
Impinger 2	Final Weight	742.4		Impinger 3	1.2
	Initial Weight	737.1			
	Increase	5.3		Impinger 4	1.5
			V_w =		
Impinger 3	Final Weight	727.2	g SO_2 =	Impinger 5	7.7
	Initial Weight	726.0	V_w =		
	Increase	1.2		Impinger 6	
Impinger 4	Final Weight	718.9		Impinger 7	
	Initial Weight	717.4	Thimble No.		
	Increase	1.5	59	Total	57.8 = V_w
Impinger 5	Final Weight	932.9	P_b = 26.93	$\%CO_2$ = 14.3	
	Initial Weight	925.2	V_m = 25.188	$\%O_2$ = 5.2	
	Increase	7.7	V_w = 57.8	%CO = 0.0	
			P_m = 0.458	$\%N_2$ = 80.5	
Impinger 6	Final Weight		Avg ΔP = 0.855	A_n = 20.235	
	Initial Weight			D_n = 0.193	
	Increase		Avg$\sqrt{\Delta P}$ = 0.919	T_t = 60	
			C_p = 0.823		
Impinger 7	Final Weight		P_s = -14.7 $'H_2O$	25.85 'Hg	
	Initial Weight		T_m = 75 °F	535 °R	
	Increase		T_s = 319 °F	779 °R	

Moisture Content: %M = 10.85 M_d = 0.8915 MW_c = 30.496 MW = 29.14

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 25.188 \left[\frac{26.93 + \frac{0.458}{13.6}}{75 + 460}\right] = \frac{22.406\ sft^3}{0.373\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 57.8 = 2.728 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{2.728}{22.406 + 2.728} \times 100 = 10.85\ \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{779}{25.85 \times 29.14}} \times 0.919 = 3941\ fpm$$

ACFM: 553,786

SCFM: 299,174

$$\%I = \frac{1.039 \times 22.406 \times 779}{0.8915 \times 25.85 \times 3941 \times 60 \times (0.193)^2} = 89.3\ \%$$

PS 12/7/06

%EA: 32.2

Job Number 06-057
Job Name ADA-ES (HARDIN, MT)
Run Number 2
Unit SDA Inlet Duct
Date 12/1/06
Operator SELAKOVICH / JACKSON
Sample Box No. 2-2 Meter Box No. 2-2

17/26A/CTM027 Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 33
Assumed Moisture % 10
Probe Length 6'
C Factor 6.4 to reference
Initial Leak @ 15.0 "Hg = 0.003 cfm
Final Leak @ 5.0 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
A-4	1203	21.638	0.91	0.58	0.58	1.5	317	248	232	33	69	70	
3	1208	23.83	0.89	0.57	0.57	1.5	316	234	233	35	69	70	
2	1213	26.09	0.81	0.52	0.52	2.0	316	240	243	38	71	70	
1	1218	28.27	0.44	0.28	0.28	1.5	310	251	247	38	72	70	
END	1223	29.884	—	—	—	—	—	—	—	—	—	—	
B-4	1224	29.884	1.15	0.75	0.75	2.5	317	248	239	39	73	70	
3	1229	32.77	1.10	0.71	0.71	3.0	317	247	247	41	74	70	
2	1234	35.29	1.10	0.71	0.71	3.5	318	251	245	42	76	70	
1	1239	37.56	0.57	0.36	0.36	3.0	316	252	247	43	76	70	
END	1244	39.706	—	—	—	—	—	—	—	—	—	—	
C-4	1245	39.706	0.92	0.59	0.59	2.5	315	251	240	42	76	71	
3	1250	41.97	0.95	0.62	0.62	3.0	313	247	246	42	77	71	
2	1255	44.33	0.90	0.58	0.58	3.0	316	240	248	41	77	71	
1	1300	46.62	0.68	0.44	0.44	3.0	317	249	247	41	78	71	
END	1305	48.640	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 26.975 ft^3
Water Collected V_w 62.0 ml
Time of Test T_t 60 min.
Stack Pressure P_s -13.0 "H_2O

Pitot Tube No. 3-4
Baro. Press. P_b 27.08 "Hg
Probe Tip Dia. D_n 0.193 in.
% CO_2 13.3 % CO 0.0
% O_2 6.0 % N_2 80.7
Area Stack A_s 20,235 in^2

Barometer No. —
Probe Tip No. 5-2
Total Volume of Leak Checks After Start: — ft^3
V_m X Dry Gas Meter Calibration Factor 27.002 X 0.999

[Dry Gas Meter Reading — ft^3 - (T_t — min. X Leak Rate — cfm)]

D-4

Impinger Box No. 2-2

			Water Weight Gain		
Impinger 1	Final Weight	795.4		Impinger 1	49.8
	Initial Weight	745.6			
	Increase	49.8		Impinger 2	5.9
Impinger 2	Final Weight	748.2		Impinger 3	1.1
	Initial Weight	742.3			
	Increase	5.9		Impinger 4	0.4
			V_w =		
Impinger 3	Final Weight	734.3	g SO_2 =	Impinger 5	4.8
	Initial Weight	733.2	V_w =		
	Increase	1.1		Impinger 6	
Impinger 4	Final Weight	721.2	Filter No.	Impinger 7	
	Initial Weight	720.8	60		
	Increase	0.4		Total	62.0 = V_w
Impinger 5	Final Weight	937.7	P_b = 27.08	$\%CO_2$ =	13.3
	Initial Weight	932.9	V_m = 26.975	$\%O_2$ =	6.0
	Increase	4.8	V_w = 62.0	%CO =	0.0
			P_m = 0.559	$\%N_2$ =	80.7
Impinger 6	Final Weight		Avg ΔP = 0.868	A_n =	20,235
	Initial Weight			D_n =	0.193
	Increase		Avg$\sqrt{\Delta P}$ = 0.924	T_1 =	60
			C_p = 0.823		
Impinger 7	Final Weight		P_s = -13.0 °H_2O		26.12 °Hg
	Initial Weight		T_m = 72 °F		532 °R
	Increase		T_s = 316 °F		776 °R

Moisture Content: %M = 10.76 M_d = 0.8924 MW_d = 30.368 MW = 29.04

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 26.975 \left[\frac{27.08 + \frac{0.559}{13.6}}{72 + 460}\right] = \frac{24.272}{0.405}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 62.0 = 2.926 sft^3

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{2.926}{24.272 + 2.926} \times 100 = 10.76\ \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{776}{26.12 \times 29.04}} \times 0.924 = 3941\ fpm$$

ACFM: 553,797

SCFM: 294,636

$$\%I = \frac{1.039 \times 24.272 \times 776}{0.8924 \times 26.12 \times 3941 \times 60 \times (0.193)^2} = 95.3\ \%$$

PS 12/7/06

%EA: 39.0

Job Number 06-057
Job Name ADA-ES (HARDIN, MT)
Run Number 3
Unit SDA INLET
Date 12/1/06
Operator SELAKOVICH/JACKSON
Sample Box No. 2-2 Meter Box No. 2-2

17/26A/CTM027 Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 26
Assumed Moisture % 10
Probe Length 6'
C Factor 6.4 to reference
Initial Leak @ 15.0 "Hg = 0.003 cfm
Final Leak @ 4.0 "Hg = 0.005 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
A-4	1647	84.701	0.90	0.58	0.58	1.0	321	232	225	24	66	66	INTEGRATED
3	1652	86.96	0.96	0.63	0.63	1.0	326	227	223	35	66	66	ORSAT
2	1657	89.33	0.80	0.52	0.52	1.5	325	251	228	42	68	66	
1	1702	91.50	0.52	0.34	0.34	1.5	322	254	226	45	69	67	
END	1707	93.419	—	—	—	—	—	—	—	—	—	—	
B-4	1708	93.419	1.10	0.71	0.71	2.0	324	250	236	44	70	67	
3	1713	95.83	1.05	0.68	0.68	2.0	321	248	235	40	71	67	
2	1718	98.29	0.97	0.63	0.63	2.0	319	255	227	36	73	67	
1	1723	100.67	0.63	0.40	0.40	2.0	318	256	234	34	74	68	
END	1728	102.629	—	—	—	—	—	—	—	—	—	—	
C-4	1729	102.629	0.85	0.55	0.55	2.5	319	257	235	33	73	68	
3	1734	104.96	0.93	0.60	0.60	2.5	319	250	228	32	74	68	
2	1739	107.28	1.00	0.65	0.65	2.5	324	256	238	31	75	69	
1	1744	109.67	0.59	0.38	0.38	2.5	320	258	234	31	76	69	
END	1749	111.641	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 26.913 ft^3
Water Collected V_w 60.6 ml
Time of Test T_t 60 min.
Stack Pressure P_s -13.5 "H_2O

Pitot Tube No. 3-4
Baro. Press. P_b 27.20 "Hg
Probe Tip Dia. D_n 0.193 in.
% CO_2 13.8 % CO 0.0
% O_2 5.7 % N_2 80.5
Area Stack A_s 20,235 in^2

Barometer No. —
Probe Tip No. 5-2
Total Volume of Leak Checks After Start: — ft^3
V_m X Dry Gas Meter Calibration Factor 26.840 X 0.999

[Dry Gas Meter Reading — ft^3 - (T_t — min. X Leak Rate — cfm)]

Impinger Box No. 2-2

			Water Weight Gain		
Impinger 1	Final Weight	789.4		Impinger 1	50.2
	Initial Weight	739.2			
	Increase	50.2		Impinger 2	4.0
Impinger 2	Final Weight	743.4		Impinger 3	0.7
	Initial Weight	738.4			
	Increase	4.0		Impinger 4	0.4
			V_w =		
Impinger 3	Final Weight	737.0	g SO_2 =	Impinger 5	5.3
	Initial Weight	736.3	V_w =		
	Increase	0.7		Impinger 6	
Impinger 4	Final Weight	722.5	THIMBLE	Impinger 7	
	Initial Weight	722.1	No. 61		
	Increase	0.4		Total	60.6 = V_w
Impinger 5	Final Weight	943.0	P_b = 27.20	$\%CO_2$ = 13.8	
	Initial Weight	937.7	V_m = 26.913	$\%O_2$ = 5.7	
	Increase	5.3	V_w = 60.6	%CO = 0.0	
			P_m = 0.556	$\%N_2$ = 80.5	
Impinger 6	Final Weight		Avg ΔP = 0.858	A_n = 20,235	
	Initial Weight			D_n = 0.193	
	Increase		Avg$\sqrt{\Delta P}$ = 0.921	T_f = 60	
			C_p = 0.823		
Impinger 7	Final Weight		P_s = −13.5 "H_2O	26.21 "Hg	
	Initial Weight		T_m = 69 °F	529 °R	
	Increase		T_s = 322 °F	782 °R	

Moisture Content: %M = 10.47 M_d = 0.8953 MW_d = 30.436 MW = 29.13

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 26.913 \left[\frac{27.20 + \frac{0.556}{13.6}}{69 + 460}\right] = \frac{24.461}{0.408}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 60.6 = 2.860 sft^3

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{2.860}{24.461 + 2.860} \times 100 = 10.47\ \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{782}{26.21 \times 29.13}} \times 0.921 = 3931\ fpm$$

ACFM: 552,327

SCFM: 293,589

$$\%I = \frac{1.039 \times 24.461 \times 782}{0.8953 \times 26.21 \times 3931 \times 60 \times (0.193)^2} = 96.4\ \%$$

PS 12/7/06

%EA: 36.5

ORSAT ANALYSIS DATA FORM

Job #: 06-057
Job Name: ADA-ES
Location: Hardin, MT
Date: 11-30-06
Operator: Hefley

Sample Location: SDA Inlet 3
Analytical Method:
Sample Type: (Single) Point / Multi Point (Grab) / Integrated
Leak Check: Time: 5 min (≥ 4 minutes) Rate: 0.0
Ambient Air Check:

CO_2 - % Vol.	0.0
O_2 - % Vol.	20.9
N_2 - % Vol.	79.1

Run #: 1 (17/26A/CTM027)
Run Time: 1545

CO_2 - % Vol.	14.3	14.3	14.3	14.3
O_2 - % Vol.	5.2	5.2	5.2	5.2
CO - % Vol.	0.0 ~~80.5~~ BH	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

Run #: 2
Run Time:

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	13.3	13.3	13.3	13.3
O_2 - % Vol.	6.0	6.0	6.0	6.0
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.7	80.7	80.7	80.7

Run #: 3
Run Time:

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	13.8	13.8	13.8	13.8
O_2 - % Vol.	5.6	5.7	5.7	5.7
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.4	80.5	80.5	80.5

Job Number 06-057
Job Name ADA-ES (HARDIN, MT)
Run Number 1
Unit SDA Inlet
Date 12/1/06
Operator SELAKOVICH/JACKSON
Sample Box No. M-2 Meter Box No. 2-2

Ontario Hydro Field Data

Read and record at the start of each test point.

Purge to: –
Purge time: –
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 28
Assumed Moisture % 10
Probe Length 6'
C Factor 6.4 to reference
Initial Leak @ 15.0 "Hg = 0.003 cfm
Final Leak @ 5.5 "Hg = 0.000 cfm

Point	(PS) 0857 Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
C-4	~~0850~~	968.412	0.86	0.55	0.55	2.5	315	253	263	28	67	67	INTEGRATED
4	0902	970.65	0.89	0.58	0.58	2.5	314	233	248	35	67	67	ORSAT
3	0907	972.83	0.83	0.54	0.54	2.5	312	235	247	35	67	67	
3	0912	975.04	0.84	0.54	0.54	2.5	312	242	252	35	68	67	SOOT BLOWING
2	0917	977.23	0.77	0.49	0.49	2.5	314	255	251	36	70	67	DURING RUN
2	0922	979.35	0.72	0.46	0.46	2.5	312	253	247	37	71	67	
1	0927	981.41	0.45	0.29	0.29	2.0	310	254	249	37	71	68	
1	0932	983.09	0.43	0.28	0.28	2.0	310	254	250	38	72	68	
END	0937	984.712	–	–	–	–	–	–	–	–	–	–	
B-4	0938	984.712	1.10	0.71	0.71	3.5	314	234	244	38	73	68	
4	0943	987.45	1.20	0.77	0.77	3.5	321	235	251	40	75	69	
3	0948	990.05	1.05	0.68	0.68	4.0	317	237	253	42	76	69	
3	0953	992.50	1.05	0.68	0.68	4.0	317	257	253	42	77	70	
2	0958	994.96	1.10	0.71	0.71	4.5	319	259	253	43	77	70	
2	1003	997.48	0.89	0.58	0.58	4.0	316	257	250	43	78	70	
1	1008	999.81	0.60	0.38	0.38	3.5	314	252	250	44	78	71	
1	1013	1001.76	0.60	0.38	0.38	3.5	313	253	249	44	77	71	
END	1018	1003.581	–	–	–	–	–	–	–	–	–	–	

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 52.763 ft^3
Water Collected V_w 214.6 ml
Time of Test T_t 120 min.
Stack Pressure P_s -13.0 "H_2O

Pitot Tube No. 3-3
Baro. Press. P_b 27.05 "Hg
Probe Tip Dia. D_n 0.192 in.
% CO_2 14.2 % CO 0.0
% O_2 6.4 % N_2 79.4
Area Stack A_s 20,235 in^2

Barometer No. –
Probe Tip No. T-2
Total Volume of Leak Checks After Start: – ft^3
V_m X Dry Gas Meter Calibration Factor 52.816 X 0.999

[Dry Gas Meter Reading – ft^3 - (T_t – min. X Leak Rate – cfm)]

Impinger Box No. M2

			Water Weight Gain		
Impinger 1	Final Weight	836.7		Impinger 1	81.6
	Initial Weight	755.1	Imp. 8		
	Increase	81.6	Final 963.9	Impinger 2	16.2
Impinger 2	Final Weight	749.4	Initial 949.8	Impinger 3	102.7
	Initial Weight	733.2	14.1		
	Increase	16.2		Impinger 4	1.8
			V_w =		
Impinger 3	Final Weight	751.5	g SO_2 =	Impinger 5	-0.3
	Initial Weight	648.8	V_w =		
	Increase	102.7		Impinger 6	-0.7
Impinger 4	Final Weight	728.8	Thimble No.	Impinger 7	-0.8
	Initial Weight	727.0	53	to 8	14.1
	Increase	1.8		Total	214.6 = V_w
Impinger 5	Final Weight	757.3	P_b = 27.05	$\%CO_2$ =	14.2
	Initial Weight	757.6	V_m = 52.763	$\%O_2$ =	6.4
	Increase	-0.3	V_w = 214.6	%CO =	0.0
			P_m = 0.533	$\%N_2$ =	79.4
Impinger 6	Final Weight	749.4	Avg ΔP = 0.828	A_s =	20,235
	Initial Weight	750.1	0.903	D_n =	0.192
	Increase	-0.7	Avg$\sqrt{\Delta P}$ = ~~0.941~~	T_1 =	120
			C_p = 0.823		
Impinger 7	Final Weight	761.4	P_s = -13.0 "H_2O	26.09	"Hg
	Initial Weight	762.2	T_m = 72 °F	532	°R
	Increase	-0.8	T_s = 315 °F	775	°R

Moisture Content: %M = 17.60 M_d = 0.8240 MW_d = 30.528 MW = 28.32

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 52.763 \left[\frac{27.05 + \frac{0.533}{13.6}}{72 + 460}\right] = \frac{47.420}{0.395}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 214.6 = 10.129 sft^3

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{10.129}{47.420 + 10.129} \times 100 = 17.60\ \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{775}{26.09 \times 28.32}} \times 0.903 = 3900\ fpm$$

ACFM: 548,009

SCFM: 269,260

$$\%I = \frac{1.039 \times 47.420 \times 775}{0.8240 \times 26.09 \times 3900 \times 120 \times (0.192)^2} = 103.0\ \%$$

PS 12/7/06

%EA: 43.7

Run Number 1

Unit SDA INLET

Date 12/1/06

Ontario Hydro FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
A-4	1019	1003.581	0.84	0.54	0.54	4.0	314	250	243	43	77	71	
4	1024	1006.02	0.87	0.56	0.56	4.0	315	245	250	44	78	72	
3	1029	1008.26	0.87	0.56	0.56	4.0	315	241	253	45	78	72	
3	1034	1010.51	0.97	0.63	0.63	5.0	318	246	253	45	79	72	
2	1039	1012.89	0.85	0.54	0.54	5.0	317	251	251	45	79	73	
2	1044	1014.00	0.85	0.54	0.54	5.0	316	252	253	43	~~67~~ 79	73	
1	1049	1017.34	0.61	0.39	0.39	4.5	316	252	250	43	79	73	
1	1054	1019.32	0.63	0.40	0.40	4.5	318	251	251	42	79	73	
END	1059	1021.228	—	—	—	—	—	—	—	—	—	—	

Job Number 06-057
Job Name ADA-ES (HARDIN, MT)
Run Number 2
Unit SPA Inlet
Date 12/2/06
Operator SGLAKOVICH / JACKSON
Sample Box No. M-2 Meter Box No. 2-2

OH Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 20
Assumed Moisture % 10
Probe Length 6'
C Factor 6.4 to reference
Initial Leak @ 15.0 "Hg = 0.002 cfm
Final Leak @ 5.5 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
A-4	0919	112.137	0.81	0.52	0.52	1.0	316	261	249	16	65	66	
4	0924	114.26	0.98	0.64	0.64	2.0	322	247	250	23	65	66	
3	0929	116.60	0.86	0.55	0.55	2.0	317	245	255	26	66	66	
3	0934	118.82	0.84	0.54	0.54	2.0	315	253	254	44	67	66	
2	0939	121.00	0.74	0.48	0.48	2.0	313	262	253	46	68	66	
2	0944	123.08	0.78	0.51	0.51	2.5	314	263	256	43	70	66	
1	0949	125.20	0.43	0.27	0.27	2.0	314	262	255	41	70	67	
1	0954	126.80	0.41	0.26	0.26	2.0	314	262	255	40	70	67	
END	0959	128.324	—	—	—	—	—	—	—	—	—	—	
B-4	1000	128.324	1.10	0.71	0.71	3.0	318	245	247	36	72	68	
4	1005	130.74	1.20	0.77	0.77	4.0	321	244	255	38	74	68	
3	1010	133.33	1.10	0.71	0.71	4.0	318	246	256	39	75	69	
3	1015	135.81	1.10	0.71	0.71	4.0	319	252	255	40	76	69	
2	1020	138.30	0.97	0.63	0.63	4.0	316	263	255	41	76	69	
2	1025	140.65	0.99	0.64	0.64	4.0	316	265	256	40	77	70	
1	1030	143.02	0.61	0.39	0.39	4.0	316	265	256	40	77	70	
1	1035	144.95	0.67	0.44	0.44	4.0	316	264	256	40	77	71	
END	1040	146.882	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 52.103 ft^3
Water Collected V_w 115.6 ml
Time of Test T_t 120 min.
Stack Pressure P_s -13.8 "H_2O

Pitot Tube No. 3-3
Baro. Press. P_b 27.52 "Hg
Probe Tip Dia. D_n 0.192 in.
% CO_2 13.9 % CO 0.0
% O_2 6.1 % N_2 80.0
Area Stack A_s 20,235 in^2

Barometer No. —
Probe Tip No. 7-2
Total Volume of Leak Checks After Start: — ft^3
V_m X Dry Gas Meter Calibration Factor 52.155 x 0.999

[Dry Gas Meter Reading ___ ft^3 - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. M-2

Impinger 1	Final Weight	840.9		Impinger 1	82.7
	Initial Weight	758.2			
	Increase	82.7		Impinger 2	17.5
Impinger 2	Final Weight	748.8		Impinger 3	3.8
	Initial Weight	731.3			
	Increase	17.5		Impinger 4	2.4
Impinger 3	Final Weight	756.7		Impinger 5	0.4
	Initial Weight	752.9			
	Increase	3.8		Impinger 6	-0.5
Impinger 4	Final Weight	731.6		Impinger 7	-0.5
	Initial Weight	729.2		Imp 8	9.8
	Increase	2.4		Total	115.6 = V_w
Impinger 5	Final Weight	762.5			
	Initial Weight	762.1			
	Increase	0.4			
Impinger 6	Final Weight	754.1			
	Initial Weight	754.6			
	Increase	-0.5			
Impinger 7	Final Weight	767.1			
	Initial Weight	767.6			
	Increase	-0.5			

Water Weight Gain

Imp 8
Final 973.4
Initial 963.6
9.8

V_w =
g SO_2 = _____
V_w =

Thimble Filter No. 54

P_b =	27.52	%CO_2 =	13.9
V_m =	52.103	%O_2 =	6.1
V_w =	115.6	%CO =	0.0
P_m =	0.542	%N_2 =	80.0
Avg ΔP =	0.840	A_n =	20,235
		D_n =	0.192
Avg$\sqrt{\Delta P}$ =	0.909	T_f =	120
C_p =	0.823		
P_s =	-13.8 "H_2O		26.51 "Hg
T_m =	71 °F		531 °R
T_s =	317 °F		777 °R

Moisture Content: %M = 10.26 M_d = 0.8974 MW_d = 30.468 MW = 29.19

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 52.103 \left[\frac{27.52 + \frac{0.542}{13.6}}{71 + 460}\right] = \frac{47.730\ sft^3}{0.398\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 115.6 = 5.456 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{5.456}{47.730 + 5.456} \times 100 = 10.26\ \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{777}{26.51 \times 29.19}} \times 0.909 = 3841 \text{ fpm}$$

ACFM: 539,741

SCFM: 292,703

$$\%I = \frac{1.039 \times 47.730 \times 777}{0.8974 \times 26.51 \times 3841 \times 120 \times (0.192)^2} = 95.3\ \%$$

%EA: 40.4

12/7/06

Run Number 2

Unit SDA INLET

Date 12/2/06

OH FIELD DATA

13.7
61
80.0

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	P_m Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
C-4	1041	146.882	0.91	0.58	0.58	3.5	318	263	252	39	77	71	
4	1046	149.19	0.89	0.57	0.57	4.0	318	244	255	40	78	71	
3	1051	151.44	0.94	0.61	0.61	4.0	319	241	256	41	78	71	
3	1056	153.75	0.91	0.59	0.59	4.5	318	250	257	42	78	72	
2	1101	156.05	0.88	0.57	0.57	5.0	320	264	257	42	78	72	
2	1106	158.31	0.88	0.57	0.57	5.0	318	264	256	42	79	72	
1	1111	160.55	0.58	0.37	0.37	4.5	318	262	255	41	79	73	
1	1116	162.44	0.58	0.37	0.37	4.5	318	263	255	40	78	73	
END	1121	164.292	—	—	—	—	—	—	—	—	—	—	

Job Number 06-057
Job Name ADA-ES (HARDIN, MT)
Run Number 3
Unit SDA INLET
Date 12-2-06
Operator SELAKOVICH/JACKSON
Sample Box No. M-2 Meter Box No. 2-2

OH Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 26
Assumed Moisture % 10
Probe Length 6'
C Factor 6.4 to reference
Initial Leak @ 15.0 "Hg = 0.003 cfm
Final Leak @ 7.0 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
A 4	1712	164.701	0.90	0.58	0.58	1.0	327	257	253	27	65	66	
4	1717	167.25	0.95	0.61	0.61	1.5	326	242	253	30	65	66	
3	1722	169.58	0.85	0.55	0.55	2.0	322	241	249	31	66	66	
3	1727	171.82	0.85	0.55	0.55	2.0	320	261	252	31	67	66	
2	1732	173.975	0.73	0.50	0.50	2.0	320	264	253	32	69	66	
2	1737	176.095	0.82	0.52	0.52	2.0	321	263	254	32	70	67	
1	1742	178.22	0.50	0.32	0.32	2.0	313	265	255	33	71	67	
1	1747	180.07	0.49	0.31	0.31	2.0	317	266	255	33	71	67	
End	1752	181.749	—	—	—	—	—	—	—	—	—	—	
B 4	1753	181.749	1.0	0.65	0.65	3.0	320	260	249	33	72	68	
4	1758	184.32	1.1	0.70	0.70	4.0	321	254	254	33	74	68	
3	1803	186.79	1.1	0.70	0.70	4.0	323	258	254	36	75	69	
3	1808	189.25	1.1	0.70	0.70	4.5	325	264	255	40	76	69	
2	1813	191.71	1.0	0.65	0.65	4.5	326	265	253	39	76	70	
2	1818	194.11	1.1	0.70	0.70	4.5	323	263	255	40	77	70	
1	1823	196.59	0.72	0.47	0.47	4.5	319	264	255	43	78	70	
1	1828	198.78	0.65	0.42	0.42	4.5	318	264	256	42	77	71	
End	1833	200.661	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 53.259 ft³
Water Collected V_w 115.5 ml
Time of Test T_t 120 min.
Stack Pressure P_s -14.0 "H₂O

Pitot Tube No. 3-4
Baro. Press. P_b 27.55 "Hg
Probe Tip Dia. D_n 0.192 in.
% CO_2 13.1 % CO 0.0
% O_2 6.2 % N_2 80.7
Area Stack A_s 20,235 in²

Barometer No. —
Probe Tip No. 7-2
Total Volume of Leak Checks After Start: — ft³
V_m X Dry Gas Meter Calibration Factor 53.312 X 0.999

[Dry Gas Meter Reading — ft³ - (T_t — min. X Leak Rate — cfm)]

Impinger Box No. M-2

Impinger 1	Final Weight	839.1	Imp. 8		Impinger 1	82.1
	Initial Weight	757.0	Final	891.7	Impinger 2	16.6
	Increase	82.1	Initial	881.4	Impinger 3	3.1
Impinger 2	Final Weight	749.9		10.3	Impinger 4	2.9
	Initial Weight	733.3				
	Increase	16.6			Impinger 5	0.5
Impinger 3	Final Weight	756.6	V_w =		Impinger 6	0.4
	Initial Weight	753.5	g SO_2 =			
	Increase	3.1	V_w =		Impinger 7	-0.4
Impinger 4	Final Weight	732.5	Thimble No.		Imp 8	10.3
	Initial Weight	729.6	55		Total	115.5 = V_w
	Increase	2.9				

Water Weight Gain

Impinger 5	Final Weight	757.1	P_b =	27.55	$\%CO_2$ =	13.1
	Initial Weight	756.6	V_m =	53.259	$\%O_2$ =	6.2
	Increase	0.5	V_w =	115.5	%CO =	0.0
			P_m =	~~0.541~~ 0.542	$\%N_2$ =	80.7
Impinger 6	Final Weight	745.5	Avg ΔP =	0.844	A_s =	20.235
	Initial Weight	745.1			D_n =	0.192
	Increase	0.4	Avg$\sqrt{\Delta P}$ =	0.913	T_t =	120
			C_p =	0.823		
Impinger 7	Final Weight	758.9	P_s =	-14.0 "H_2O		26.52 "Hg
	Initial Weight	759.3	T_m =	71 °F		531 °R
	Increase	-0.4	T_s =	320 °F		780 °R

Moisture Content: %M = 10.04 M_d = 0.8996 MW_d = 30.344 MW = 29.10

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 53.259 \left[\frac{27.55 + \frac{0.542}{13.6}}{71 + 460}\right] = 48.842\ sft^3 = 0.407\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 115.5 = 5.452 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{5.452}{48.842 + 5.452}$ x 100 = 10.04 %

V_s = 5123.8 x 0.823 $\sqrt{\frac{780}{26.52 \times 29.10}}$ x 0.913 = 3871 fpm

ACFM: 543898

SCFM: 294686

%I = $\frac{1.039 \times 780 \times 48.842}{0.8996 \times 26.52 \times 3871 \times 120 \times (0.192)^2}$ = 96.89 %

PS 12/7/06

%EA: 40.85

Run Number 3

Unit SDA INLET

Date 12-2-06

OH FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	P_m Pump Vacuum "Hg Guage	T_s Stack Temp °F (BH)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
C4	1834	200.661	0.80	0.51	0.51	4.0	317 ~~262~~	262	253	38	77	71	
4	1839	202.98	0.80	0.51	0.51	4.0	318	260	253	39	77	71	
3	1844	205.12	0.90	0.58	0.58	4.5	318	260	254	39	77	71	
3	1849	207.39	0.90	0.58	0.58	4.5	318	261	253	39	78	72	
2	1854	209.66	0.84	0.54	0.54	5.0	318	262	256	39	78	72	
2	1859	211.85	0.87	0.56	0.56	5.0	318	261	254	43	78	72	
1	1904	214.09	0.60	0.39	0.39	5.0	317	264	256	45	78	72	
1	1909	215.99	0.67	0.40	0.40	5.0	318	265	254	48	78	72	
End	1914	218.013	—	—	—	—	—	—	—	—	—	—	
All													

ORSAT ANALYSIS DATA FORM

Job #: 06-057
Job Name: ADA-ES
Location: Hardin, MT
Date: 12-1-06
Operator: Hefley

Sample Location: SDA Inlet
Analytical Method: 3
Sample Type: Single Point / Multi Point Grab / Integrated
Leak Check: Time: 5 min (≥ 4 minutes) Rate: 0.0
Ambient Air Check:

CO_2 - % Vol.	0.0
O_2 - % Vol.	20.9
N_2 - % Vol.	79.1

Run #: 1 (OH)
Run Time:

CO_2 - % Vol.				
O_2 - % Vol.				
CO - % Vol.				
N_2 - % Vol.				

Run #: 2
Run Time:

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	13.9	13.9	13.9	13.9
O_2 - % Vol.	6.1	6.0	6.1	6.1
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.0	80.1	80.0	80.0

Run #: 3
Run Time:

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	13.1	13.1	13.1	13.1
O_2 - % Vol.	6.2	6.2	6.2	6.2
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.7	80.7	80.7	80.7

Job Number 06-057
Job Name ADA-ES (HARDIN, MT)
Run Number 1
Unit SDA INLET
Date 11/30/06
Operator SELAKOVICH / JACKSON
Sample Box No. 3-1 Meter Box No. 2-2

8A Field Data

Read and record at the start of each test point.

Purge to: 914.605
Purge time: 1425-1440
Pitot Leak Check Initial — Final —

Ambient Temp. °F 32
Assumed Moisture % 12.0
Probe Length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.006 cfm
Final Leak @ 5.0 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF (887.217)	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet (OUTLET TEMP. (#5))	WATER BATH (T_m) Remarks
D-1	1323	~~886.802~~	—	0.35	0.35	4.0	114	315	504	40	68	68	174
	1328	888.70	—	0.35	0.35	4.0	121	335	504	42	67	68	174
	1333	890.53	—	0.35	0.35	4.0	137	344	504	41	68	68	175
	1338	892.33	—	0.35	0.35	4.0	136	349	506	38	69	68	176
	1343	894.13	—	0.35	0.35	4.0	141	350	504	37	69	68	177
	1348	895.94	—	0.35	0.35	4.0	141	346	506	36	71	68	176
	1353	897.73	—	0.35	0.35	4.5	139	349	505	36	72	69	176
	1358	899.55	—	0.35	0.35	4.5	140	352	502	37	73	69	175
	1403	901.35	—	0.35	0.35	4.5	140	346	507	36	73	69	175
	1408	903.17	—	0.35	0.35	5.0	142	343	506	38	74	70	176
	1413	904.97	—	0.35	0.35	5.0	142	342	505	40	74	70	176
	1418	906.80	—	0.35	0.35	5.0	140	344	506	42	75	71	177
END	1423	908.810	—	—	—	—	—	—	—	—	—	—	—
All													

Pitot Tube Calibration Factor C_p —
Volume Collected V_m 21.571 ft³
Water Collected V_w 45.9 ml
Time of Test T_t 60 min.
Stack Pressure P_s -14.7 "H₂O

Pitot Tube No. —
Baro. Press. P_b 26.94 "Hg
Probe Tip Dia. D_n — in.
% CO_2 14.3 % CO 0.0
% O_2 5.2 % N_2 80.5
Area Stack A_s 20,235 in²

Barometer No. —
Probe Tip No. —
Total Volume of Leak Checks After Start: — ft³
V_m X Dry Gas Meter Calibration Factor 21.593 X 0.999

[Dry Gas Meter Reading — ft³ - (T_t — min. X Leak Rate — cfm)]

Impinger Box No. 3-1

			Water Weight Gain		
Impinger 1	Final Weight	772.7		Impinger 1	38.3
	Initial Weight	733.4			
	Increase	38.3		Impinger 2	0.9
Impinger 2	Final Weight	735.0		Impinger 3	0.1
	Initial Weight	734.1			
	Increase	0.9		Impinger 4	5.6
			V_w =		
Impinger 3	Final Weight	737.9	g SO_2 =	Impinger 5	
	Initial Weight	737.8	V_w =		
	Increase	0.1		Impinger 6	
Impinger 4	Final Weight	903.7		Impinger 7	
	Initial Weight	898.1			
	Increase	5.6	Thimble No. 62	Total	45.9 = V_w

Impinger 5	Final Weight		P_b =	26.94	%CO_2 =	14.3	
	Initial Weight		V_m =	21.571	%O_2 =	5.2	
	Increase		V_w =	45.9	%CO =	0.0	
			P_m =	0.350	%N_2 =	80.5	
Impinger 6	Final Weight		Avg ΔP =	—	A_n =	20.235	
	Initial Weight				D_n =	—	
	Increase		Avg$\sqrt{\Delta P}$ =	—	T_1 =	60	
			C_p =	—			
Impinger 7	Final Weight		P_s =	-14.7	"H_2O	25.86	"Hg
	Initial Weight		T_m =	70	°F	530	°R
	Increase		T_s =	—	°F	—	°R

Moisture Content: %M = 10.06 M_d = 0.8994 MW_c = — MW = —

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 21.571 \left[\frac{26.94 + \frac{0.350}{13.6}}{70 + 460}\right] = \frac{19.371}{0.323}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 45.9 = 2.166 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{2.166}{19.371 + 2.166}$ x 100 = 10.06 %

V_s = 5123.8 x ____ $\sqrt{\quad}$ ____ x ____ = — fpm

ACFM: —

SCFM: —

%I = 1.039 x ____ x ____ x ____ x ____ x( )^2 = — %

%EA: ____

PS 12/6/06

Job Number 06-057
Job Name ADA-ES (HARDIN, MT)
Run Number 2
Unit SDA INLET
Date 11/30/06
Operator SEKAKOVICH / JACKSON
Sample Box No. 3-1 Meter Box No. 2-2

8A Field Data

Read and record at the start of each test point.

Purge to: 968-107
Purge time: 1852-1807
Pitot Leak Check Initial — Final —

Ambient Temp. °F 35
Assumed Moisture % 10
Probe Length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.000 cfm
Final Leak @ 6.0 "Hg = 0.000 cfm

ΔP_s P_m Condenser Outlet T_m

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage	~~Stack~~ Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Water Bath Remarks
D-1	1648	940.249	—	0.35	0.35	5.0	115	315	514	35	72	72	172
	1653	942.26	—	0.35	0.35	4.0	117	316	514	37	72	72	175
	1658	944.06	—	0.35	0.35	4.0	137	338	516	37	72	72	176
	1703	945.88	—	0.35	0.35	4.0	144	339	518	34	73	72	177
	1708	947.70	—	0.35	0.35	4.0	144	333	519	33	74	72	176
	1713	949.52	—	0.35	0.35	4.5	141	332	519	32	75	72	176
	1718	951.34	—	0.35	0.35	4.5	143	332	521	33	76	72	176
	1723	953.18	—	0.35	0.35	4.5	142	330	527	32	76	73	176
	1728	955.00	—	0.35	0.35	4.5	140	331	526	32	77	73	175
	1733	956.83	—	0.35	0.35	4.5	140	328	527	32	77	73	176
	1738	958.67	—	0.35	0.35	5.0	142	331	525	32	78	73	175
	1743	960.49	—	0.35	0.35	5.0	141	332	527	32	78	74	176
END	1748	962.350	—	—	—	—	—	—	—	—	—	—	—
All													

Pitot Tube Calibration Factor C_p —
Volume Collected V_m 22.079 ft^3
Water Collected V_w 50.0 ml
Time of Test T_t 60 min.
Stack Pressure P_s -14.9 "H_2O

Pitot Tube No. —
Baro. Press. P_b 26.96 "Hg
Probe Tip Dia. D_n — in.
% CO_2 14.3 % CO 0.0
% O_2 5.2 % N_2 80.5
Area Stack A_s 20,235 in^2

Barometer No. —
Probe Tip No. —
Total Volume of Leak Checks After Start: — ft^3
V_m X Dry Gas Meter Calibration Factor 22.101 X 0.999

[Dry Gas Meter Reading — ft^3 - (T_t — min. X Leak Rate — cfm)]

Impinger Box No. 3-1

			Water Weight Gain		
Impinger 1	Final Weight	783.0		Impinger 1	44.9
	Initial Weight	738.1			
	Increase	44.9		Impinger 2	0.0
Impinger 2	Final Weight	738.2		Impinger 3	0.0
	Initial Weight	738.2			
	Increase	0.0		Impinger 4	5.1
			V_w =		
Impinger 3	Final Weight	737.9	g SO_2 =	Impinger 5	
	Initial Weight	737.9	V_w =		
	Increase	0.0		Impinger 6	
Impinger 4	Final Weight	908.8	Thimble No.	Impinger 7	
	Initial Weight	903.7	63		
	Increase	5.1		Total	50.0 = V_w

Impinger 5	Final Weight		P_b =	26.96	%CO_2 =	14.3	
	Initial Weight		V_m =	22.079	%O_2 =	5.2	
	Increase		V_w =	50.0	%CO =	0.0	
			P_m =	0.350	%N_2 =	80.5	
Impinger 6	Final Weight		Avg ΔP =	—	A_s =	20,235	
	Initial Weight				D_n =	—	
	Increase		Avg$\sqrt{\Delta P}$ =	—	T_t =	60	
			C_p =	—			
Impinger 7	Final Weight		P_s =	-14.9	"H_2O	25.86	"Hg
	Initial Weight		T_m =	74	°F	534	°R
	Increase		T_s =	—	°F	—	°R

PS

Moisture Content: %M = 10.70 M_d = ~~0.8793~~ 0.8930 MW_c = — MW = —

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 22.079 \left[\frac{26.96 + \frac{0.350}{13.6}}{74 + 460}\right] = \frac{19.693\ sft^3}{0.328\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 50.0 = 2.360 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{2.360}{19.693 + 2.360}$ x 100 = 10.70 %

V_s = 5123.8 x ____ $\sqrt{\quad}$ ____ x ____ = — fpm

ACFM: —

SCFM: —

%I = 1.039 x ____ x ____ / (x x x x( )^2) = — %

PS 12/7/06

%EA: ____

Job Number 06-057
Job Name ADA-ES (HARDIN, MT)
Run Number 3
Unit SDA INLET
Date 12/1/06
Operator SELAKOVICH/JACKSON
Sample Box No. 3-1 Meter Box No. 2-2

8A Field Data

Read and record at the start of each test point.

Purge to: 83.907
Purge time: 1505-1520
Pitot Leak Check Initial — Final —

Ambient Temp. °F Cold
Assumed Moisture % 10
Probe Length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.002 cfm
Final Leak @ 7.0 "Hg = 0.004 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage	Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Water Bath Remarks
			ΔP_s		P_m		T_s Condenser Outlet				T_m		
D-1	1401	49.004	—	0.35	0.35	4.5	104	313	507	24	69	70	170
	1406	50.96	—	0.35	0.35	4.5	111	319	509	27	69	69	178
	1411	52.75	—	0.35	0.35	4.5	114	339	511	27	70	69	175
	1416	54.56	—	0.35	0.35	4.5	119	355	511	27	71	70	176
	1421	56.36	—	0.35	0.35	4.0	119	367	512	27	72	70	175
	1426	58.17	—	0.35	0.35	4.0	116	369	512	27	73	70	176
	1431	59.95	—	0.35	0.35	4.5	115	365	512	27	74	70	173
	1436	61.75	—	0.35	0.35	4.5	112	365	512	27	74	70	174
	1441	63.57	—	0.35	0.35	4.5	114	366	514	27	75	71	175
	1446	65.37	—	0.35	0.35	4.5	113	366	513	27	75	71	176
	1451	67.19	—	0.35	0.35	5.0	113	366	511	27	76	71	175
	1456	69.00	—	0.35	0.35	5.0	112	366	513	27	76	71	174
END	1501	70.851	—	—	—	—	—	—	—	—	—	—	—

Pitot Tube Calibration Factor C_p —
Volume Collected V_m 21.825 ft³
Water Collected V_w 49.8 ml
Time of Test T_t 60 min.
Stack Pressure P_s -13.4 "H₂O

Pitot Tube No. —
Baro. Press. P_b 27.14 "Hg
Probe Tip Dia. D_n — in.
% CO_2 ____ % CO ____
% O_2 ____ % N_2 ____
Area Stack A_s 20.235 in²

Barometer No. —
Probe Tip No. —
Total Volume of Leak Checks After Start: — ft³
V_m X Dry Gas Meter Calibration Factor 21.847 x 0.999

[Dry Gas Meter Reading ____ ft³ - (T_t ____ min. X Leak Rate ____ cfm)]

Impinger Box No. 3-1

			Water Weight Gain		
Impinger 1	Final Weight	789.1		Impinger 1	45.8
	Initial Weight (BH)	~~740.4~~ 743.3		Impinger 2	-0.1
	Increase	45.8			
Impinger 2	Final Weight	743.3		Impinger 3	-0.1
	Initial Weight (BH)	~~738.8~~ 743.4			
	Increase	-0.1		Impinger 4	4.2
			V_w =		
Impinger 3	Final Weight	745.5	g SO_2 =	Impinger 5	
	Initial Weight (BH)	~~737.9~~ 745.6	V_w =		
	Increase	-0.1		Impinger 6	
Impinger 4	Final Weight	913.0		Impinger 7	
	Initial Weight	908.8			
	Increase	4.2		Total	49.8 = V_w

Impinger 5	Final Weight		P_b =	27.14		%CO_2 =	
	Initial Weight		V_m =	21.825		%O_2 =	
	Increase		V_w =	49.8		%CO =	
			P_m =	0.350		%N_2 =	
Impinger 6	Final Weight		Avg ΔP =	—		A_n =	20.235
	Initial Weight					D_n =	—
	Increase		Avg$\sqrt{\Delta P}$ =			T_1 =	60
			C_p =	—			
Impinger 7	Final Weight		P_s =	-13.4	"H_2O	26.15	"Hg
	Initial Weight		T_m =	72	°F	532	°R
	Increase		T_s =	—	°F	—	°R

Moisture Content: %M = 10.68 M_d = 0.8932 MW_c = _____ MW = _____

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 21.825 \left[\frac{27.14 + \frac{0.350}{13.6}}{72 + 460}\right] = \frac{19.670\ sft^3}{0.328\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 49.8 = 2.351 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{2.351}{19.670 + 2.351} \times 100 = 10.68\ \%$$

V_s = 5123.8 x _____ $\sqrt{\quad}$ _____ x _____ = — fpm

ACFM: _____

SCFM: _____

%I = 1.039 x _____ x _____ / x x x x( )² = — %

BS 12/1/00

%EA: _____

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 06-057

Job Name ADA ES (HARDIN, MT)

Sampling Location INLET (SDA)

Date 11/28/06 Time 0915-0940

Stack Height 92' 9 3/4" ft.

Sampling Port Height Above Ground 36' 9 1/2" ft.

	Port A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)	160.75	160.75	160.75		160.75
Port & Wall Thickness (in.)	18.50	18.50	18.50		18.50
Inside Stack Diameter (in.)	142.25	142.25	142.25		142.25

Sampling Ports are 13 ft. 4 in. (1.12 EQ. DUCT ~~stack~~ diameters) downstream from disturbance (inlet, constriction, bend, expansion)

Sampling Ports are 56 ft. 3 in. (4.75 EQ. DUCT ~~stack~~ diameters) upstream from disturbance (outlet, constriction, bend, expansion)

Point Number	Percent Diameter	Distance from Ref. Point (decimal in.)	Distance from Ref. Point (fractional in.)	Port A $\Delta P/T_s/\alpha$	Port B $\Delta P/T_s/\alpha$	Port C $\Delta P/T_s/\alpha$	Port D $\Delta P/T_s/\alpha$
1			7 7/8"	0.81 / 309 / 0	0.41 / 304 / 5	0.38 / 307 / 7	/ /
2			23 11/16"	0.42 / 307 / 0	0.55 / 309 / 0	0.49 / 310 / 5	/ /
3			39 1/2"	0.49 / 309 / 0	0.59 / 310 / 2	0.56 / 310 / 5	/ /
4			55 5/16"	0.51 / 310 / 5	0.63 / 310 / 0	0.55 / 308 / 0	/ /
5				/ /	/ /	/ /	/ /
6				/ /	/ /	/ /	/ /
7				/ /	/ /	/ /	/ /
8				/ /	/ /	/ /	/ /
9				/ /	/ /	/ /	/ /
10				/ /	/ /	/ /	/ /
11				/ /	/ /	/ /	/ /
12				/ /	/ /	/ /	/ /
13				/ /	/ /	/ /	/ /
14				/ /	/ /	/ /	/ /
15				/ /	/ /	/ /	/ /
16				/ /	/ /	/ /	/ /
17				/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21				/ /	/ /	/ /	/ /
22				/ /	/ /	/ /	/ /
23				/ /	/ /	/ /	/ /
24				/ /	/ /	/ /	/ /

Pitot Tube No. 3-3

C_p = 0.823

P_b = 26.99 "Hg

P_s = _____ "H_2O _____ "Hg

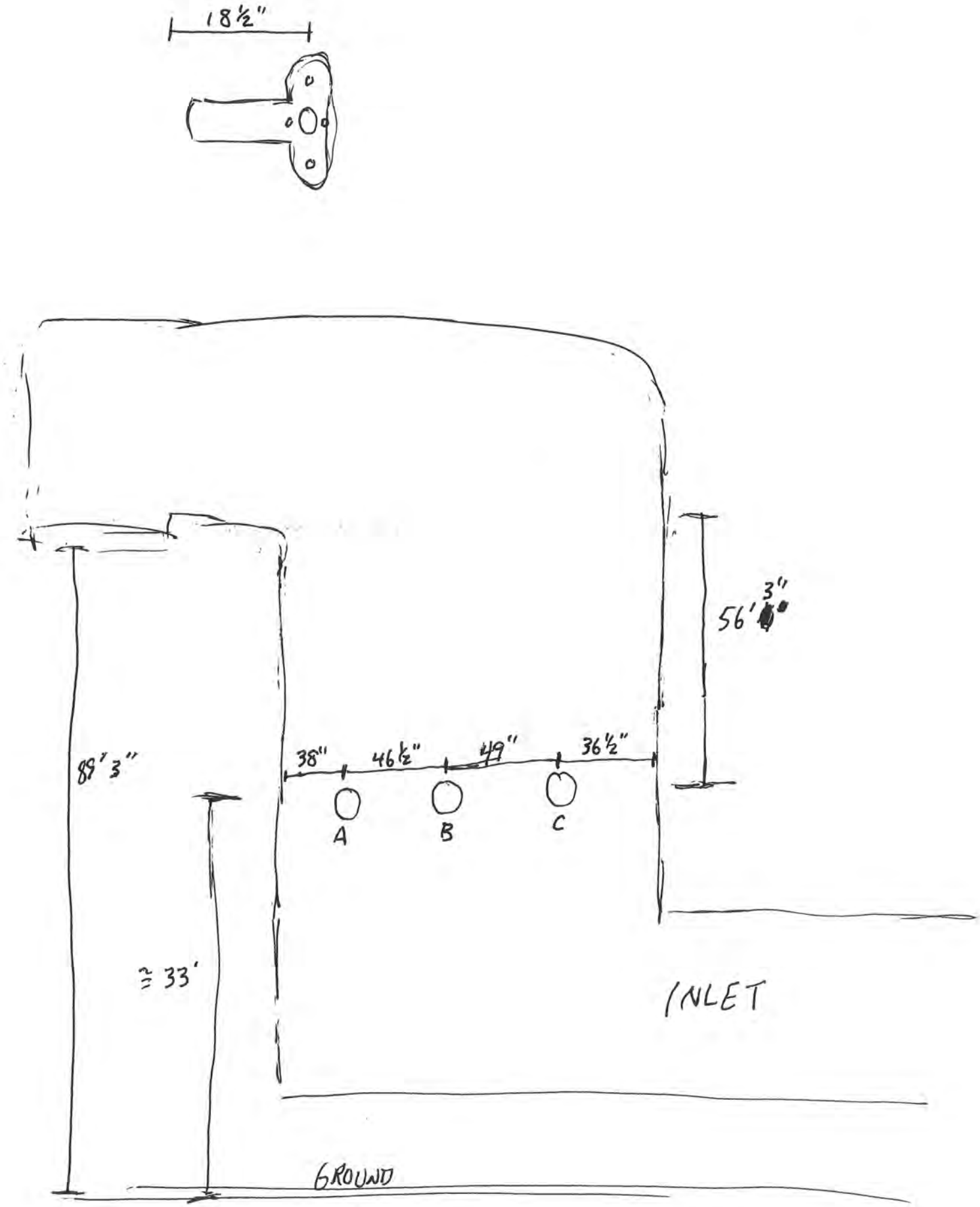
A_s = 20,235 in.^{2}

Average ΔP 0.533

Average $\Delta P^{1/2}$ 0.726

Average T_s 309 °F

Average α 2.4 degrees


18½"
56' 3"
89' 3"
38"
46½"
49"
36½"
A
B
C
≅ 33'
INLET
GROUND

Job Number 06-057
Job Name APA-ES Hardin, MT
Run Number 1
Unit Stack
Date 30 November 2006
Operator Mullins, Goldman
Sample Box No. 1-1 Meter Box No. 1-1

M5/202 Field Data

Read and record at the start of each test point.

Purge to: ~~1640~~ 60m 11/30/06
Purge time: 1648 – 1748
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 37
Assumed Moisture % 10.5
Probe Length 9'
C Factor 5.5 to reference
Initial Leak @ 15.0 "Hg = 0.005 cfm
Final Leak @ 8.0 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
B-10	1334	758.601	4.05	2.25	2.25	7.0	211	305	298	35	66	64	209	
9	1339	763.00	3.80	2.10	2.10	6.0	221	294	302	38	66	64	203	
8	1344	767.16	3.70	2.05	2.05	6.0	229	290	300	39	68	65	193	
7	1349	771.23	3.75	2.10	2.10	6.0	219	289	300	42	70	66	191	
6	1354	775.37	3.65	2.00	2.00	6.0	215	285	302	45	73	67	192	
5	1359	779.45	3.75	2.10	2.10	6.5	214	277	300	47	75	68	191	
4	1404	783.60	3.75	2.10	2.10	6.5	212	268	300	48	76	69	188	
3	1409	787.76	3.80	2.10	2.10	7.0	212	255	300	49	78	71	185	
2	1414	791.95	3.55	1.95	1.95	6.5	211	247	300	50	80	72	181	
2	1419	796.00	3.60	1.95	1.95	6.5	210	247	300	51	81	73	182	
1	1424	800.02	3.25	1.80	1.80	6.5	209	247	301	52	82	74	182	
1	1429	803.95	3.25	1.80	1.80	6.5	209	250	300	54	83	75	185	
End	1434	807.845	—	—	—	—	—	—	—	—	—	—		
A-10	1442	807.845	3.85	2.10	2.10	7.0	209	278	299	44	81	77	187	
9	1447	812.02	3.85	2.10	2.10	7.0	208	262	301	47	82	77	186	
8	1452	816.25	3.80	2.10	2.10	7.0	208	278	300	51	83	78	186	
7	1457	820.48	3.70	2.05	2.05	7.0	208	293	300	53	85	78	191	
6	1502	824.69	3.70	2.05	2.05	7.0	209	300	300	55	85	79	191	

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 97.698 ft³
Water Collected V_w 317.3 ml
Time of Test T_t 120 min.
Stack Pressure P_s –1.60 "H₂O

Pitot Tube No. 3-1
Baro. Press. P_b 26.94 "Hg
Probe Tip Dia. D_n 0.171 in.
% CO_2 12.1 % CO 0.0
% O_2 7.9 % N_2 80.0
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 4-2
Total Volume of Leak Checks After Start: 0 ✓ ft³
V_m X Dry Gas Meter Calibration Factor 0.985 x 99.186

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. ASM-1-1

			Water Weight Gain		
Impinger 1	Final Weight	930.3		Impinger 1	195.5
	Initial Weight	734.8			
	Increase	195.5		Impinger 2	68.0
Impinger 2	Final Weight	826.0		Impinger 3	14.6
	Initial Weight	758.0			
	Increase	68.0		Impinger 4	39.2
			V_w =		
Impinger 3	Final Weight	741.2	g SO_2 =	Impinger 5	
	Initial Weight	726.6	V_w =		
	Increase	14.6		Impinger 6	
Impinger 4	Final Weight	946.6		Impinger 7	
	Initial Weight	907.4	Filter No. A114		
	Increase	39.2		Total	317.3 = V_w
Impinger 5	Final Weight		P_b = 26.94	$\%CO_2$ = 12.1	
	Initial Weight		V_m = 97.698	$\%O_2$ = 7.9	
	Increase		V_w = 317.3	%CO = 0.0	
			P_m = 2.029	$\%N_2$ = 80.0	
Impinger 6	Final Weight		Avg ΔP = 3.677	A_n = 9363	
	Initial Weight			D_n = 0.171	
	Increase		Avg$\sqrt{\Delta P}$ = 1.917	T_1 = 120	
			C_p = 0.823		
Impinger 7	Final Weight		P_s = -1.60 "H_2O	26.82 "Hg	
	Initial Weight		T_m = 77 °F	537 °R	
	Increase		T_s = 210 °F	670 °R	

Moisture Content: %M = 14.69 M_d = 0.8531 MW_d = 30.252 MW = 28.45

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 97.698 \left[\frac{26.94 + \frac{2.029}{13.6}}{77 + 460}\right] = \frac{86.987}{0.725}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 317.3 = 14.977 sft^3

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{14.977}{86.987 +} \times 100 = 14.69\ \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{670}{26.82 \times 28.45}} \times 1.917 = 7575\ fpm$$

ACFM: 492,531

SCFM: 297,911

$$\%I = \frac{1.039 \times 86.987 \times 670}{0.8531 \times 26.82 \times 7575 \times 120 \times (0.171)^2} = 99.6\ \%$$

B 12/6/06

%EA: 59.4

Run Number 1

Unit Stack

Date 30 November 2006

5/202 FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
A-5	1507	828.86	3.80	2.10	2.10	7.5	206	305	301	59	86	79	196	
4	1512	833.05	3.90	2.15	2.15	7.5	206	303	300	60	87	80	200	
3	1517	837.25	3.85	2.10	2.10	7.5	205	295	300	61	88	81	202	
2	1522	841.57	3.70	2.05	2.05	7.5	205	282	298	61	88	81	201	
2	1527	845.76	3.70	2.05	2.05	7.5	205	276	299	61	89	82	199	
1	1532	849.97	3.10	1.70	1.70	6.5	203	276	300	59	88	82	200	
1	1537	853.84	3.40	1.85	1.85	7.0	204	278	300	59	88	83	201	
End	1542	857.78	—	—	—	—	—	—	—	—	—	—	—	
All														

Job Number 06-057
Job Name ADA-ES Hardin, MT
Run Number 2
Unit STACK
Date 1 December 2006
Operator Mullins, Goldman
Sample Box No. 1-1 Meter Box No. 1-1

M5/202 Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: 1458-1558
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 31
Assumed Moisture % 15.3
Probe Length 9'
C Factor ~~3.55~~ 5.5 to reference
Initial Leak @ 15.0 "Hg = 0.003 cfm
Final Leak @ 7.0 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
A-10	1204	989.400	3.50	1.90	1.90	5.0	209	277	298	31	74	72	175	
9	1209	993.41	3.35	1.85	1.85	5.0	208	258	299	33	75	72	181	
8	1214	997.36	3.60	2.00	2.00	5.5	209	254	298	36	77	73	185	
7	1219	1001.39	3.60	2.00	2.00	5.5	209	265	299	37	79	74	187	
6	1224	1005.45	3.95	2.15	2.15	6.5	209	263	300	39	80	74	187	
5	1229	1009.65	3.60	2.00	2.00	6.0	209	257	300	39	81	75	187	
4	1234	1013.74	3.60	2.00	2.00	6.0	211	255	301	40	82	76	189	
3	1239	1017.84	4.00	2.20	2.20	7.0	211	252	300	40	83	76	190	
2	1244	1022.12	3.60	2.00	2.00	6.5	210	247	301	39	84	77	190	
2	1249	1026.30	3.45	1.90	1.90	6.0	206	244	301	38	84	78	190	
1	1254	1030.32	3.05	1.70	1.70	5.5	202	244	300	37	85	78	190	
1	1259	1034.15	3.00	1.65	1.65	5.5	202	243	300	36	85	79	190	
End	1304	1037.874	—	—	—	—	—	—	—	—	—	—	—	
B-10	1309	1037.874	3.75	2.05	2.05	6.5	206	260	302	32	84	79	186	
9	1314	1042.00	3.75	2.05	2.05	6.5	204	262	301	32	85	80	183	
8	1319	1046.14	3.95	2.15	2.15	7.0	203	267	300	31	85	80	178	
7	1324	1050.40	3.70	2.05	2.05	7.0	202	271	302	31	86	80	178	
6	1329	1054.62	3.35	1.85	1.85	6.5	203	268	301	31	86	81	176	

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 95.513 ft³
Water Collected V_w 320.5 ml
Time of Test T_t 120 min.
Stack Pressure P_s −1.30 "H₂O

Pitot Tube No. 3-1
Baro. Press. P_b 27.08 "Hg
Probe Tip Dia. D_n 0.171 in.
% CO_2 13.0 % CO 0.0
% O_2 6.2 % N_2 80.8
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 4-2
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.985 ✓ x 96.968

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 1-1

			Water Weight Gain		
Impinger 1	Final Weight	969.7		Impinger 1	230.1
	Initial Weight	739.6			
	Increase	230.1		Impinger 2	55.3
Impinger 2	Final Weight	818.8		Impinger 3	7.4
	Initial Weight	763.5			
	Increase	55.3		Impinger 4	27.7
			V_w =		
Impinger 3	Final Weight	739.0	g SO_2 =	Impinger 5	
	Initial Weight	731.6	V_w =		
	Increase	7.4		Impinger 6	
Impinger 4	Final Weight	938.9	FILTER#:	Impinger 7	
	Initial Weight	911.2	A115		
	Increase	27.7		Total	320.5 = V_w

Impinger 5	Final Weight		P_b =	27.08	$\%CO_2$ =	13.0	
	Initial Weight		V_m =	95.513	$\%O_2$ =	6.2	
	Increase		V_w =	320.5	%CO =	0.0	
			P_m =	1.927	$\%N_2$ =	80.8	
Impinger 6	Final Weight		Avg ΔP =	3.500	A_s =	9363	
	Initial Weight				D_n =	0.171	
	Increase		Avg$\sqrt{\Delta P}$ =	1.869	T_t =	120	
			C_p =	0.823			
Impinger 7	Final Weight		P_s =	-1.30	$^{\circ}H_2O$	26.98	$^{\circ}Hg$
	Initial Weight		T_m =	81	°F	541	°R
	Increase		T_s =	206	°F	666	°R

Moisture Content: %M = 15.13 M_d = 0.8487 MW_d = 30.328 MW = 28.46

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 95.513 \left[\frac{27.08 + \frac{1.927}{13.6}}{81 + 460}\right] = \frac{84.825\ sft^3}{0.707\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 320.5 = 15.128 sft^3

~~84.825~~ 12/1/06

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{15.128}{84.825 + 15.128}$ x 100 = 15.13 %

V_s = 5123.8 x 0.823 $\sqrt{\frac{666}{26.98 \times 28.46}}$ x 1.869 = 7340 fpm

ACFM: 477,257

SCFM: 290,628

%I = $\frac{1.039 \times 84.825 \times 666}{0.8487 \times 26.98 \times 7340 \times 120 \times (0.171)^2}$ = 99.5 %

Checked by: 10/6/06

%EA: 40.8

Run Number 2

Unit Stack

Date 1 December 2006

M5/202 FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired (P_m)	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
p-5	1334	1058.69	3.45	1.90	1.90	6.5	203	260	301	31	86	81	175	
4	1339	1062.73	3.45	1.90	1.90	6.5	203	253	300	31	86	81	174	
3	1344	1066.77	3.70	2.05	2.05	6.5	203	249	301	31	86	81	174	
2	1349	1070.92	3.50	1.90	1.90	6.5	205	246	302	31	86	81	175	
2	1354	1074.96	3.30	1.80	1.80	6.0	205	245	301	33	86	81	176	
1	1359	1078.99	2.90	1.60	1.60	5.5	202	246	302	33	86	81	177	
1	1404	1082.65	2.90	1.60	1.60	5.5	201	247	301	34	86	81	178	
End	1409	1086.368	—	—	—	—	—	—	—	—	—	—	—	
All														

Job Number 06-057
Job Name ADA-ES Hardin, MT
Run Number 3
Unit Stack
Date 2 December 2006
Operator Mullins, Goldman
Sample Box No. 1-1 Meter Box No. 1-1

5/202 Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: 1514 – 1614
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 25
Assumed Moisture % 15
Probe Length 9'
C Factor 5.5 to reference
Initial Leak @ 15.0 "Hg = 0.002 cfm
Final Leak @ 7.5 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line Remarks
A-10	1215	214.444	3.65	2.00	2.00	5.5	204	269	300	30	73	71	176
9	1220	218.61	3.65	2.00	2.00	5.5	204	273	300	34	75	72	190
8	1225	222.67	3.60	1.95	1.95	5.0	205	278	300	37	77	73	200
7	1230	226.65	3.55	1.90	1.90	5.0	203	286	300	38	79	73	206
6	1235	230.60	3.40	1.85	1.85	5.0	202	292	300	39	81	74	210
5	1240	234.52	3.60	1.95	1.95	5.0	205	293	301	39	82	75	211
4	1245	238.50	3.70	2.00	2.00	5.5	208	288	300	40	83	75	208
3	1250	242.58	3.60	1.95	1.95	5.5	207	283	301	40	84	76	209 Orsat
2	1255	246.61	3.45	1.90	1.90	5.5	204	280	300	40	85	77	208
1	1300	250.58	3.45	1.90	1.90	5.5	204	276	300	40	85	77	207
E 1	1305	254.50	3.20	1.75	1.75	5.0	204	276	300	41	86	78	207
1	1310	258.50	3.25	1.75	1.75	5.0	204	276	300	40	86	78	208
End	1315	262.212	—	—	—	—	—	—	—	—	—	—	—
B-10	1319	262.212	3.85	2.10	2.10	5.5	204	290	301	36	84	79	207
9	1324	266.32	3.80	2.05	2.05	6.0	204	285	300	39	85	79	207
8	1329	270.43	3.75	2.05	2.05	6.0	204	289	300	41	86	80	207
7	1334	274.55	3.70	2.00	2.00	6.0	204	296	299	42	87	80	209
6	1339	278.62	3.40	1.85	1.85	5.5	205	301	300	43	87	80	209

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 94.604 ft^3
Water Collected V_w 309.1 ml
Time of Test T_t 120 min.
Stack Pressure P_s -1.45 "H_2O

Pitot Tube No. 3-1
Baro. Press. P_b 27.52 "Hg
Probe Tip Dia. D_n 0.171 in.
% CO_2 13.3 % CO 0.0
% O_2 6.2 % N_2 80.5
Area Stack A_s 9363 in^2

Barometer No. —
Probe Tip No. 4-2
Total Volume of Leak Checks After Start: 0 ft^3
V_m X Dry Gas Meter Calibration Factor 0.985 X 96.045

[Dry Gas Meter Reading ___ ft^3 - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 1-1

			Water Weight Gain		
Impinger 1	Final Weight	928.9		Impinger 1	191.8
	Initial Weight	737.1			
	Increase	191.8		Impinger 2	66.0
Impinger 2	Final Weight	824.0		Impinger 3	14.5
	Initial Weight	758.0			
	Increase	66.0		Impinger 4	36.8
			V_w =		
Impinger 3	Final Weight	748.2	g SO_2 =	Impinger 5	
	Initial Weight	733.7	V_w =		
	Increase	14.5		Impinger 6	
Impinger 4	Final Weight	986.9	Filter No.	Impinger 7	
	Initial Weight	950.1	#116		
	Increase	36.8		Total	309.1 = V_w

Impinger 5	Final Weight		P_b =	27.52	%CO_2 =	13.3	
	Initial Weight		V_m =	94.604	%O_2 =	6.2	
	Increase		V_w =	309.1	%CO =	0.0	
			P_m =	1.927	%N_2 =	80.5	
Impinger 6	Final Weight		Avg ΔP =	3.542	A_s =	9363	
	Initial Weight				D_n =	0.171	
	Increase		Avg$\sqrt{\Delta P}$ =	1.881	T_1 =	120	
			C_p =	0.823			
Impinger 7	Final Weight		P_s =	−1.45	"H_2O	27.41	"Hg
	Initial Weight		T_m =	81	°F	541	°R
	Increase		T_s =	205	°F	665	°R

Moisture Content: %M = 14.59 M_d = 0.8541 MW_c = 30.376 MW = 28.57

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 94.604 \left[\frac{27.52 + \frac{1.927}{13.6}}{81 + 460}\right] = \frac{85.376\ \text{sft}^3}{0.711\ \text{scfm}}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 309.1 = 14.590 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{14.590}{85.376 + 14.590}$ x 100 = 14.59 %

V_s = 5123.8 x 0.823 $\sqrt{\frac{665}{27.41 \times 28.57}}$ x 1.881 = 7309 fpm

ACFM: 475,264

SCFM: 296,329

%I = $\frac{1.039 \times 85.376 \times 665}{0.8541 \times 27.41 \times 7309 \times 120 \times (0.171)^2}$ = 98.2 %

PS 12/6/06

%EA: 41.0

Run Number 3

Unit Stack

Date 2 December 2006

5/202 FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
5	1344	282.58	3.50	1.90	1.90	5.5	206	305	300	45	87	80	210	
4	1349	286.54	3.60	1.95	1.95	6.0	206	307	300	45	88	81	210	
3	1354	290.57	3.80	2.10	2.10	6.5	206	309	299	45	88	81	210	
2	1359	294.70	3.50	1.90	1.90	6.0	209	310	301	46	88	81	212	
2	1404	298.71	3.60	1.95	1.95	6.0	209	312	301	47	88	81	212	
1	1409	302.73	3.10	1.70	1.70	5.5	205	312	300	46	88	82	216	
1	1414	306.56	3.30	1.80	1.80	6.0	207	313	301	44	89	82	218	
End	1419	310.489	—	—	—	—	—	—	—	—	—	—	—	
All														

ORSAT ANALYSIS DATA FORM

Job #: 06-057
Job Name: ADA-ES
Location: Hardin, MT
Date: 11-30-06
Operator: Hefley

Sample Location: Stack
Analytical Method: 3
Sample Type: Single Point / Multi Point / Grab / Integrated
Leak Check: Time: 5 min (≥ 4 minutes) Rate: 0.0
Ambient Air Check:

CO_2 - % Vol.	0.0
O_2 - % Vol.	20.9
N_2 - % Vol.	79.1

Run #: 1 (M5/202) 11/30/06
Run Time: 1525

CO_2 - % Vol.	12.1	12.1	12.2	12.1
O_2 - % Vol.	7.9	7.9	7.8	7.9
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.0	80.0	80.0	80.0

Run #: 2
Run Time: 1210-1255 12/1/06

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	13.0	13.0	13.0	13.0
O_2 - % Vol.	6.2	6.2	6.2	6.2
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.8	80.8	80.8	80.8

Run #: 3
Run Time: 1250 12/2/06

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	13.3	13.3	13.3	13.3
O_2 - % Vol.	6.2	6.2	6.2	6.2
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

Job Number 06-057
Job Name ADA-ES (HARDIN, MT)
Run Number 1
Unit STACK
Date 1 December 2006
Operator Mullins, Goldman
Sample Box No. M-3 Meter Box No. 1-1

OH Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 27
Assumed Moisture % 15.3
Probe Length 91
C Factor 3.55 to reference
Initial Leak @ 15.0 "Hg = 0.005 cfm
Final Leak @ 6.0 "Hg = 0.001 cfm

Point	Clock Time 6:00 12/1/06	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
B-10	0850	909.834	3.75	1.35	1.35	4.5	209	251	250	26	64	62	189	
9	0902	913.26	3.70	1.35	1.35	4.5	210	250	250	31	64	63	189	
8	0907	916.64	3.75	1.35	1.35	4.5	210	251	250	32	66	63	187	
7	0912	920.00	3.85	1.35	1.35	4.5	210	251	250	33	68	64	183	
6	0917	923.31	3.80	1.35	1.35	4.5	211	251	250	33	70	65	183	
5	0922	926.61	3.60	1.30	1.30	4.5	212	252	250	34	71	65	184	
4	0927	929.91	3.60	1.30	1.30	4.5	211	252	249	36	73	67	189	
3	0932	933.19	3.65	1.30	1.30	4.5	211	252	252	36	74	67	190	
2	0937	936.47	3.50	1.25	1.25	4.5	210	253	251	37	75	68	191	
2	0942	939.68	3.80	1.35	1.35	5.0	211	253	250	39	76	70	196	
1	0947	943.00	3.10	1.10	1.10	4.5	212	252	251	39	77	70	200	
1	0952	946.09	3.30	1.15	1.15	4.5	213	253	250	41	78	71	203	Orsat
End	0957	949.154	—	—	—	—	—	—	—	—	—	—	—	
A-10	1005	949.154	3.60	1.30	1.30	5.0	215	253	250	36	77	73	201	
9	1010	952.45	3.60	1.30	1.30	5.0	214	253	250	38	77	73	192	
8	1015	955.77	3.75	1.35	1.35	5.0	213	255	252	38	78	74	188	
7	1020	959.10	3.75	1.35	1.35	5.0	212	253	248	38	79	74	184	
6	1025	962.47	3.60	1.30	1.30	5.0	212	252	249	38	80	74	183	

Pitot Tube Calibration Factor C_p 0.824
Volume Collected V_m 77.921 ft³
Water Collected V_w 257.1 ml
Time of Test T_t 120 min.
Stack Pressure P_s −1.55 "H_2O

Pitot Tube No. 3-2
Baro. Press. P_b 27.05 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 12.8 % CO 0.0
% O_2 6.2 % N_2 81.0
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 7-8 7-8
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.9854 X 79.108

[Dry Gas Meter Reading — ft³ - (T_t — min. X Leak Rate — cfm)]

Impinger Box No. M-3

			Water Weight Gain		
Impinger 1	Final Weight	943.6		Impinger 1	205.0
	Initial Weight	738.6			
	Increase	205.0	Imp.8 942.3 − 945.1 = 17.2	Impinger 2	30.0
Impinger 2	Final Weight	782.5		Impinger 3	4.3
	Initial Weight	752.5			
	Increase	30.0	V_w =	Impinger 4	1.7
Impinger 3	Final Weight	754.9	g SO_2 =	Impinger 5	−0.4
	Initial Weight	750.6	V_w =		
	Increase	4.3		Impinger 6	−0.6
Impinger 4	Final Weight	740.7		Impinger 7	−0.1
	Initial Weight	739.0	FILTER #:	Impinger 8	17.2
	Increase	1.7	A117	Total	257.1 = V_w

Impinger 5	Final Weight	735.0	P_b =	27.05	%CO_2 =	12.8	
	Initial Weight	735.4	V_m =	77.921	%O_2 =	6.2	
	Increase	−0.4	V_w =	257.1	%CO =	0.0	
			P_m =	1.294	%N_2 =	81.0	
Impinger 6	Final Weight	743.6	Avg ΔP =	3.606	A_s =	9363	
	Initial Weight	744.2			D_n =	0.154	
	Increase	−0.6	Avg$\sqrt{\Delta P}$ =	1.898	T_1 =	120	
			C_p =	0.8234			
Impinger 7	Final Weight	741.5	P_s =	−1.55 °H_2O	26.94	°Hg	
	Initial Weight	741.6	T_m =	73 °F	533	°R	
	Increase	−0.1	T_s =	212 °F	672	°R	

Moisture Content: %M = 14.77 M_d = 0.8523 MW_d = 30.296 MW = 28.48

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 77.921 \left[\frac{27.05 + \frac{1.294}{13.6}}{73 + 460}\right] = 70.043\ sft^3 = 0.584\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 257.1 = 12.135 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{12.135}{70.043 + 12.135}$ x 100 = 14.77 %

V_s = 5123.8 x 0.823 $\sqrt{\frac{672}{26.94 \times 28.48}}$ x 1.898 = 7499 fpm

ACFM: 487623

SCFM: 295083

%I = $\frac{1.039 \times 70.043 \times 672}{0.8523 \times 26.94 \times 7499 \times 120 \times (0.154)^2}$ = 99.8 %

%EA: 40.6

Run Number 1

Unit Stack

Date 1 December 2006

OH FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
A-5	1030	965.81	3.70	1.35	1.35	5.0	211	252	250	38	81	75	183	
4	1035	969.21	3.85	1.40	1.40	5.0	214	250	250	39	81	75	182	
3	1040	972.65	3.75	1.35	1.35	5.5	214	245	250	38	81	76	181	
2	1045	976.07	3.50	1.25	1.25	5.0	214	236	250	38	82	76	178	
2	1050	979.35	3.60	1.30	1.30	5.0	213	230	251	36	82	76	177	
1	1055	982.63	3.20	1.15	1.15	5.0	214	225	251	36	81	76	176	
1	1100	985.81	3.25	1.15	1.15	5.0	214	225	250	36	82	76	174	
End	1105	988.942	—	—	—	—	—	—	—	—	—	—	—	
All														

Job Number 06-057
Job Name ADA-ES Hardin, MT
Run Number 2
Unit Stack
Date 2 December 2006
Operator Mullins, Goldman
Sample Box No. M-3 Meter Box No. 1-1

OH Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 12
Assumed Moisture % 15
Probe Length 9'
C Factor 3.55 to reference
Initial Leak @ 15.0 "Hg = 0.003 cfm
Final Leak @ 6.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
B-10	0919	135.354	3.70	1.30	1.30	3.0	205	261	250	16	53	52	226	
9	0924	138.66	3.85	1.35	1.35	3.0	206	261	250	22	53	52	226	
8	0929	141.94	3.80	1.35	1.35	3.0	206	261	248	26	54	52	224	
7	0934	145.200	3.65	1.30	1.30	3.0	205	260	250	28	56	53	223	
6	0939	148.46	3.60	1.30	1.30	3.0	205	260	250	29	57	54	222	
5	0944	151.71	3.60	1.30	1.30	3.0	208	261	250	31	59	54	222	
4	0949	154.93	3.70	1.30	1.30	3.0	210	261	250	32	60	54	221	
3	0954	158.13	3.70	1.30	1.30	3.0	210	261	250	34	61	55	222	
2	0959	161.34	3.45	1.25	1.25	3.0	208	258	250	35	62	56	224	
2	1004	164.50	3.55	1.25	1.25	3.0	208	260	250	35	63	56	220	
1	1009	167.68	3.05	1.10	1.10	3.0	206	260	249	36	64	57	221	
1	1014	170.65	3.20	1.15	1.15	3.0	206	259	250	35	64	57	222	
End	1019	173.597	—	—	—	—	—	—	—	—	—	—	—	
A-10	1024	173.597	3.80	1.35	1.35	3.5	210	261	250	32	64	58	230	
9	1029	176.94	3.85	1.35	1.35	4.0	210	260	251	37	65	59	232	
8	1034	180.31	4.10	1.45	1.45	4.5	208	260	251	40	67	60	234	Orsat
7	1039	183.75	3.85	1.35	1.35	4.0	207	262	250	40	68	60	235	
6	1044	187.14	3.60	1.30	1.30	4.0	208	261	250	42	69	61	232	

Pitot Tube Calibration Factor C_p 0.824
Volume Collected V_m 76.711 ft³
Water Collected V_w 265.2 ml
Time of Test T_t 120 min.
Stack Pressure P_s −1.40 "H₂O

Pitot Tube No. 03-2
Baro. Press. P_b 27.52 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 13.2 % CO 0.0
% O_2 6.4 % N_2 80.4
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. X-8
Total Volume of Leak Checks After Start: 0 ft³ 5 BTM 12/2/06
V_m X Dry Gas Meter Calibration Factor 0.985 X 77.879

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. M-3

			Water Weight Gain		
Impinger 1	Final Weight	931.3		Impinger 1	190.2
	Initial Weight	741.1	Imp. 8		
	Increase	190.2	Final 975.9	Impinger 2	49.1
			Initial 961.6		(P5)
Impinger 2	Final Weight	796.8	14.3	Impinger 3	~~2.9~~ 10.3
	Initial Weight	747.7			
	Increase	49.1		Impinger 4	2.9
			V_w =		
Impinger 3	Final Weight	766.8	g SO_2 =	Impinger 5	-0.4
	Initial Weight	756.5	V_w =		
	Increase	10.3		Impinger 6	-0.5
Impinger 4	Final Weight	752.3	Filter No.	Impinger 7	-0.7
	Initial Weight	749.4	A118	Imp 8	14.3
	Increase	2.9		Total	265.2 = V_w
Impinger 5	Final Weight	742.0	P_b = 27.52	$\%CO_2$ =	13.2
	Initial Weight	742.4	V_m = 76.711	$\%O_2$ =	6.4
	Increase	-0.4	V_w = 265.2	%CO =	0.0
			P_m = 1.292	$\%N_2$ =	80.4
Impinger 6	Final Weight	751.4	Avg ΔP = 3.644	A_n =	9363
	Initial Weight	751.9		D_n =	0.154
	Increase	-0.5	Avg$\sqrt{\Delta P}$ = 1.908	T_t =	120
			C_p = 0.824		
Impinger 7	Final Weight	747.9	P_s = -1.40 H_2O		27.42 "Hg
	Initial Weight	748.6	T_m = 62 °F		522 °R
	Increase	-0.7	T_s = 207 °F		667 °R

Moisture Content: %M = 14.88 M_d = 0.8512 MW_s = 30.368 MW = 28.53

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 76.711 \left[\frac{27.52 + \frac{1.292}{13.6}}{62 + 460}\right] = \frac{71.627}{0.597}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 265.2 = 12.517 sft^3

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{12.517}{71.627 + 12.517} \times 100 = 14.88\ \%$$

$$V_s = 5123.8 \times 0.824 \sqrt{\frac{667}{27.42 \times 28.53}} \times 1.908 = 7438\ fpm$$

ACFM: 483,647

SCFM: 299,743

$$\%I = \frac{1.039 \times 71.627 \times 667}{0.8512 \times 27.42 \times 7438 \times 120 \times (0.154)^2} = 100.5\ \%$$

(P5) 12/6/06

%EA: 42.9

Run Number 2

Unit Stack

Date 2 December 2006

OH FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
A-5	1049	190.44	3.70	1.30	1.30	4.5	208	261	250	43	70	62	230	
4	1054	193.71	3.70	1.30	1.30	4.5	208	261	250	45	71	63	232	
3	1059	196.98	3.85	1.35	1.35	4.5	207	261	251	46	72	64	233	
2	1104	200.33	3.70	1.30	1.30	4.5	207	260	250	47	73	65	228	
2	1109	203.62	3.75	1.30	1.30	4.5	206	259	249	47	74	65	222	
1	1114	206.92	3.25	1.15	1.15	4.0	205	260	250	47	75	66	218	
1	1119	210.06	3.45	1.25	1.25	4.0	207	261	250	46	76	67	218	
End	1124	213.233	—	—	—	—	—	—	—	—	—	—	—	
All														

Job Number 06-057
Job Name ADA-ES (HARDIN, MT)
Run Number 3
Unit STACK
Date 2 December 2006 12/2/06
Operator Mullins, ~~Goldman~~ Jackson
Sample Box No. M-3 Meter Box No. 1-1

OH Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 18
Assumed Moisture % 15
Probe Length 9'
C Factor 3.55 to reference
Initial Leak @ 15.0 "Hg = 0.006 cfm
Final Leak @ 5.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
B-10	1712	312.200	4.20	1.50	1.50	5.0	218	256	250	18	77	77	172	
9	1717	315.76	3.85	1.35	1.35	4.5	218	256	250	22	77	77	175	
8	1722	319.16	3.50	1.25	1.25	4.0	216	256	250	23	78	77	178	
7	1727	322.42	3.50	1.25	1.25	4.0	213	258	249	24	79	77	183	
6	1732	325.63	3.65	1.30	1.30	4.0	212	259	250	24	80	77	195	
5	1737	328.88	3.75	1.35	1.35	4.0	214	257	250	26	81	77	200	
4	1742	332.25	3.50	1.25	1.25	4.0	213	257	250	26	82	77	204	
3	1747	335.50	3.45	1.25	1.25	4.0	212	258	250	26	83	78	206	
2	1752	338.74	3.35	1.20	1.20	4.0	211	256	251	27	83	78	205	Orsat
2	1757	341.95	3.35	1.20	1.20	4.0	211	252	250	27	84	78	201	
1	1802	345.12	2.95	1.05	1.05	4.0	213	252	250	27	84	78	201	
1	1807	348.13	2.95	1.05	1.05	4.0	216	257	250	27	84	78	203	
End	1812	351.073	—	—	—	—	—	—	—	—	—	—	—	
A-10	1817	351.073	3.60	1.30	1.30	4.5	216	259	250	26	82	79	216	
9	1822	354.37	3.45	1.25	1.25	4.5	215	258	250	29	83	79	220	
8	1827	357.61	3.50	1.25	1.25	4.5	213	258	251	30	83	79	222	
7	1832	360.85	3.65	1.30	1.30	4.5	212	260	250	33	84	79	225	
6	1837	364.14	3.40	1.20	1.20	4.5	211	260	251	35	85	79	229	

Pitot Tube Calibration Factor C_p 0.824
Volume Collected V_m 76.188 ft³
Water Collected V_w 247.2 ml
Time of Test T_t 120 min.
Stack Pressure P_s −1.35 "H₂O

Pitot Tube No. 3-2
Baro. Press. P_b 27.55 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 13.3 % CO 0.0
% O_2 6.2 % N_2 80.5
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 5-8
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.985 X 77.348

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. M-3

Impinger 1	Final Weight	930.4		Impinger 1	189.0
	Initial Weight	741.4		Impinger 2	37.1
	Increase			Impinger 3	6.8
Impinger 2	Final Weight	785.5		Impinger 4	2.1
	Initial Weight	748.4		Impinger 5	0.0
	Increase			Impinger 6	-0.2
Impinger 3	Final Weight	771.6		Impinger 7	-0.4
	Initial Weight	764.8			12.8
	Increase			Total	247.2 = V_w
Impinger 4	Final Weight	739.1			
	Initial Weight	737.0			
	Increase				
Impinger 5	Final Weight	742.6			
	Initial Weight	742.6			
	Increase				
Impinger 6	Final Weight	749.3			
	Initial Weight	749.5			
	Increase				
Impinger 7	Final Weight	744.3			
	Initial Weight	744.7			
	Increase				

Water Weight Gain

#48 FINAL 937.7
INITIAL 924.9
INC.

V_w =
g SO_2 = _____
V_w =

FILTER # A119

P_b =	27.55	%CO_2 =	13.3
V_m =	76.188	%O_2 =	6.2
V_w =	247.2	%CO =	0.0
P_m =	1.235	%N_2 =	80.5
Avg ΔP =	3.452	A_s =	9363
		D_n =	0.154
Avg$\sqrt{\Delta P}$ =	1.856	T_1 =	120
C_p =	0.824		
P_s =	-1.35 "H_2O		27.45 "Hg
T_m =	81 °F		541 °R
T_s =	212 °F		672 °R

Moisture Content: %M = 14.52 M_d = 0.8548 MW_c = 30.376 MW = 28.58

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 76.188 \left[\frac{27.55 + \frac{1.235}{13.6}}{81 + 460}\right] = 68.704\ sft^3 = 0.573\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 247.2 = 11.668 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{11.668}{68.704 + 11.668} \times 100 = 14.52\ \%$$

$$V_s = 5123.8 \times 0.824 \sqrt{\frac{672}{27.45 \times 28.58}} \times 1.856 = 7252\ fpm$$

ACFM: 471,555

SCFM: 291,619

$$\%I = \frac{1.039 \times 68.704 \times 672}{7252 \times 27.45 \times 0.8548 \times 120 \times (0.154)^2} = 99.1\ \%$$

(B) 12/6/06

%EA: 41.0

Run Number 3

Unit Stack

Date 2 December 2006

OH FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	P_m Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line Remarks
5	1842	367.35	3.45	1.25	1.25	4.5	210	261	250	36	85	79	228
4	1847	370.57	3.55	1.25	1.25	4.5	210	259	250	36	85	79	228
3	1852	373.78	3.50	1.25	1.25	4.5	210	260	250	36	85	80	235
2	1857	377.00	3.35	1.20	1.20	4.5	209	259	251	38	85	80	232
2	1902	380.19	3.45	1.25	1.25	4.5	210	259	250	38	86	80	232
1	1907	383.40	2.90	1.05	1.05	4.5	209	259	250	39	86	80	233
1	1912	386.47	3.05	1.10	1.10	4.5	205	259	250	39	86	80	234
End	1917	389.548	—	—	—	—	—	—	—	—	—	—	—
All													

ORSAT ANALYSIS DATA FORM

Job #: 06-057
Job Name: ADA-ES
Location: Hardin, MT
Date: 11-30-06
Operator: Hefley

Sample Location: Stack
Analytical Method: 3
Sample Type: Single Point / Multi Point Grab / Integrated
Leak Check: Time: 5 min (≥ 4 minutes) Rate: 0.0
Ambient Air Check:

CO_2 - % Vol.	0.0
O_2 - % Vol.	20.9
N_2 - % Vol.	79.1

Run #: 1 (26A)
Run Time: 1745

CO_2 - % Vol.	11.6	11.7	11.5	11.6
O_2 - % Vol.	7.6	7.6	7.5	7.6
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.8	80.7	81.0	80.8

Run #: 2
Run Time: 1645

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	12.8	12.8	12.8	12.8
O_2 - % Vol.	6.7	6.7	6.7	6.7
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

Run #: 3
Run Time: 2120 12/02/06

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	13.2	13.2	13.2	13.2
O_2 - % Vol.	6.3	6.3	6.3	6.3
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

Job Number 06-057
Job Name ADA-ES Hardin, MT
Run Number 1
Unit Stack
Date 30 November 2006
Operator Mullins, Goldman
Sample Box No. 2-1 Meter Box No. 1-1

26A Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 34
Assumed Moisture % 6.5
Probe Length 9'
C Factor 3.9 to reference
Initial Leak @ 15.0 "Hg = 0.004 cfm
Final Leak @ 6.0 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line Remarks
A-10	1642	859.212	3.45	1.35	1.35	4.0	213	225	249	33	76	77	199
9	1645	861.22	3.85	1.50	1.50	4.5	214	225	251	33	76	77	200
8	1648	863.34	3.85	1.50	1.50	4.5	216	225	251	34	76	77	203
7	1651	865.46	3.70	1.45	1.45	4.5	217	250	249	34	77	76	205
6	1654	867.56	3.85	1.50	1.50	4.5	218	255	251	35	78	76	207
5	1657	869.67	3.70	1.45	1.45	4.5	219	255	251	36	79	76	207
4	1700	871.80	3.60	1.40	1.40	4.5	218	249	251	36	80	76	209
3	1703	873.86	3.75	1.45	1.45	4.5	216	254	250	37	80	76	211
2	1706	875.96	3.65	1.45	1.45	4.5	216	253	250	38	81	76	212
2	1709	878.06	3.65	1.45	1.45	4.5	215	254	250	39	81	76	214
1	1712	880.15	3.20	1.35	1.35	4.5	214	255	250	40	81	76	215
1	1715	882.20	3.20	1.35	1.35	4.5	213	252	250	40	81	76	216
End	1718	884.205	—	—	—	—	—	—	—	—	—	—	—
B-10	1723	884.205	3.90	1.55	1.55	4.5	212	254	250	35	79	76	217
9	1726	886.34	3.95	1.55	1.55	5.0	211	248	250	38	80	76	217
8	1729	888.50	3.90	1.55	1.55	5.0	210	255	249	39	81	76	216
7	1732	890.69	3.70	1.45	1.45	5.0	210	257	250	39	81	77	217
6	1735	892.83	3.65	1.45	1.45	5.0	208	258	250	39	82	77	217

Pitot Tube Calibration Factor C_p 0.824
Volume Collected V_m 49.389 ft³
Water Collected V_w 167.5 ml
Time of Test T_t 72 min.
Stack Pressure P_s −1.60 "H₂O

Pitot Tube No. 4-1
Baro. Press. P_b 26.94 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 11.6 % CO 0.0
% O_2 7.6 % N_2 80.8
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 5-8
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.985 x 50.141

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 2-1

			Water Weight Gain		
Impinger 1	Final Weight	883.7		Impinger 1	118.2
	Initial Weight	765.5			
	Increase	118.2		Impinger 2	30.3
Impinger 2	Final Weight	761.8		Impinger 3	5.2
	Initial Weight	731.5			
	Increase	30.3		Impinger 4	1.2
			V_w =		
Impinger 3	Final Weight	742.2	g SO_2 =	Impinger 5	12.6
	Initial Weight	737.0	V_w =		
	Increase	5.2		Impinger 6	
Impinger 4	Final Weight	729.6		Impinger 7	
	Initial Weight	728.4			
	Increase	1.2	Filter No. A092	Total	167.5 = V_w
Impinger 5	Final Weight	949.7	P_b = 26.94	%CO_2 =	11.6
	Initial Weight	937.1	V_m = 49.389	%O_2 =	7.6
	Increase	12.6	V_w = 167.5	%CO =	0.0
			P_m = 1.433	%N_2 =	80.8
Impinger 6	Final Weight		Avg ΔP = 3.631	A_s =	9363
	Initial Weight			D_n =	0.154
	Increase		Avg$\sqrt{\Delta P}$ = 1.905	T_1 =	72
			C_p = 0.824		
Impinger 7	Final Weight		P_s = -1.60 "H_2O		26.82 "Hg
	Initial Weight		T_m = 79 °F		539 °R
	Increase		T_s = 211 °F		671 °R

Moisture Content: %M = 15.31 M_d = 0.8469 MW_d = 30.160 MW = 28.30

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 49.389 \left[\frac{26.94 + \frac{1.433}{13.6}}{79 + 460}\right] = \frac{43.740\ sft^3}{0.607\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 167.5 = 7.906 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{7.906}{43.740 + 7.906}$ x 100 = 15.31 %

V_s = 5123.8 x 0.824 $\sqrt{\frac{671}{26.82 \times 28.30}}$ x 1.905 = 7562 fpm

ACFM: 491,706

SCFM: 294,798

%I = $\frac{1.039 \times 43.740 \times 671}{0.8469 \times 26.82 \times 7562 \times 72 \times (0.154)^2}$ = 104.0 %

(P5) 12/6/06

%EA: 55.0

Run Number 1

Unit Stack

Date 30 November 2006

26 A FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line Remarks
B-S	1738	894.95	3.70	1.45	1.45	5.0	206	257	251	40	82	77	218
4	1741	897.07	3.65	1.45	1.45	5.0	205	258	250	41	82	77	219
3	1744	899.18	3.70	1.45	1.45	5.0	204	257	251	41	83	77	219
2	1747	901.30	3.55	1.40	1.40	5.0	203	257	250	43	83	78	220
2	1750	903.37	3.55	1.40	1.40	5.0	203	256	250	43	84	78	220
1	1753	905.46	3.20	1.25	1.25	4.5	201	256	248	42	84	78	220
1	1756	907.44	3.25	1.25	1.25	4.5	202	256	248	42	84	79	220
End	1759	909.353	—	—	—	—	—	—	—	—	—	—	—
All													

Job Number 06-057
Job Name ADA-ES Hardin, MT
Run Number 2
Unit STACK
Date 1 December 2006
Operator Mullins, Goldman
Sample Box No. 1-2 Meter Box No. 1-1

26A Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 29
Assumed Moisture % 14.8
Probe Length 9'
C Factor 3.55 to reference
Initial Leak @ 15.0 "Hg = 0.004 cfm
Final Leak @ 6.0 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF (V_m)	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line	Remarks
B-10	1509	86.726	3.65	1.30	1.30	4.0	202	230	248	25	74	74	172	
9	1512	88.80	3.55	1.25	1.25	4.0	201	235	250	27	74	74	170	
8	1515	90.85	3.60	1.25	1.25	4.0	201	238	251	27	74	74	171	
7	1518	92.79	3.65	1.30	1.30	4.0	201	238	250	27	75	74	169	
6	1521	94.78	3.60	1.25	1.25	4.0	201	238	250	27	76	74	168	
5	1524	96.77	3.70	1.30	1.30	4.5	202	238	250	27	76	74	167	
4	1527	98.78	3.70	1.30	1.30	4.5	203	238	250	29	77	74	166	
3	1530	100.77	3.60	1.25	1.25	4.0	202	239	251	28	77	74	167	
2	1533	102.72	3.60	1.25	1.25	4.0	201	241	252	28	78	74	167	orsat
2	1536	104.65	3.70	1.30	1.30	4.0	202	245	251	29	78	74	168	
1	1539	106.60	3.20	1.15	1.15	4.0	201	248	250	29	79	74	170	
1	1542	108.50	3.45	1.25	1.25	4.0	201	247	251	30	79	74	169	
End	1545	110.439	—	—	—	—	—	—	—	—	—	—	—	
A-10	1550	110.439	3.50	1.25	1.25	4.0	202	231	249	26	77	74	170	
9	1553	112.42	3.50	1.25	1.25	4.0	202	223	250	27	77	75	169	
8	1556	114.38	3.60	1.25	1.25	4.0	202	225	251	27	77	75	170	
7	1559	116.35	3.90	1.40	1.40	5.0	205	225	249	27	77	75	171	
6	1602	118.38	3.75	1.35	1.35	4.5	207	230	250	28	78	74	167	

Pitot Tube Calibration Factor C_p 0.824
Volume Collected V_m 47.095 ft^3
Water Collected V_w 157.8 ml
Time of Test T_t 72 min.
Stack Pressure P_s −1.80 "H_2O

Pitot Tube No. 4-1
Baro. Press. P_b 27.17 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 12.8 % CO 0.0
% O_2 6.7 % N_2 80.5
Area Stack A_s 9363 in^2

Barometer No. —
Probe Tip No. 5-8
Total Volume of Leak Checks After Start: 0 ft^3
V_m X Dry Gas Meter Calibration Factor 0.985 ✓ x 47.812

[Dry Gas Meter Reading ___ ft^3 - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 1-2

			Water Weight Gain		
Impinger 1	Final Weight	902.0		Impinger 1	136.8
	Initial Weight	765.2			
	Increase	136.8		Impinger 2	12.2
Impinger 2	Final Weight	745.4		Impinger 3	1.5
	Initial Weight	733.2			
	Increase	12.2		Impinger 4	0.2
Impinger 3	Final Weight	752.6	V_w =	Impinger 5	7.1
	Initial Weight	751.1	g SO_2 =		
	Increase	1.5	V_w =	Impinger 6	
Impinger 4	Final Weight	734.8		Impinger 7	
	Initial Weight	734.6			
	Increase	0.2		Total	157.8 = V_w
Impinger 5	Final Weight	956.7			
	Initial Weight	949.6			
	Increase	7.1			
Impinger 6	Final Weight				
	Initial Weight				
	Increase				
Impinger 7	Final Weight				
	Initial Weight				
	Increase				

FILTER # A112

P_b =	27.17	%CO_2 =	12.8
V_m =	47.095	%O_2 =	6.57
V_w =	157.8	%CO =	0.0
P_m =	1.281	%N_2 =	80.5
Avg ΔP =	3.615	A_s =	9363
		D_n =	0.154
Avg$\sqrt{\Delta P}$ =	1.900	T_1 =	72
C_p =	0.824		
P_s =	-1.80 H_2O		27.04 °Hg
T_m =	76 °F		536 °R
T_s =	204 °F		664 °R

Moisture Content: %M = 14.98 M_d = 0.8502 MW_d = 30.316 MW = 28.47

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 47.095 \left[\frac{27.17 + \frac{1.281}{13.6}}{76 + 460}\right] = \frac{42.281\ sft^3}{0.587\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 157.8 = 7.448 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{7.448}{42.281 + 7.448} \times 100 = 14.98\ \%$$

$$V_s = 5123.8 \times 0.824 \sqrt{\frac{664}{27.04 \times 28.47}} \times 1.900 = 7450 \text{ fpm}$$

ACFM: 484,409

SCFM: 297,054

$$\%I = \frac{1.039 \times 42.281 \times 664}{0.8502 \times 27.04 \times 7450 \times 72 \times (0.154)^2} = 99.7\ \%$$

%EA: 45.8

Run Number 2

Unit Stack

Date 1 December 2006

26 A FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line	Remarks
A-5	1605	120.45	3.70	1.30	1.30	4.5	207	223	249	29	78	74	167	
4	1608	122.47	3.75	1.30	1.30	4.5	208	225	250	29	78	74	167	
3	1611	124.47	3.60	1.30	1.30	4.5	208	226	251	28	78	74	167	
2	1614	126.48	4.05	1.45	1.45	5.0	208	228	250	28	79	74	165	
2	1617	128.58	4.00	1.45	1.45	5.0	210	229	251	28	79	74	164	
1	1620	130.70	3.20	1.15	1.15	4.0	208	230	250	28	79	74	164	
1	1623	132.68	3.20	1.15	1.15	4.0	205	228	250	28	79	74	164	
End	1626	134.538	—	—	—	—	—	—	—	—	—	—	—	
All														

Job Number 06-057
Job Name ADA-ES Hardin, MT
Run Number 3
Unit Stack
Date 2 December 2006
Operator Mullins, Jackson
Sample Box No. 2-1 Meter Box No. 1-1

26A Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 13
Assumed Moisture % 15
Probe Length 9'
C Factor 3.55 to reference
Initial Leak @ 15.0 "Hg = 0.004 cfm
Final Leak @ 5.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line Remarks
A-10	2025	389.900	3.50	1.25	1.25	4.0	212	226	250	16	74	75	107
9	2028	391.87	3.45	1.25	1.25	4.0	213	233	250	21	74	75	94
8	2031	393.84	3.50	1.25	1.25	4.0	213	245	250	22	75	75	92
7	2034	395.77	3.60	1.30	1.30	4.0	213	248	251	24	75	74	124
6	2037	397.73	3.50	1.25	1.25	4.0	213	247	250	24	76	74	141
5	2040	399.69	3.50	1.25	1.25	4.0	212	249	250	26	77	74	154
4	2043	401.61	3.50	1.25	1.25	3.5	212	248	250	26	78	74	166
3	2046	403.55	3.60	1.30	1.30	3.5	212	247	250	27	78	74	177
2	2049	405.48	3.50	1.25	1.25	3.5	213	246	250	27	79	74	186
2	2052	407.43	3.45	1.25	1.25	3.5	212	246	251	27	79	74	195
1	2055	409.35	2.90	1.05	1.05	3.5	211	246	250	28	80	74	201
1	2058	411.18	2.90	1.05	1.05	3.5	211	248	250	28	80	75	207
End	2101	412.983	—	—	—	—	—	—	—	—	—	—	—
B-10	2105	412.983	3.65	1.30	1.30	4.0	213	247	251	26	78	75	220
9	2108	414.96	3.60	1.30	1.30	4.0	214	246	250	28	79	75	223
8	2111	416.95	3.60	1.30	1.30	4.0	214	247	251	29	79	75	225
7	2114	418.94	3.60	1.30	1.30	4.0	214	246	249	30	80	75	227
6	2117	420.92	3.60	1.30	1.30	4.0	215	246	250	31	80	75	229 Orsat

Pitot Tube Calibration Factor C_p 0.824
Volume Collected V_m 45.665 ft³
Water Collected V_w 154.3 ml
Time of Test T_t 72 min.
Stack Pressure P_s −1.25 "H₂O

Pitot Tube No. 4-1
Baro. Press. P_b 27.55 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 13.2 % CO 0.0
% O_2 6.3 % N_2 80.5
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 5-8
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.985 X 46.360

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 2-1

Impinger 1	Final Weight	884.7		Impinger 1	115.0
	Initial Weight	769.7			
	Increase	115.0		Impinger 2	24.5
Impinger 2	Final Weight	753.6		Impinger 3	3.9
	Initial Weight	729.1			
	Increase	24.5		Impinger 4	0.7
Impinger 3	Final Weight	752.3	V_w = g SO_2 = V_w =	Impinger 5	10.2
	Initial Weight	748.4			
	Increase	3.9		Impinger 6	
Impinger 4	Final Weight	737.2	Filter No. A113	Impinger 7	
	Initial Weight	736.5			
	Increase	0.7		Total	154.3 = V_w
Impinger 5	Final Weight	968.4	P_b = 27.55	$\%CO_2$ = 13.2	
	Initial Weight	958.2	V_m = 45.665	$\%O_2$ = 6.3	
	Increase	10.2	V_w = 154.3	%CO = 0.0	
			P_m = 1.234	$\%N_2$ = 80.5	
Impinger 6	Final Weight		Avg ΔP = 3.431	A_n = 9363	
	Initial Weight			D_n = 0.154	
	Increase		Avg$\sqrt{\Delta P}$ = 1.851	T_1 = 72	
			C_p = 0.824		
Impinger 7	Final Weight		P_s = −1.25 "H_2O	27.46 "Hg	
	Initial Weight		T_m = 77 °F	537 °R	
	Increase		T_s = 213 °F	673 °R	

Moisture Content: %M = 14.93 M_d = 0.8507 MW_d = 30.364 MW = 28.52

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 45.665 \left[\frac{27.55 + \frac{1.234}{13.6}}{77 + 460}\right] = \frac{41.486}{0.576}\ \text{sft}^3\ \text{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 154.3 = 7.283 sft^3

$$\%\ \text{Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{7.283}{41.486 + 7.283} \times 100 = 14.93\ \%$$

$$V_s = 5123.8 \times 0.824 \sqrt{\frac{673}{27.46 \times 28.52}} \times 1.851 = 7244\ \text{fpm}$$

ACFM: 471,043

SCFM: 289,575

$$\%I = \frac{1.039 \times 41.486 \times 673}{0.8507 \times 27.46 \times 7244 \times 72 \times (0.154)^2} = 100.4\ \%$$

(B) 2/6/06

%EA: 41.9

Run Number 3

Unit Stack

Date 2 December 2006

26A FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line Remarks
5	2120	422.90	3.65	1.30	1.30	4.0	214	246	250	31	80	75	229
4	2123	424.87	3.65	1.30	1.30	4.0	214	246	249	31	81	75	230
3	2126	426.85	3.70	1.35	1.35	4.0	215	246	250	32	81	75	232
2	2129	428.85	3.45	1.25	1.25	4.0	214	246	250	33	81	75	233
2	2132	430.82	3.45	1.25	1.25	4.0	214	246	251	33	81	75	234
1	2135	432.76	2.70	0.96	0.96	3.6	212	246	250	34	81	75	234
1	2138	434.53	2.80	1.00	1.00	3.5	211	246	250	33	81	75	235
End	2141	436.260	—	—	—	—	—	—	—	—	—	—	—
All													

ORSAT ANALYSIS DATA FORM

Job #: 06-057
Job Name: ADA-ES
Location: Hardin, MT
Date: 12-1-06
Operator: Hefley

Sample Location: Stack
Analytical Method: 3
Sample Type: Single Point / Multi Point Grab / Integrated
Leak Check: Time: 5 min (≥ 4 minutes) Rate: 0.0
Ambient Air Check:

CO_2 - % Vol.	0.0
O_2 - % Vol.	20.9
N_2 - % Vol.	79.1

Run #: 1 (OH)
Run Time:

CO_2 - % Vol.	12.8	12.8	12.8	12.8
O_2 - % Vol.	6.2	6.2	6.3	6.3
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	81.0	81.0	80.9	80.9

Run #: 2
Run Time:

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	13.2	13.3	13.2	13.2
O_2 - % Vol.	6.4	6.3	6.4	6.4
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.4	80.4	80.4	80.4

Run #: 3
Run Time: 1755

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	13.3	13.3	13.3	13.3
O_2 - % Vol.	6.2	6.2	6.2	6.2
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 06-057

Job Name ADA-ES

Sampling Location Stack

Date 11/28/06 Time 0845-0900

Stack Height _____ ft.

Sampling Port Height Above Ground 123'-1½" ft.

	Port A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)					124 5/16"
Port & Wall Thickness (in.)	15 1/8"	15 1/8"			15 1/8"
Inside Stack Diameter (in.)					109 3/16"

Sampling Ports are 38 3 ft. 1½ in. (3.64 stack diameters) downstream from disturbance (inlet, constriction, bend, expansion)

Sampling Ports are _____ ft. _____ in. (>2.00 stack diameters) upstream from disturbance (outlet, constriction, bend, expansion)

Point Number	Percent Diameter	Distance from Ref. Point (decimal in.)	Distance from Ref. Point (fractional in.)	Port A $\Delta P/T_s/\alpha$	Port B $\Delta P/T_s/\alpha$	Port C $\Delta P/T_s/\alpha$	Port D $\Delta P/T_s/\alpha$
1	2.1	2.293	2 5/16"	2.40 12 14 5	3.00 12 21 0	/ /	/ /
2	6.7	7.316	7 5/16"	2.80 12 15 5	3.45 12 31 1	/ /	/ /
3	11.8	12.884	12 7/8"	2.80 12 16 3	3.50 12 41 0	/ /	/ /
4	17.7	19.326	19 5/16"	2.80 12 16 3	3.25 12 31 3	/ /	/ /
5	25.0	27.297	27 5/16"	2.80 12 16 0	3.20 12 31 7	/ /	/ /
6	35.6	38.871	38 7/8"	3.00 12 16 0	3.30 12 31 9	/ /	/ /
7	64.4	70.317	70 5/16"	3.10 12 15 9	3.20 12 31 11	/ /	/ /
8	75.0	81.891	81 7/8"	3.45 12 15 9	3.25 12 31 10	/ /	/ /
9	82.3	89.861	89 7/8"	3.40 12 15 10	3.30 12 13 10	/ /	/ /
10	88.2	96.303	96 5/16"	3.50 12 15 8	3.30 12 12 13	/ /	/ /
11	93.3	101.872	101 7/8"	3.20 12 12 8	3.10 12 12 11	/ /	/ /
12	97.9	106.895	106 7/8"	2.80 12 11 5	3.10 12 11 4	/ /	/ /
13				/ /	/ /	/ /	/ /
14				/ /	/ /	/ /	/ /
15				/ /	/ /	/ /	/ /
16				/ /	/ /	/ /	/ /
17				/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21				/ /	/ /	/ /	/ /
22				/ /	/ /	/ /	/ /
23				/ /	/ /	/ /	/ /
24				/ /	/ /	/ /	/ /

Pitot Tube No. 3-Z

C_p = 0.824

P_b = 26.99 "Hg

P_s = -2.20 "H_2O 26.83 "Hg

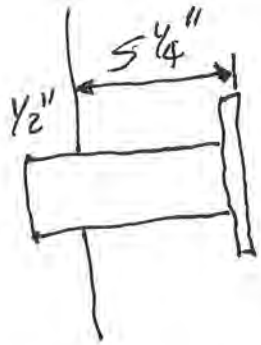
A_s = 9363 in.²

Average ΔP 3.125

Average $\Delta P^{1/2}$ 1.766

Average T_s 214 °F

Average α 6 degrees

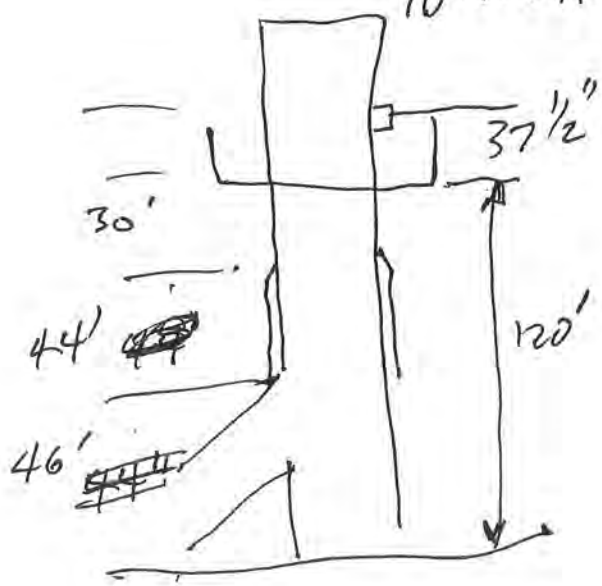


A	B
15 5/8"	15 5/8"
- 1/2"	- 1/2"
15 1/8"	15 1/8"

95
109
101
100
OC = 405"

OD = 128.916
− 19.750
ID = 109.166 = 109 3/16"

Wall
15.125
− 5.250
9.875
× 2
19.750 = 2 walls



123' 1 1/2"

AIR SAMPLING ASSOCIATES, INC.

Appendix E:

EPA Test Methods 5B and 202 (Particulate Matter) Analytical Data

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 06-057

Date Analysis Completed: 12/12/06

Project Name: ADA-ES

Unit Tested: Stack

Project Location: Hardin, MT

EPA Method 5/202

Run Number:	1	2	3
Particulate Matter on Filter (mg):	20.6	29.1	31.9
Particulate Matter in Front Wash (mg):	12.2	11.6	11.4
Total Particulate Matter in "Front-Half" – MF (mg):	32.8	40.7	43.3
Particulate Matter in "Back-Half" (mg):	43.4	37.2	12.2
Total Particulate Matter in Sample – MT (mg):	76.2	81.4	55.5

Billy J. Mullinax Jr
Analyst

Bill [illegible] **Date:** 1-17-07
Data Checked By

Version No. 1 5/30/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 5

Stack Filters

Project No. 06-057
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	12/05/06 1530	12/07/06 0855			
Desiccator Time Out	12/07/06 0855	12/07/06 1500			

Run No.	1	Filter No. A 114	Sample I.D.	
Filter & Particulate (g)	0.4018	0.4018 ✓		

Filter & Particulate Average (g) 0.4018
Initial Filter Weight (g) 0.3812
Total Particulate (mg) 20.6

Run No.	2	Filter No. A 115	Sample I.D.	
Filter & Particulate (g)	0.3993	0.3991 ✓		

Filter & Particulate Average (g) 0.3991
Initial Filter Weight (g) 0.3700
Total Particulate (mg) 29.1

Run No.	3	Filter No. A 116	Sample I.D.	
Filter & Particulate (g)	0.3999	0.3998 ✓		

Filter & Particulate Average (g) 0.3998
Initial Filter Weight (g) 0.3679
Total Particulate (mg) 31.9

Billy J. Mullins, Jr.
Analyst

AIR SAMPLING ASSOCIATES, INC.

Filter Weight Log
EPA Method 5

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
A105	10/2/06 0800	0.3801 10/12/06 1000	0.3801 10/13/06 0826				0.3801
A106	10/2/06 0800	0.3827 10/12/06 1001	0.3825 10/13/06 0827				0.3825
A107	10/2/06 0800	0.3808 10/12/06 1002	0.3810 10/13/06 0828				0.3810
A108	10/2/06 0800	0.3843 10/12/06 1003	0.3845 10/13/06 0829				0.3845
A109	10/2/06 0800	0.3872 10/12/06 1004	0.3873 10/13/06 0830				0.3873
A110	10/2/06 0800	0.3885 10/12/06 1005	0.3886 10/13/06 0831				0.3886
A112	10/2/06 0800	0.3833 10/12/06 1006	0.3832 10/13/06 0832				0.3832
A113	10/2/06 0800	0.3781 10/12/06 1007	0.3778 10/13/06 0833				0.3778
A114	10/2/06 0800	0.3814 10/12/06 1008	0.3812 10/13/06 0834				0.3812
A115	10/2/06 0800	0.3701 10/12/06 1009	0.3700 10/13/06 0835				0.3700
A116	10/2/06 0800	0.3678 10/12/06 1010	0.3679 10/13/06 0836				0.3679
A117	10/2/06 0800	0.3644 10/12/06 1011	0.3644 10/13/06 0837				0.3644
A118	10/2/06 0800	0.3636 11/20/06 1245	0.3635 11/21/06 0807				0.3635
A119	10/2/06 0800	0.3655 11/20/06 1246	0.3655 11/21/06 0808				0.3655
A120	10/2/06 0800	0.3616 11/20/06 1247	0.3615 11/21/06 0809				0.3615

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 5

Front Wash

Project No. 06-057
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	12/08/06 1650	12/11/06 0820	12/12/06 0810		
Desiccator Time Out	12/11/06 0815	12/12/06 0810	12/12/06 1525		

Run No.	1	Volume (ml)	125	Sample I.D.	
Final Weight (g)	104.2852	104.2788	104.2783 ✓		
Initial Weight (g)	104.2651	104.2651	104.2651		
Particulate Weight (g)					

Particulate Average (mg) 13.2
Less Acetone Blank (mg) 1.0
Total Particulate (mg) 12.2

Run No.	2	Volume (ml)	145	Sample I.D.	
Final Weight (g)	91.3758	91.3716	91.3715 ✓		
Initial Weight (g)	91.3588	91.3588	91.3588		
Particulate Weight (g)					

Particulate Average (mg) 12.7
Less Acetone Blank (mg) 1.1
Total Particulate (mg) 11.6

Run No.	3	Volume (ml)	175	Sample I.D.	
Final Weight (g)	104.3077	104.3031	104.3027 ✓		
Initial Weight (g)	104.2899	104.2899	104.2899		
Particulate Weight (g)					

Particulate Average (mg) 12.8
Less Acetone Blank (mg) 1.4
Total Particulate (mg) 11.4

Acetone Blank		Volume (ml)	200	Sample I.D.	
Final Weight (g)	103.5041	103.5043 ✓			
Initial Weight (g)	103.5020	103.5020			
Particulate Weight (g)					

Average (mg) 2.3
* mg/l 11.5

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

Billy J. Mullins Jr. Date: 12/12/06
Analyst

Version No.2 10/22/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 5

Front Half Tare Weights

Project No. 06-057 Location Hardin, MT
Project Name ADA-ES Unit Tested Stack

Desiccator Time In	12/05/06 1530	12/06/06 1640	12/07/06 0835		
Desiccator Time Out	12/06/06 1635	12/07/06 0835	12/08/06 0815		

Run No.	1			Sample I.D.	
Weight (g)	104.2659	104.2649	104.2651 ✓		

Run No.	2			Sample I.D.	
Weight (g)	91.3596	91.3585	91.3588 ✓		

Run No.	3			Sample I.D.	
Weight (g)	104.2909	104.2899	104.2899 ✓		

Acetone Blank				Sample I.D.	
Weight (g)	103.5029	103.5019	103.5020 ✓		

Billy J. Mullins, Jr.
Analyst

AIR SAMPLING ASSOCIATES, INC.

ADA-ES

Hardin, MT

202 – Back Half Particulate Analyses

Run No.	MeCl (mg)	MeCl Blank Correction (mg)	DI Water (mg)	DI Water Blank Correction (mg)	Less Chlorides (mg)	Less Sulfates (mg)	Total (mg)
1	0.4	0.0	80.0	60.5	0.3	16.8	43.4
2	1.0	0.2	73.5	54.3	0.3	17.0	37.2
3	0.5	0.0	38.9	19.7	0.3	7.2	12.2
Blank	0.8		15.1				

Methylene Chloride Rinse

Job Number	**06-4108**	**Run Date**	11/30/2006
Client Name	**Air Sampling Associates**		
Unit Name	**Hardin Stack**	Method: 202	

RUN 1	**BEAKER**	9612	**VOLUME**	ml	243	**AVERAGE**
Beaker + Particulate (g)		120.9275	120.9270			120.9273
Beaker Tare (g)		120.9269	120.9268			120.9269
Particulate Weight (g)		0.0006	0.0002			0.0004

RUN 2	**BEAKER**	9614	**VOLUME**	ml	252	**AVERAGE**
Beaker + Particulate (g)		109.5722	109.5717			109.5720
Beaker Tare (g)		109.5710	109.5710			109.5710
Particulate Weight (g)		0.0012	0.0007			0.0010

RUN 3	**BEAKER**	9616	**VOLUME**	ml	249	**AVERAGE**
Beaker + Particulate (g)		116.7404	116.7403			116.7404
Beaker Tare (g)		116.7400	116.7398			116.7399
Particulate Weight (g)		0.0004	0.0005			0.0005

Blank	**BEAKER**	9610	**VOLUME**	ml	266	**AVERAGE**
Beaker + Particulate (g)		108.6839	108.6834			108.6837
Beaker Tare (g)		108.6829	108.6829			108.6829
Particulate Weight (g)		0.0010	0.0005			0.0008

Analyst LB

FINAL REPORT

Started 12/4/2006
Completed 12/12/2006

DI Water Analysis (Back)

Job Number	**06-4108**	**Run Date**	11/30/2006
Client Name	**Air Sampling Associates**		
Unit Name	**Hardin Stack**	Method: 202	

RUN 1	**BEAKER**	9611	**VOLUME**	ml	770	**AVERAGE**
Beaker + Particulate (g)		106.7603	106.7608			106.7606
Beaker Tare (g)		106.6806	106.6805			106.6806
Particulate Weight (g)		0.0797	0.0803			0.0800

RUN 2	**BEAKER**	9613	**VOLUME**	ml	760	**AVERAGE**
Beaker + Particulate (g)		114.2443	114.2447			114.2445
Beaker Tare (g)		114.1712	114.1708			114.1710
Particulate Weight (g)		0.0731	0.0739			0.0735

RUN 3	**BEAKER**	9615	**VOLUME**	ml	760	**AVERAGE**
Beaker + Particulate (g)		108.6769	108.6774			108.6772
Beaker Tare (g)		108.6385	108.6380			108.6383
Particulate Weight (g)		0.0384	0.0394			0.0389

Blank	**BEAKER**	9609	**VOLUME**	ml	598	**AVERAGE**
Beaker + Particulate (g)		97.7328	97.7330			97.7329
Beaker Tare (g)		97.7179	97.7177			97.7178
Particulate Weight (g)		0.0149	0.0153			0.0151

Analyst LB

FINAL REPORT

Started 12/4/2006
Completed 12/12/2006

Chloride **06-4108**

	Sample No.	Lab Results, ug	Blank, ug	Final Results, mg Corrected to NH4Cl
Run 1	9611	7.29	202	-0.294
Run 2	9613	8.84	202	-0.291
Run 3	9615	0.842	202	-0.304
Blank	9609	202		

Sulfate **06-4108**

	Sample No.	Sample Volume, ml	Lab Volume, ml	Lab Results, ug/ml	Blank, ug/ml	Final Results, mg
Run 1	4108-1	770	20	61.8	0.115	16.814
Run 2	4108-2	760	20	63.3	0.115	16.999
Run 3	4108-3	760	20	27	0.115	7.233
Blank	4108-4	598	20	0.115		0.024

AIR SAMPLING ASSOCIATES, INC.

Appendix F:

EPA Test Methods 17, 26A, and CTM027 (Particulate Matter, Hydrogen Halides & Halogens, and) Analytical Data – SDA Inlet Duct

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 06-057

Date Analysis Completed: 12/8/06

Project Name: ADA-ES

Unit Tested: SDA Inlet

Project Location: Hardin, MT

EPA Method 17

Run Number:	1	2	3
Particulate Matter on Filter (mg):	4,554.7	5,056.9	4,302.8
Particulate Matter in Front Wash (mg):	1,450.0	2,170.0	2,060.0
Total Particulate Matter in "Front-Half" – MF (mg):	6,004.7	7,226.9	6,362.8
Particulate Matter in "Back-Half" (mg):	—	—	—
Total Particulate Matter in Sample – MT (mg):	—	—	—

Billy J. Mullins, Jr.
Analyst

Bill Hyp **Date:** 1-17-07
Data Checked By

Version No. 1 5/30/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 17

Stack Filters

Project No. 06-057
Project Name ADA-ES

Location Hardin, MT
Unit Tested SDA Inlet

Desiccator Time In	12/05/06 1530	12/07/06 0905	12/07/06 1505	12/08/06 0835
Desiccator Time Out	12/07/06 0900	12/07/06 1505 BM 12/7/06	12/08/06 0830	12/08/06 1510

Run No. 1	Filter No. ~~60~~ 59			Sample I.D.
Filter & Particulate (g)	7.6861	7.6821	7.6707	7.6707 ✓

Filter & Particulate Average (g) 7.6707
Initial Filter Weight (g) 3.1160
Total Particulate (mg) 4,554.7

Run No. 2	Filter No. 60			Sample I.D.
Filter & Particulate (g)	7.7854	7.7825	7.7784	7.7779 ✓

Filter & Particulate Average (g) 7.7779
Initial Filter Weight (g) 2.7210
Total Particulate (mg) 5,056.9

Run No. 3	Filter No. 61			Sample I.D.
Filter & Particulate (g)	7.0722	7.0680	7.0563	7.0558 ✓

Filter & Particulate Average (g) 7.0558
Initial Filter Weight (g) 2.7530
Total Particulate (mg) 4,302.8

Billy J. Mullins, Jr.
Analyst

AIR SAMPLING ASSOCIATES, INC.

Thimble Tare Weight Log
EPA Method 17

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
45		2.7941	2.7944				2.7944
	9/29/06	10/2/06	10/3/06				
	1200	1635	1100				
46		2.7987	2.7990				2.7990
		10/2/06	10/3/06				
		1636	1101				
47		2.5514	2.5514				2.5514
		10/2/06	10/3/06				
		1637	1102				
48		2.7781	2.7785				2.7785
		10/2/06	10/3/06				
		1638	1103				
49		2.7795	2.7799				2.7799
		10/2/06	10/3/06				
		1639	1104				
50		2.6485	2.6487				2.6487
		10/2/06	10/3/06				
		1640	1105				
51		2.8600	2.8605				2.8605
		10/2/06	10/3/06				
		1641	1106				
52		2.8470	2.8474				2.8474
		10/2/06	10/3/06				
		1642	1107				
53		2.7349	2.7352				2.7352
		10/2/06	10/3/06				
		1643	1108				
54		3.5794	3.5795				3.5795
	11/20/06	11/21/06	11/22/06				
	1360	1350	0745				
55		2.8785	2.8788				2.8788
		11/21/06	11/22/06				
		1351	0746				
56		2.4725	2.4724				2.4724
		11/21/06	11/22/06				
		1352	0747				
57		2.9916	2.9911				2.9911
		11/21/06	11/22/06				
		1353	0748				
58		3.4660	3.4656				3.4656
		11/21/06	11/22/06				
		1354	0749				
59		3.1165	3.1160				3.1160
		11/21/06	11/22/06				
		1355	0750				

AIR SAMPLING ASSOCIATES, INC.

Thimble Tare Weight Log
EPA Method 17

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
60	11/20/06 1300	2.7215 11/21/06 1358	2.7210 ✓ 11/22/06 0752				2.7210
61	11/20/06 1300	2.7531 11/21/06 1359	2.7530 ✓ 11/22/06 07531				2.7530
62	11/20/06 1300	2.7516 11/21/06 1400	2.7514 ✓ 11/22/06 0754				2.7514
63	11/20/06 1300	2.7846 11/21/06 1401	2.7848 ✓ 11/22/06 0755				2.7848
64	11/20/06 1300	2.9993 11/21/06 1402	2.9992 ✓ 11/22/06 0756				2.9992
65	11/20/06 1300	2.6385 11/21/06 1403	2.6381 ✓ 11/22/06 0757				2.6381
66	11/20/06 1300	2.8663 11/21/06 1404	2.8660 ✓ 11/22/06 0800				2.8660
67	11/20/06 1300	2.9442 11/21/06 1404	2.9439 ✓ 11/22/06 0801				2.9439
68	11/20/06 1300	2.5183 11/21/06 1405	2.5182 ✓ 11/22/06 0802				2.5182
69	11/20/06 1300	2.7293 11/21/06 1406	2.7291 ✓ 11/22/06 0803				2.7291
70	11/20/06 1300	2.5250 11/21/06 1407	2.5248 ✓ 11/22/06 0804				2.5248
71	11/20/06 1300	2.4725 11/21/06 1408	2.4721 ✓ 11/22/06 0805				2.4721
72	11/20/06 1300	2.7991 11/21/06 1409	2.7988 ✓ 11/22/06 0806				2.7988
73	11/20/06 1300	3.1339 11/21/06 1410	3.1336 ✓ 11/22/06 0807				3.1336
74	11/20/06 1300	2.8562 11/21/06 1410	2.8561 ✓ 11/22/06 0808				2.8561

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SEVERN TRENT STL

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ANALYTICAL REPORT

REVISED

PROJECT NO. 06-057

Hardin, Montana SDA Inlet Duct

Lot #: H6L110106

Bill Hefley

Air Sampling Associates, Inc.
407-2B Holford's Prairie Road
Lewisville, TX 75056

SEVERN TRENT LABORATORIES, INC.

Terry Wasmund
Project Manager

January 22, 2007

ANALYTICAL METHODS SUMMARY

H6L110106

PARAMETER	ANALYTICAL METHOD
Ammonia Nitrogen	MCAWW 350.3
Bromine Emissions	KNOX 0050/26A Mod
Chlorine Emissions	KNOX 0050/26A Mod
Hydrogen Bromide Emissions	KNOX 0050/26A Mod
Hydrogen Chloride Emissions	KNOX 0050/26A Mod
Hydrogen Fluoride Emissions	KNOX 0050/26A Mod
Particulate Emissions	CFR60A 5

References:

CFR60A "Test Methods", 40 CFR, Part 60, Appendix A, July 1, 1993.

KNOX Severn Trent Laboratories Knoxville, Facility Standard Operating Procedure.

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

QC DATA ASSOCIATION SUMMARY

H6L110106

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	AIR	CFR60A 5		6349313	
002	AIR	KNOX 0050/26A Mod		6361375	6362029
	AIR	KNOX 0050/26A Mod		6363147	6363102
	AIR	KNOX 0050/26A Mod		6361376	6362031
003	WATER	MCAWW 350.3		6348460	6348277
004	AIR	KNOX 0050/26A Mod		6356347	6356196
	AIR	KNOX 0050/26A Mod		6356350	6356197
	AIR	KNOX 0050/26A Mod		6356352	6356198
005	AIR	CFR60A 5		6349313	
006	AIR	KNOX 0050/26A Mod		6361375	
	AIR	KNOX 0050/26A Mod		6363147	
	AIR	KNOX 0050/26A Mod		6361376	
007	WATER	MCAWW 350.3		6348460	6348277
008	AIR	KNOX 0050/26A Mod		6356347	6356196
	AIR	KNOX 0050/26A Mod		6356350	6356197
	AIR	KNOX 0050/26A Mod		6356352	6356198
009	AIR	CFR60A 5		6349313	
010	AIR	KNOX 0050/26A Mod		6361375	
	AIR	KNOX 0050/26A Mod		6363147	
	AIR	KNOX 0050/26A Mod		6361376	
011	WATER	MCAWW 350.3		6348460	6348277
012	AIR	KNOX 0050/26A Mod		6356347	6356196
	AIR	KNOX 0050/26A Mod		6356350	6356197
	AIR	KNOX 0050/26A Mod		6356352	6356198
013	AIR	KNOX 0050/26A Mod		6361375	
	AIR	KNOX 0050/26A Mod		6363098	
	AIR	KNOX 0050/26A Mod		6361376	
014	WATER	MCAWW 350.3		6348460	6348277

(Continued on next page)

QC DATA ASSOCIATION SUMMARY

H6L110106

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
015	AIR	KNOX 0050/26A Mod		6356347	6356196
	AIR	KNOX 0050/26A Mod		6356350	6356197
	AIR	KNOX 0050/26A Mod		6356352	6356198
016	AIR	KNOX 0050/26A Mod		6361375	
	AIR	KNOX 0050/26A Mod		6363098	
	AIR	KNOX 0050/26A Mod		6361376	

SAMPLE SUMMARY

H6L110106

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
JK7J5	001	HARDIN SDA INLET DUCT RUN 1 ACE FW	11/30/06	17:18
JK7J7	002	HARDIN SDA INLET DUCT RUN 1 0.1N H2SO4	11/30/06	16:40
JK7J8	003	HARDIN SDA INLET DUCT RUN 1 0.1N H2SO4	11/30/06	16:40
JK7KA	004	HARDIN SDA INLET DUCT RUN 1 0.1N NAOH	11/30/06	16:46
JK7KE	005	HARDIN SDA INLET DUCT RUN 2 ACE FW	12/01/06	15:58
JK7KG	006	HARDIN SDA INLET DUCT RUN 2 0.1N H2SO4	12/01/06	15:40
JK7KK	007	HARDIN SDA INLET DUCT RUN 2 0.1N H2SO4	12/01/06	15:40
JK7KN	008	HARDIN SDA INLET DUCT RUN 2 0.1N NAOH	12/01/06	15:42
JK7KQ	009	HARDIN SDA INLET DUCT RUN 3 ACE FW	12/02/06	08:07
JK7KT	010	HARDIN SDA INLET DUCT RUN 3 0.1N H2SO4	12/02/06	08:32
JK7KV	011	HARDIN SDA INLET DUCT RUN 3 0.1N H2SO4	12/02/06	08:32
JK7KW	012	HARDIN SDA INLET DUCT RUN 3 0.1N NAOH	12/02/06	08:36
JK7K0	013	HARDIN STACK & SDA INLET RB 0.1N H2SO4 BLANK	12/01/06	15:53
JK7K1	014	HARDIN STACK & SDA INLET RB 0.1N H2SO4 BLANK	12/01/06	15:53
JK7K2	015	HARDIN STACK & SDA INLET RB 0.1N NAOH BLANK	12/01/06	15:51
JK7K4	016	HARDIN STACK & SDA INLET RB D.I.WATER BLANK	12/01/06	15:49

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

PROJECT NARRATIVE
H6L110106
Revised
01/19/07

NOTE: This data package has been revised to include ammonia results that were inadvertently omitted from the original package.

The results reported herein are applicable to the samples submitted for analysis only.

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The original chain of custody documentation is included with this report.

Sample Receipt

The chain of custody documentation shows that container number 2 was retained by ASAI. However, container number 2 was received.

Custody seals were not present upon sample receipt at STL Knoxville.

Subcontract

The following analyses were performed by the STL North Canton Laboratory (NELAP Accrediting Authority: FLDOH; Lab ID E87225), 4101 Shuffel Drive, NW, North Canton, OH 44720, (330) 497-9396, Opal Johnson, Laboratory Director: Ammonia Nitrogen (MCAWW 350.3)

Quality Control and Data Interpretation

Unless otherwise noted, all holding times and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Samples were analyzed for chloride (Cl^-), fluoride (F^-) and bromide (Br^-) by ion chromatography using SOP number KNOX-WC-005 (based on EPA methods 9056, 9057 and 26A). Results for the H_2SO_4 impinger samples were reported as total µg hydrogen chloride (HCl), total µg hydrogen fluoride (HF) and total µg hydrogen bromide (HBr).

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. #05-043-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. #000687, Indiana DOH Cert. #C-TN-02, Iowa DNR Cert. #375, Kansas DHE Cert. #E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Ohio EPA VAP Cert. #CL0059, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. #68-00576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. # QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, West Virginia DEP Cert. #345, Wisconsin DNR Lab ID #998044300, Naval Facilities Engineering Service Center and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

PROJECT NARRATIVE
H6L110106
Revised
01/19/07

Results for the NaOH impinger samples were reported as total µg chlorine (Cl_2), total µg hydrogen fluoride (HF) and total µg hydrogen bromine (Br_2).

Please note that the halogen fluorine (F) is not expected to be present in stack gas as diatomic fluorine (F_2). Fluorine reacts with water vapor in a favored reaction that forms HF: $2F_2 + 2H_2O \rightarrow 4HF + O_2$. Therefore, the results from the H_2SO_4 impingers and the NaOH impingers are reported as HF, and no F_2 is expected in the samples.

Results were calculated using the following equations:

$$\text{HX, ug} = \left(X^-, \text{ug/mL}\right) * \left(\text{Sample Volume, mL}\right) * \left(\frac{\text{Molecular Weight HX}}{\text{Molecular Weight } X^-}\right) * \left(\text{Bench Dilution}\right)$$

$$Cl_2, Br_2 \text{ ug} = \left(X^-, \text{ug/mL}\right) * \left(\text{Sample Volume, mL}\right) * \left(\text{Bench Dilution}\right)$$

NaOH impinger samples were treated with sodium thiosulfate ($Na_2S_2O_3$) prior to the final analysis in order to convert residual hypochlorite (OCl^-) to chloride ion. The presence of hypobromite is also assumed to be converted to bromide under these conditions.

Note: A sample volume of 100 mL was used to convert the results to total µg for the method blanks, laboratory control samples, and client reagent blanks.

For demonstration of analytical method performance on these samples, STL Knoxville analyzed matrix spikes (MS) and matrix spike duplicates (MSD). Acceptable recoveries of these spikes demonstrate that quantitation from this particular stack gas matrix is accurate and acceptable. Impinger samples containing 0.1N H_2SO4 and 0.1N NaOH display matrix interference effects causing poor method performance and possibly giving unreliable data unless the interference is removed. Therefore, the samples were diluted in the lab to remove the interference for a more accurate chloride response. The samples may be analyzed at increasing dilutions along with matrix spikes until matrix spikes recover from the sample within laboratory control limits. The ion chromatograph

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. #05-043-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. #000687, Indiana DOH Cert. #C-TN-02, Iowa DNR Cert. #375, Kansas DHE Cert. #E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Ohio EPA VAP Cert. #CL0059, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. #68-00576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. # QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, West Virginia DEP Cert. #345, Wisconsin DNR Lab ID #998044300, Naval Facilities Engineering Service Center and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

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calibration range used to quantitate the sample results permits a standard ten-fold sample dilution while supporting the reporting limit with the low calibration standard.

The dilution factor reported on the sample result form does not represent the bench dilution factor. It is actually the combination of factors required by the method to convert the anion reporting limit and method detection limit from µg/mL to total µg. It may appear to be elevated because it includes the total sample volume in mL.

All holding times and QC criteria were met.

The pH for several samples was adjusted prior to analysis. Refer to the STL Knoxville Source Air Analysis Sample Information form in the Raw Data section of the deliverable.

The measurement of the mass of particulate matter trapped by the probe rinses derived from M-5 sampling trains was performed using SOP number KNOX-WC-0006 (based on EPA Methods 0050 and 5). 150 mL beakers are carefully inspected and tare weighed to constant weight. The acetone probe rinse solution is evaporated to dryness, and then weighed to constant weight to determine the total particulate mass collected in the rinse.

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Sample Data Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110106-002 Work Order #...: JK7J7 Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	430	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4303.61		MDL.....: 215		
Hydrogen chloride	ND	1750	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 17483.3		MDL.....: 734		
Hydrogen fluoride	ND	448	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 4475.47		MDL.....: 224		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110106-004 Work Order #...: JK7KA Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	295	ug	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 2950		MDL.....: 70.8		
Chlorine	216 B	295	ug	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 2950		MDL.....: 124		
Hydrogen fluoride	ND	311	ug	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 3106.5		MDL.....: 155		

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110106-006 Work Order #...: JK7KG Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	405	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4050.46		MDL.....: 203		
Hydrogen chloride	ND	1650	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 16454.87		MDL.....: 691		
Hydrogen fluoride	ND	421	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 4212.21		MDL.....: 211		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110106-008 **Work Order #...:** JK7KN **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	280	ug	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 2800		MDL.....: 67.2		
Chlorine	**151 B**	**280**	**ug**	**KNOX 0050/26A Mod**	**12/19/06**	**6356350**
		Dilution Factor: 2800		MDL.....: 118		
Hydrogen fluoride	ND	295	ug	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 2948.55		MDL.....: 147		

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110106-010 **Work Order #...:** JK7KT **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	368	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 3675.79		MDL.....: 184		
Hydrogen chloride	ND	1490	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 14932.79		MDL.....: 627		
Hydrogen fluoride	ND	382	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 3822.58		MDL.....: 191		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110106-012 **Work Order #...:** JK7KW **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	270	ug	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 2700		MDL.....: 64.8		
Chlorine	**159 B**	**270**	**ug**	**KNOX 0050/26A Mod**	**12/19/06**	**6356350**
		Dilution Factor: 2700		MDL.....: 113		
Hydrogen fluoride	ND	284	ug	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 2843.24		MDL.....: 142		

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less thao RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK & SDA INLET RB 0.1N H2SO4 BLANK

General Chemistry

Lot-Sample #...: H6L110106-013 Work Order #...: JK7K0 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	101	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 1012.61		MDL.....: 50.6		
Hydrogen chloride	ND	206	ug	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 2056.86		MDL.....: 86.4		
Hydrogen fluoride	ND	105	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 1053.05		MDL.....: 52.7		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK & SDA INLET RB 0.1N NAOH BLANK

General Chemistry

Lot-Sample #...: H6L110106-015 **Work Order #...:** JK7K2 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	100	ug	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 1000		MDL.....: 24.0		
Chlorine	**47.4 B**	**100**	**ug**	**KNOX 0050/26A Mod**	**12/19/06**	**6356350**
		Dilution Factor: 1000		MDL.....: 42.0		
Hydrogen fluoride	ND	105	ug	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 1053.05		MDL.....: 52.7		

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK & SDA INLET RB D.I.WATER BLANK

General Chemistry

Lot-Sample #...: H6L110106-016 Work Order #...: JK7K4 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	101	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 1012.61		MDL.....: 50.6		
Hydrogen chloride	ND	103	ug	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 1028.43		MDL.....: 43.2		
Hydrogen fluoride	ND	105	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 1053.05		MDL.....: 52.7		

METHOD BLANK REPORT

General Chemistry

Client Lot #...: H6L110106 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		Work Order #: JL21F1AA		MB Lot-Sample #:	H6L220000-347	
	ND	10.0	ug	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 100				
Chlorine		Work Order #: JL21W1AA		MB Lot-Sample #:	H6L220000-350	
	ND	10.0	ug	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 100				
Hydrogen bromide		Work Order #: JL69F1AA		MB Lot-Sample #:	H6L270000-375	
	ND	10.1	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 101.2				
Hydrogen chloride		Work Order #: JL8TM1AA		MB Lot-Sample #:	H6L290000-098	
	ND	10.3	ug	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 102.8				
Hydrogen chloride		Work Order #: JL9AA1AA		MB Lot-Sample #:	H6L290000-147	
	ND	10.3	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 102.8				
Hydrogen fluoride		Work Order #: JL69G1AA		MB Lot-Sample #:	H6L270000-376	
	ND	10.5	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 105.3				
Hydrogen fluoride		Work Order #: JL22H1AA		MB Lot-Sample #:	H6L220000-352	
	ND	10.5	ug	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 105.3				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: H6L110106 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#:JL21F1AC-LCS/JL21F1AD-LCSD LCS Lot-Sample#: H6L220000-347					
	103	(90 - 110)			KNOX 0050/26A Mod	12/19/06	6356347
	101	(90 - 110)	1.9	(0-20)	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 100					
Chlorine		WO#:JL21W1AC-LCS/JL21W1AD-LCSD LCS Lot-Sample#: H6L220000-350					
	103	(90 - 110)			KNOX 0050/26A Mod	12/19/06	6356350
	104	(90 - 110)	1.4	(0-20)	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 100					
Hydrogen bromide		WO#:JL69F1AC-LCS/JL69F1AD-LCSD LCS Lot-Sample#: H6L270000-375					
	96	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6361375
	99	(90 - 110)	2.6	(0-20)	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 101.2					
Hydrogen chloride		WO#:JL8TM1AC-LCS/JL8TM1AD-LCSD LCS Lot-Sample#: H6L290000-098					
	100	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6363098
	101	(90 - 110)	1.2	(0-20)	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 102.8					
Hydrogen chloride		WO#:JL9AA1AC-LCS/JL9AA1AD-LCSD LCS Lot-Sample#: H6L290000-147					
	100	(90 - 110)			KNOX 0050/26A Mod	12/28/06	6363147
	101	(90 - 110)	0.82	(0-20)	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 102.8					
Hydrogen fluoride		WO#:JL22H1AC-LCS/JL22H1AD-LCSD LCS Lot-Sample#: H6L220000-352					
	102	(90 - 110)			KNOX 0050/26A Mod	12/19/06	6356352
	102	(90 - 110)	0.37	(0-20)	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 105.3					
Hydrogen fluoride		WO#:JL69G1AC-LCS/JL69G1AD-LCSD LCS Lot-Sample#: H6L270000-376					
	100	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6361376
	100	(90 - 110)	0.51	(0-20)	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Lot-Sample #...: H6L110106 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#:JL21F1AC-LCS/JL21F1AD-LCSD LCS Lot-Sample#: H6L220000-347						
	75.0	77.2	ug	103		KNOX 0050/26A Mod	12/19/06	6356347
	75.0	75.7	ug	101	1.9	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 100						
Chlorine		WO#:JL21W1AC-LCS/JL21W1AD-LCSD LCS Lot-Sample#: H6L220000-350						
	75.0	77.0	ug	103		KNOX 0050/26A Mod	12/19/06	6356350
	75.0	78.0	ug	104	1.4	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 100						
Hydrogen bromide		WO#:JL69F1AC-LCS/JL69F1AD-LCSD LCS Lot-Sample#: H6L270000-375						
	76.0	73.1	ug	96		KNOX 0050/26A Mod	12/18/06	6361375
	76.0	75.0	ug	99	2.6	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 101.2						
Hydrogen chloride		WO#:JL8TM1AC-LCS/JL8TM1AD-LCSD LCS Lot-Sample#: H6L290000-098						
	77.1	77.2	ug	100		KNOX 0050/26A Mod	12/18/06	6363098
	77.1	78.1	ug	101	1.2	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 102.8						
Hydrogen chloride		WO#:JL9AA1AC-LCS/JL9AA1AD-LCSD LCS Lot-Sample#: H6L290000-147						
	77.1	77.1	ug	100		KNOX 0050/26A Mod	12/28/06	6363147
	77.1	77.8	ug	101	0.82	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 102.8						
Hydrogen fluoride		WO#:JL22H1AC-LCS/JL22H1AD-LCSD LCS Lot-Sample#: H6L220000-352						
	79.0	80.9	ug	102		KNOX 0050/26A Mod	12/19/06	6356352
	79.0	80.6	ug	102	0.37	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 105.3						
Hydrogen fluoride		WO#:JL69G1AC-LCS/JL69G1AD-LCSD LCS Lot-Sample#: H6L270000-376						
	79.0	78.8	ug	100		KNOX 0050/26A Mod	12/18/06	6361376
	79.0	79.2	ug	100	0.51	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 105.3						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H6L110106 **Matrix.....:** AIR
Date Sampled...: 11/30/06 **Date Received..:** 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#: JK7KA1AE-MS/JK7KA1AF-MSD MS Lot-Sample #: H6L110106-004					
	101	(75 - 125)			KNOX 0050/26A Mod	12/19/06	6356347
	93	(75 - 125)	8.4	(0-20)	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 2950					
Chlorine		WO#: JK7KA1AG-MS/JK7KA1AH-MSD MS Lot-Sample #: H6L110106-004					
	95	(75 - 125)			KNOX 0050/26A Mod	12/19/06	6356350
	95	(75 - 125)	0.35	(0-20)	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 2950					
Hydrogen bromide		WO#: JK7J71AE-MS/JK7J71AF-MSD MS Lot-Sample #: H6L110106-002					
	104	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6361375
	105	(75 - 125)	0.69	(0-20)	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4303.					
Hydrogen chloride		WO#: JK7J71AJ-MS/JK7J71AK-MSD MS Lot-Sample #: H6L110106-002					
	99	(75 - 125)			KNOX 0050/26A Mod	12/28/06	6363147
	99	(75 - 125)	0.59	(0-20)	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 17483					
Hydrogen fluoride		WO#: JK7J71AG-MS/JK7J71AH-MSD MS Lot-Sample #: H6L110106-002					
	105	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6361376
	107	(75 - 125)	1.7	(0-20)	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 4475.					
Hydrogen fluoride		WO#: JK7KA1AJ-MS/JK7KA1AK-MSD MS Lot-Sample #: H6L110106-004					
	102	(75 - 125)			KNOX 0050/26A Mod	12/19/06	6356352
	105	(75 - 125)	2.5	(0-20)	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 3106.					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H6L110106 **Matrix.....:** AIR
Date Sampled...: 11/30/06 **Date Received..:** 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#: JK7KA1AE-MS/JK7KA1AF-MSD				MS Lot-Sample #: H6L110106-004		
	ND	590	596	ug	101		KNOX 0050/26A	12/19/06	6356347
	ND	590	548	ug	93	8.4	KNOX 0050/26A	12/19/06	6356347
			Dilution Factor: 2950						
Chlorine			WO#: JK7KA1AG-MS/JK7KA1AH-MSD				MS Lot-Sample #: H6L110106-004		
	216	590	779	ug	95		KNOX 0050/26A	12/19/06	6356350
	216	590	776	ug	95	0.35	KNOX 0050/26A	12/19/06	6356350
			Dilution Factor: 2950						
Hydrogen bromide			WO#: JK7J71AE-MS/JK7J71AF-MSD				MS Lot-Sample #: H6L110106-002		
	ND	861	898	ug	104		KNOX 0050/26A	12/18/06	6361375
	ND	861	904	ug	105	0.69	KNOX 0050/26A	12/18/06	6361375
			Dilution Factor: 4303.						
Hydrogen chloride			WO#: JK7J71AJ-MS/JK7J71AK-MSD				MS Lot-Sample #: H6L110106-002		
	ND	3500	3470	ug	99		KNOX 0050/26A	12/28/06	6363147
	ND	3500	3450	ug	99	0.59	KNOX 0050/26A	12/28/06	6363147
			Dilution Factor: 17483						
Hydrogen fluoride			WO#: JK7J71AG-MS/JK7J71AH-MSD				MS Lot-Sample #: H6L110106-002		
	ND	895	943	ug	105		KNOX 0050/26A	12/18/06	6361376
	ND	895	959	ug	107	1.7	KNOX 0050/26A	12/18/06	6361376
			Dilution Factor: 4475.						
Hydrogen fluoride			WO#: JK7KA1AJ-MS/JK7KA1AK-MSD				MS Lot-Sample #: H6L110106-004		
	ND	621	634	ug	102		KNOX 0050/26A	12/19/06	6356352
	ND	621	650	ug	105	2.5	KNOX 0050/26A	12/19/06	6356352
			Dilution Factor: 3106.						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 ACE FW

General Chemistry

Lot-Sample #...: H6L110106-001 Work Order #...: JK7J5 Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	1450	0.50	mg	CFR60A 5	12/15-12/18/06	6349313

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 ACE FW

General Chemistry

Lot-Sample #...: H6L110106-005 **Work Order #...:** JK7KE **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**2170**	**0.50**	**mg**	**CFR60A 5**	**12/15-12/18/06**	**6349313**
		Dilution Factor: 1		MDL.....: 0.50		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 ACE FW

General Chemistry

Lot-Sample #...: H6L110106-009 **Work Order #...:** JK7KQ **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**2060**	**0.50**	**mg**	**CFR60A 5**	**12/15-12/18/06**	**6349313**
		Dilution Factor: 1		MDL.....: 0.50		

Sample Receipt Documentation

HBL110106

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 4
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Waomund
Run No.: 1	Test Method: EPA 17 / 26A / CTM027	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Hydrogen Halides	Halogens	
Cont. No. 1	11-30-06	1715	—	1	Thimble No. 59	X				
Cont. No. 2	11-30-06	1718	—	1	ACE F.W.	X				
Cont. No. 3	11-30-06	1640	0.1N H_2SO_4	1	Imps 1 & 2 + Rinse		X	X		
Cont. No. 4	11-30-06	1646	0.1N NaOH	1	Imps 3 & 4 + Rinse				X	
Rec'd temp. Ambient, No custody seals										
MFH 12-6-06, 9 containers Fedex# 696769459203		9199								
		9214								
		9133								
		9177								
		9166								
		9188								
		9225								

Special Instructions: Cont No. 1 & No. 2 retained by ASAI. Split Container No. 3 for IC analysis to determine NH_3. HF and HBr are primary analytes for the 26A analysis.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For ~~30~~ 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	11-30-06	1718	1. Relinquished By: Bill Mullins	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Raybance	12/3/06	1330	3. Relinquished By: Alan D. Raybance	12/4/06	0820

Comments: [illegible] 12/4/06 0820 [illegible] 12/5/06 1400

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Rec'd BY: Matthew T. Howard, 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

HGL110106

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 2 of 4	Analysis
Address: 8100 Southpark Way	Unit No.: Hardis SDA Inlet Duct	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: EPA 17/26A/CTM027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Halogen/halids	Halogens
Cont. No. 1	12-1-06	1556	—	1	Thimble No. 60	X			
Cont. No. 2	12-1-06	1558	—	1	ACE F.W.	X			
Cont. No. 3	12-1-06	1540	0.1N H_2SO_4	1	Imps 1 & 2 + Rinse		X	X	
Cont. No. 4	12-1-06	1542	0.1N NaOH	1	Imps 3 & 4 + Rinse			X	

Special Instructions: Cont. Nos. 1 and 2 retained by ASAI. Split Cont. No. 3 for IC analysis to determine NH_3. HF and HBr are primary analytes for the EPA 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1558	1. Relinquished By: Bill Mullins	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [signature]	12/4/06	0820	[signature]	12/5/06	1400

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Rec'd By: Matthew F. Howard, 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

HGL 110106

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 3 of 4	
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville	
City: Littleton, State: CO, Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 3	Test Method: EPA 17 / 26A / CTM027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Hydrogen Halides	Halogens	
Cont. 1	12-2-06	0801	—	1	Thimble No. 61	X				
Cont. 2 /	12-2-06	0807	—	1	ACE FW.	X				
Cont. 3 //	12-2-06	0832	0.1N H_2SO_4	1	Imps 1 & 2 + Rinse		X	X		
Cont. 4 /	12-2-06	0836	0.1N NaOH	1	Imps 3 & 4 + Rinse				X	

Special Instructions: Container No. 1 and 2 retained by ASAI. Split Cont. No. 3 for IC analysis to determine NH_3. HF and HBr are primary analytes for the 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyby	12-2-06	0836	1. Relinquished By: Bill Hyby	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [signature]	12/4/06	0820	[signature]	12/5/06	1400

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Rec'd By: Matthew J. Howard 12-6-06, 09:15

H6L110106

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 4 of 4	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin Stack & SDA Inlet	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: Reagent Blanks	Test Method: EPA 17/26A/CTM027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Hydrogen Halides	Halogens	
Cont. No. 6	12-1-06	1553	—	1	0.1 N H_2SO_4 Blank		X	X		
Cont. No. 7	12-1-06	1551	—	1	0.1 N NaOH Blank				X	
Cont. No. 8	12-1-06	1549	—	1	D.I. Water Blank			X	X	
Cont. No. 9	12-1-06	1547	—	1	ACE Blank	X				

Special Instructions: Split Cont. No. 6 for IC analysis to determine NH_3. HF and HBR ~~and~~ are the primary analytes for EPA 26A. Cont. No. 9 retained by ASAI.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1553	1. Relinquished By: Bill Mullins	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [signature]	12/4/06	0820	[signature]	12/5/06	1400

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Rec'd By: Matthew Howard, 12-6-06, 09:15

STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: Air Sampling Associates **Project:** _____ **Lot Number:** 1H6L110106

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times) MPH 12-6-06	✓	✓		☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☑ 1g Other:	4a 1g Cont. No. 2 was mcid. The CoC says that Cont. 1 and 2 were retained by ASAI.
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?	✓			☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?			✓	If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: _____ PM Instructions: _____

Sample Receiving Associate: Matthew J Howard Date: 12-6-06

QA026R18.doc, 1/30/06

Wet Chemistry

Sample Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 ACE FW

General Chemistry

Lot-Sample #...: H6L110106-001 Work Order #...: JK7J5 Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	1450	0.50	mg	CFR60A 5	12/15-12/18/06	6349313

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110106-002 Work Order #...: JK7J7 Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	430	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4303.61		MDL.....: 215		
Hydrogen chloride	ND	1750	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 17483.3		MDL.....: 734		
Hydrogen fluoride	ND	448	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 4475.47		MDL.....: 224		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110106-004 Work Order #...: JK7KA Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	295	ug	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 2950		MDL.....: 70.8		
Chlorine	216 B	295	ug	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 2950		MDL.....: 124		
Hydrogen fluoride	ND	311	ug	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 3106.5		MDL.....: 155		

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 ACE FW

General Chemistry

Lot-Sample #...: H6L110106-005 Work Order #...: JK7KE Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	2170	0.50	mg	CFR60A 5	12/15-12/18/06	6349313

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110106-006 Work Order #...: JK7KG Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	405	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4050.46		MDL.....: 203		
Hydrogen chloride	ND	1650	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 16454.87		MDL.....: 691		
Hydrogen fluoride	ND	421	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 4212.21		MDL.....: 211		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110106-008 Work Order #...: JK7KN Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	280	ug	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 2800		MDL.....: 67.2		
Chlorine	151 B	280	ug	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 2800		MDL.....: 118		
Hydrogen fluoride	ND	295	ug	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 2948.55		MDL.....: 147		

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 ACE FW

General Chemistry

Lot-Sample #...: H6L110106-009 Work Order #...: JK7KQ Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	2060	0.50	mg	CFR60A 5	12/15-12/18/06	6349313

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110106-010 Work Order #...: JK7KT Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	368	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 3675.79		MDL.....: 184		
Hydrogen chloride	ND	1490	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 14932.79		MDL.....: 627		
Hydrogen fluoride	ND	382	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 3822.58		MDL.....: 191		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110106-012 Work Order #...: JK7KW Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	270	ug	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 2700		MDL.....: 64.8		
Chlorine	159 B	270	ug	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 2700		MDL.....: 113		
Hydrogen fluoride	ND	284	ug	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 2843.24		MDL.....: 142		

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK & SDA INLET RB 0.1N H2SO4 BLANK

General Chemistry

Lot-Sample #...: H6L110106-013 Work Order #...: JK7K0 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	101	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 1012.61		MDL.....: 50.6		
Hydrogen chloride	ND	206	ug	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 2056.86		MDL.....: 86.4		
Hydrogen fluoride	ND	105	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 1053.05		MDL.....: 52.7		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK & SDA INLET RB 0.1N NAOH BLANK

General Chemistry

Lot-Sample #...: H6L110106-015 Work Order #...: JK7K2 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	100	ug	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 1000		MDL.....: 24.0		
Chlorine	**47.4 B**	**100**	**ug**	**KNOX 0050/26A Mod**	**12/19/06**	**6356350**
		Dilution Factor: 1000		MDL.....: 42.0		
Hydrogen fluoride	ND	105	ug	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 1053.05		MDL.....: 52.7		

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK & SDA INLET RB D.I.WATER BLANK

General Chemistry

Lot-Sample #...: H6L110106-016 **Work Order #...:** JK7K4 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	101	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 1012.61		MDL.....: 50.6		
Hydrogen chloride	ND	103	ug	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 1028.43		MDL.....: 43.2		
Hydrogen fluoride	ND	105	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 1053.05		MDL.....: 52.7		

QC Summary

METHOD BLANK REPORT

General Chemistry

Client Lot #...: H6L110106 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		Work Order #: JL21F1AA		MB Lot-Sample #:	H6L220000-347	
	ND	10.0	ug	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 100				
Chlorine		Work Order #: JL21W1AA		MB Lot-Sample #:	H6L220000-350	
	ND	10.0	ug	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 100				
Hydrogen bromide		Work Order #: JL69F1AA		MB Lot-Sample #:	H6L270000-375	
	ND	10.1	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 101.2				
Hydrogen chloride		Work Order #: JL8TM1AA		MB Lot-Sample #:	H6L290000-098	
	ND	10.3	ug	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 102.8				
Hydrogen chloride		Work Order #: JL9AA1AA		MB Lot-Sample #:	H6L290000-147	
	ND	10.3	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 102.8				
Hydrogen fluoride		Work Order #: JL69G1AA		MB Lot-Sample #:	H6L270000-376	
	ND	10.5	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 105.3				
Hydrogen fluoride		Work Order #: JL22H1AA		MB Lot-Sample #:	H6L220000-352	
	ND	10.5	ug	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 105.3				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: H6L110106 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#:JL21F1AC-LCS/JL21F1AD-LCSD LCS Lot-Sample#: H6L220000-347					
	103	(90 - 110)			KNOX 0050/26A Mod	12/19/06	6356347
	101	(90 - 110)	1.9	(0-20)	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 100					
Chlorine		WO#:JL21W1AC-LCS/JL21W1AD-LCSD LCS Lot-Sample#: H6L220000-350					
	103	(90 - 110)			KNOX 0050/26A Mod	12/19/06	6356350
	104	(90 - 110)	1.4	(0-20)	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 100					
Hydrogen bromide		WO#:JL69F1AC-LCS/JL69F1AD-LCSD LCS Lot-Sample#: H6L270000-375					
	96	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6361375
	99	(90 - 110)	2.6	(0-20)	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 101.2					
Hydrogen chloride		WO#:JL8TM1AC-LCS/JL8TM1AD-LCSD LCS Lot-Sample#: H6L290000-098					
	100	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6363098
	101	(90 - 110)	1.2	(0-20)	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 102.8					
Hydrogen chloride		WO#:JL9AA1AC-LCS/JL9AA1AD-LCSD LCS Lot-Sample#: H6L290000-147					
	100	(90 - 110)			KNOX 0050/26A Mod	12/28/06	6363147
	101	(90 - 110)	0.82	(0-20)	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 102.8					
Hydrogen fluoride		WO#:JL22H1AC-LCS/JL22H1AD-LCSD LCS Lot-Sample#: H6L220000-352					
	102	(90 - 110)			KNOX 0050/26A Mod	12/19/06	6356352
	102	(90 - 110)	0.37	(0-20)	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 105.3					
Hydrogen fluoride		WO#:JL69G1AC-LCS/JL69G1AD-LCSD LCS Lot-Sample#: H6L270000-376					
	100	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6361376
	100	(90 - 110)	0.51	(0-20)	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Lot-Sample #...: H6L110106 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#:JL21F1AC-LCS/JL21F1AD-LCSD			LCS Lot-Sample#: H6L220000-347		
	75.0	77.2	ug	103		KNOX 0050/26A Mod	12/19/06	6356347
	75.0	75.7	ug	101	1.9	KNOX 0050/26A Mod	12/19/06	6356347
			Dilution Factor: 100					
Chlorine			WO#:JL21W1AC-LCS/JL21W1AD-LCSD			LCS Lot-Sample#: H6L220000-350		
	75.0	77.0	ug	103		KNOX 0050/26A Mod	12/19/06	6356350
	75.0	78.0	ug	104	1.4	KNOX 0050/26A Mod	12/19/06	6356350
			Dilution Factor: 100					
Hydrogen bromide			WO#:JL69F1AC-LCS/JL69F1AD-LCSD			LCS Lot-Sample#: H6L270000-375		
	76.0	73.1	ug	96		KNOX 0050/26A Mod	12/18/06	6361375
	76.0	75.0	ug	99	2.6	KNOX 0050/26A Mod	12/18/06	6361375
			Dilution Factor: 101.2					
Hydrogen chloride			WO#:JL8TM1AC-LCS/JL8TM1AD-LCSD			LCS Lot-Sample#: H6L290000-098		
	77.1	77.2	ug	100		KNOX 0050/26A Mod	12/18/06	6363098
	77.1	78.1	ug	101	1.2	KNOX 0050/26A Mod	12/18/06	6363098
			Dilution Factor: 102.8					
Hydrogen chloride			WO#:JL9AA1AC-LCS/JL9AA1AD-LCSD			LCS Lot-Sample#: H6L290000-147		
	77.1	77.1	ug	100		KNOX 0050/26A Mod	12/28/06	6363147
	77.1	77.8	ug	101	0.82	KNOX 0050/26A Mod	12/28/06	6363147
			Dilution Factor: 102.8					
Hydrogen fluoride			WO#:JL22H1AC-LCS/JL22H1AD-LCSD			LCS Lot-Sample#: H6L220000-352		
	79.0	80.9	ug	102		KNOX 0050/26A Mod	12/19/06	6356352
	79.0	80.6	ug	102	0.37	KNOX 0050/26A Mod	12/19/06	6356352
			Dilution Factor: 105.3					
Hydrogen fluoride			WO#:JL69G1AC-LCS/JL69G1AD-LCSD			LCS Lot-Sample#: H6L270000-376		
	79.0	78.8	ug	100		KNOX 0050/26A Mod	12/18/06	6361376
	79.0	79.2	ug	100	0.51	KNOX 0050/26A Mod	12/18/06	6361376
			Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H6L110106 **Matrix.....:** AIR
Date Sampled...: 11/30/06 **Date Received..:** 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#: JK7KA1AE-MS/JK7KA1AF-MSD MS Lot-Sample #: H6L110106-004					
	101	(75 - 125)			KNOX 0050/26A Mod	12/19/06	6356347
	93	(75 - 125)	8.4	(0-20)	KNOX 0050/26A Mod	12/19/06	6356347
		Dilution Factor: 2950					
Chlorine		WO#: JK7KA1AG-MS/JK7KA1AH-MSD MS Lot-Sample #: H6L110106-004					
	95	(75 - 125)			KNOX 0050/26A Mod	12/19/06	6356350
	95	(75 - 125)	0.35	(0-20)	KNOX 0050/26A Mod	12/19/06	6356350
		Dilution Factor: 2950					
Hydrogen bromide		WO#: JK7J71AE-MS/JK7J71AF-MSD MS Lot-Sample #: H6L110106-002					
	104	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6361375
	105	(75 - 125)	0.69	(0-20)	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4303.					
Hydrogen chloride		WO#: JK7J71AJ-MS/JK7J71AK-MSD MS Lot-Sample #: H6L110106-002					
	99	(75 - 125)			KNOX 0050/26A Mod	12/28/06	6363147
	99	(75 - 125)	0.59	(0-20)	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 17483					
Hydrogen fluoride		WO#: JK7J71AG-MS/JK7J71AH-MSD MS Lot-Sample #: H6L110106-002					
	105	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6361376
	107	(75 - 125)	1.7	(0-20)	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 4475.					
Hydrogen fluoride		WO#: JK7KA1AJ-MS/JK7KA1AK-MSD MS Lot-Sample #: H6L110106-004					
	102	(75 - 125)			KNOX 0050/26A Mod	12/19/06	6356352
	105	(75 - 125)	2.5	(0-20)	KNOX 0050/26A Mod	12/19/06	6356352
		Dilution Factor: 3106.					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H6L110106 Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#: JK7KA1AE-MS/JK7KA1AF-MSD				MS Lot-Sample #: H6L110106-004		
	ND	590	596	ug	101		KNOX 0050/26A	12/19/06	6356347
	ND	590	548	ug	93	8.4	KNOX 0050/26A	12/19/06	6356347
			Dilution Factor: 2950						
Chlorine			WO#: JK7KA1AG-MS/JK7KA1AH-MSD				MS Lot-Sample #: H6L110106-004		
	216	590	779	ug	95		KNOX 0050/26A	12/19/06	6356350
	216	590	776	ug	95	0.35	KNOX 0050/26A	12/19/06	6356350
			Dilution Factor: 2950						
Hydrogen bromide			WO#: JK7J71AE-MS/JK7J71AF-MSD				MS Lot-Sample #: H6L110106-002		
	ND	861	898	ug	104		KNOX 0050/26A	12/18/06	6361375
	ND	861	904	ug	105	0.69	KNOX 0050/26A	12/18/06	6361375
			Dilution Factor: 4303.						
Hydrogen chloride			WO#: JK7J71AJ-MS/JK7J71AK-MSD				MS Lot-Sample #: H6L110106-002		
	ND	3500	3470	ug	99		KNOX 0050/26A	12/28/06	6363147
	ND	3500	3450	ug	99	0.59	KNOX 0050/26A	12/28/06	6363147
			Dilution Factor: 17483						
Hydrogen fluoride			WO#: JK7J71AG-MS/JK7J71AH-MSD				MS Lot-Sample #: H6L110106-002		
	ND	895	943	ug	105		KNOX 0050/26A	12/18/06	6361376
	ND	895	959	ug	107	1.7	KNOX 0050/26A	12/18/06	6361376
			Dilution Factor: 4475.						
Hydrogen fluoride			WO#: JK7KA1AJ-MS/JK7KA1AK-MSD				MS Lot-Sample #: H6L110106-004		
	ND	621	634	ug	102		KNOX 0050/26A	12/19/06	6356352
	ND	621	650	ug	105	2.5	KNOX 0050/26A	12/19/06	6356352
			Dilution Factor: 3106.						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Raw Data

Anions

STL Knoxville IC Initial Calibration Data Review / Narrative Checklist
Methods: 300.0, 9056, 9057 and 26A, SOP: KNOX-WC-0005, Rev. 8

(ICS-1500)

Analysis Date:	10/18/06	File ID:	J18-LOWLEVEL-FCLNO2BRNO3-101806

Initial Calibration Review Items	N/A	Yes	No	If No, why is data reportable?	2nd √
1. Were at least 5 levels of each analyte analyzed?		✓			✓
2. Is low level standard concentration ≤ RL?		✓			✓
3. Are the correlation coefficients (r) ≥0.995; r^2≥0.990?		✓			✓
4. For method 300.0, was the calibration curve processed using linear reqression?	✓				NA
5. For manual integrated standards, are before/after chromatograms provided with initials/date/reason?	✓			Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system	NA

Analyst: CWK **Date:** 10/19/06

Comments:

Range: 0.075 - 2.0 mg/L

- 2nd order calibration using peak hgt. vs amount.

LOW LEVEL

2nd Level Reviewer: DOwhal **Date:** 10/19/06

Comments:

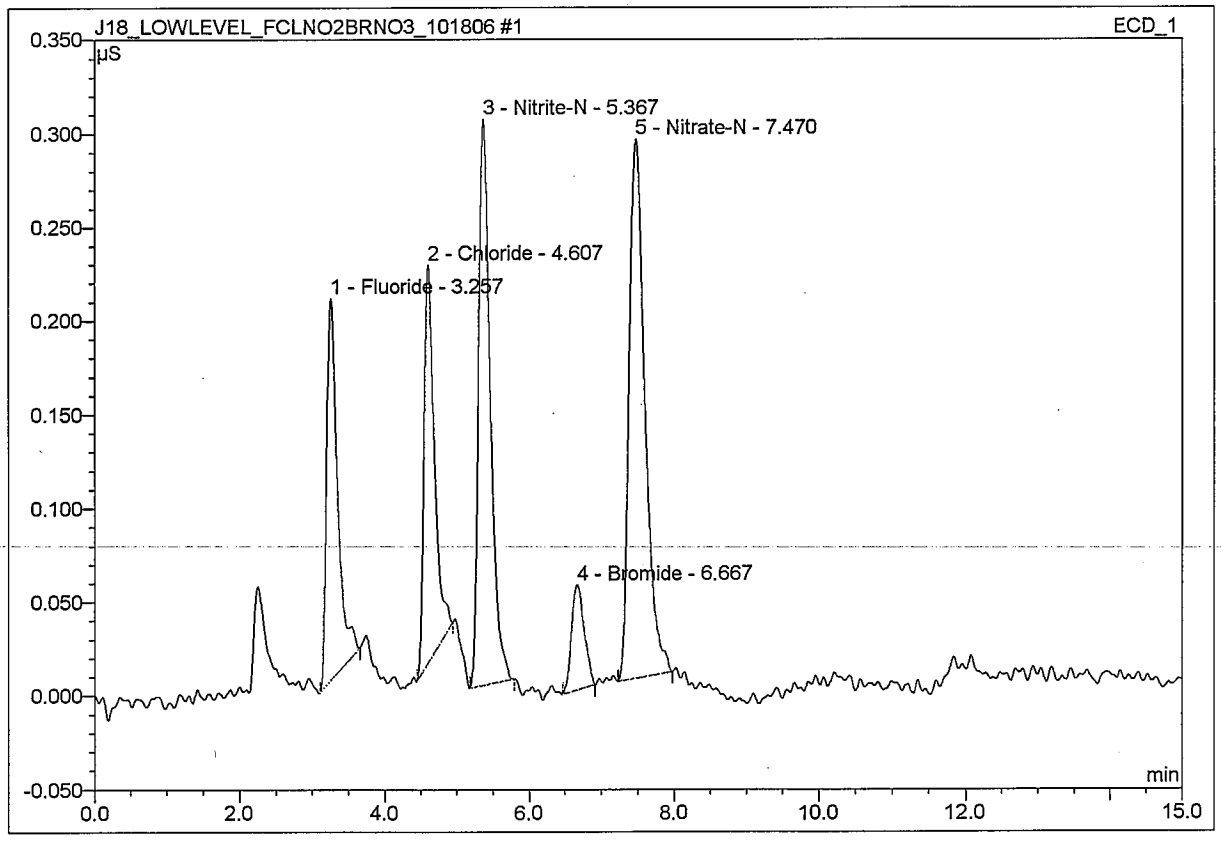
Cal std (5) = ICWS-8919 (CL)

peak height = Ø + 2.19733(.9966) + Ø.033578(.9966)²
" " = Ø + 2.1899 + Ø.0334
" " = 2.223

Scanned 10/19/06 DKW

1 CAL STD #1 ICWS-8915

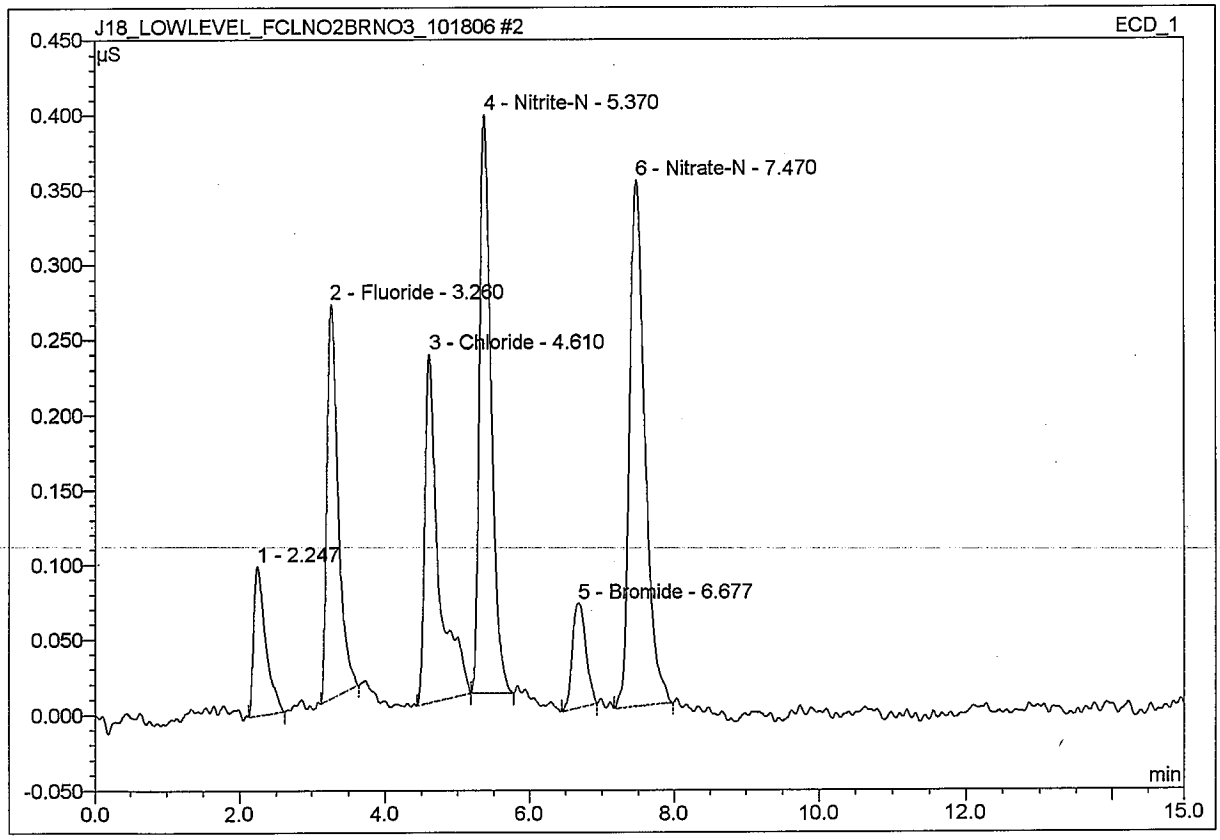
Sample Name:	**CAL STD #1 ICWS-8915**	*Injection Volume:*	**50.0**
Vial Number:	**1292**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 9:14**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.26	Fluoride	0.20347	0.035	16.69	0.0752	BMB
2	4.61	Chloride	0.21212	0.036	16.87	0.0964	BMB
3	5.37	Nitrite-N	0.30167	0.057	26.98	0.0791	BMB
4	6.67	Bromide	0.05610	0.011	5.39	0.0791	BMB
5	7.47	Nitrate-N	0.28758	0.072	34.07	0.0828	BMB

2 CAL STD #2 ICWS-8916

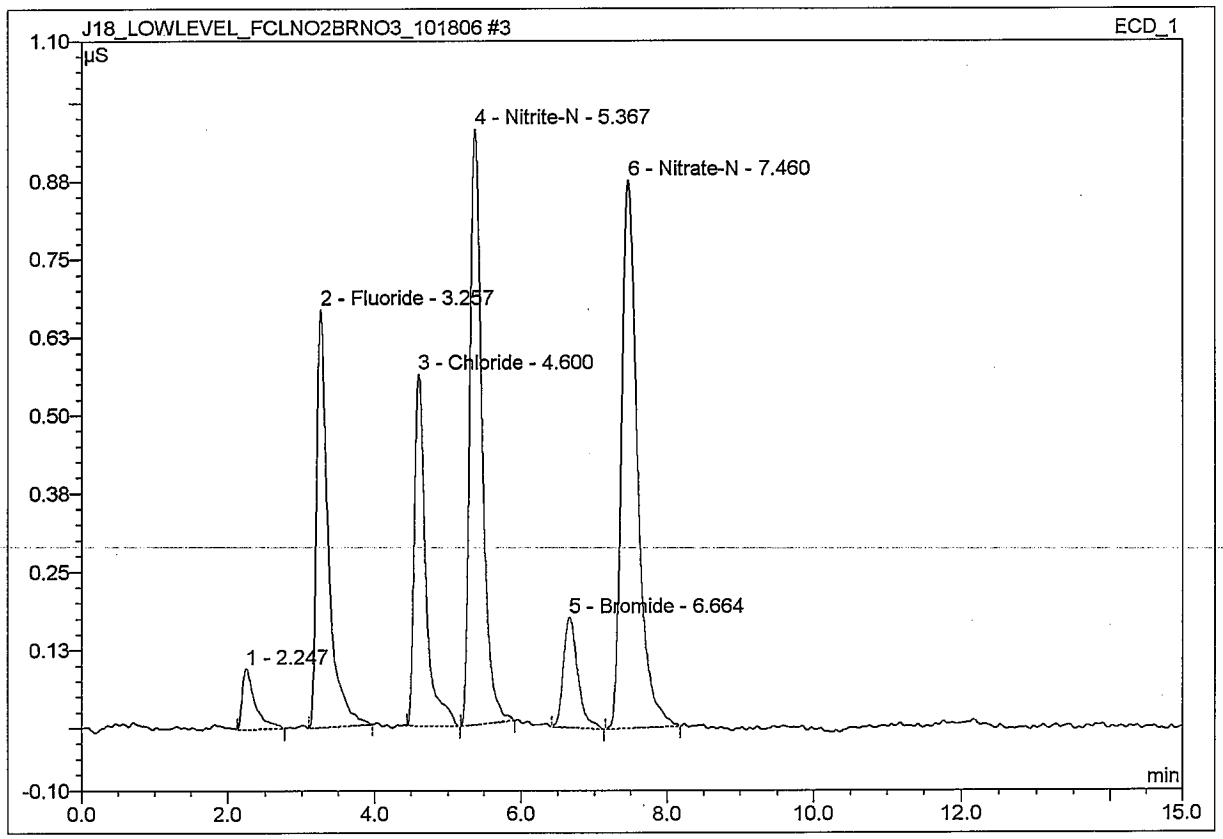
Sample Name:	**CAL STD #2 ICWS-8916**	*Injection Volume:*	**50.0**
Vial Number:	**1293**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 9:32**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.25	n.a.	0.09910	0.019	6.45	n.a.	BMB
2	3.26	Fluoride	0.26277	0.046	15.73	0.0970	BMB
3	4.61	Chloride	0.23228	0.052	17.83	0.1055	BMB
4	5.37	Nitrite-N	0.38584	0.072	24.74	0.1012	BMB
5	6.68	Bromide	0.06928	0.015	5.09	0.0977	BMB
6	7.47	Nitrate-N	0.35086	0.088	30.16	0.1009	BMB

3 CAL STD #3 ICWS-8917

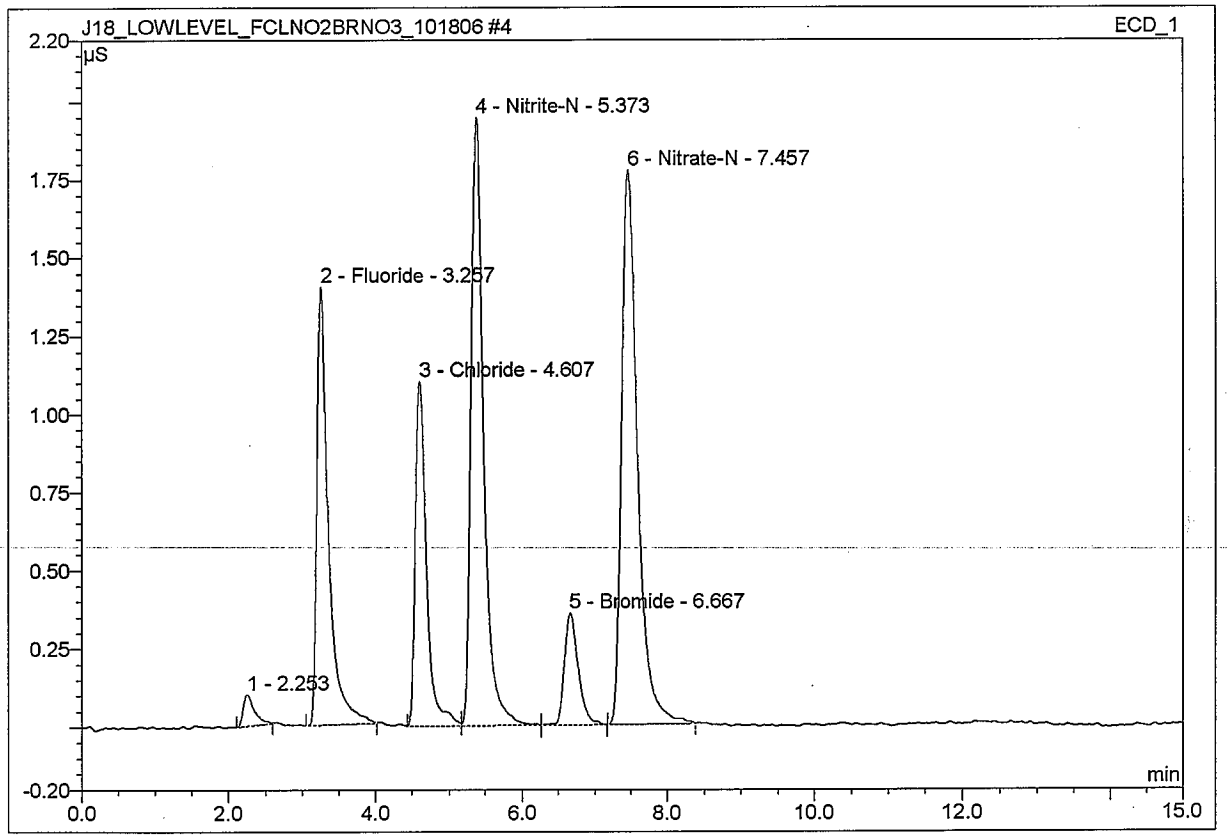
Sample Name:	**CAL STD #3 ICWS-8917**	*Injection Volume:*	**50.0**
Vial Number:	**1293**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 9:49**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.25	n.a.	0.09667	0.019	2.79	n.a.	BMB
2	3.26	Fluoride	0.66838	0.127	18.21	0.2438	BMB
3	4.60	Chloride	0.56206	0.103	14.73	0.2548	BMB
4	5.37	Nitrite-N	0.95211	0.184	26.44	0.2484	BMB
5	6.66	Bromide	0.17667	0.040	5.79	0.2488	BMB
6	7.46	Nitrate-N	0.87649	0.223	32.04	0.2502	BMB

4 CAL STD #4 ICWS-8918

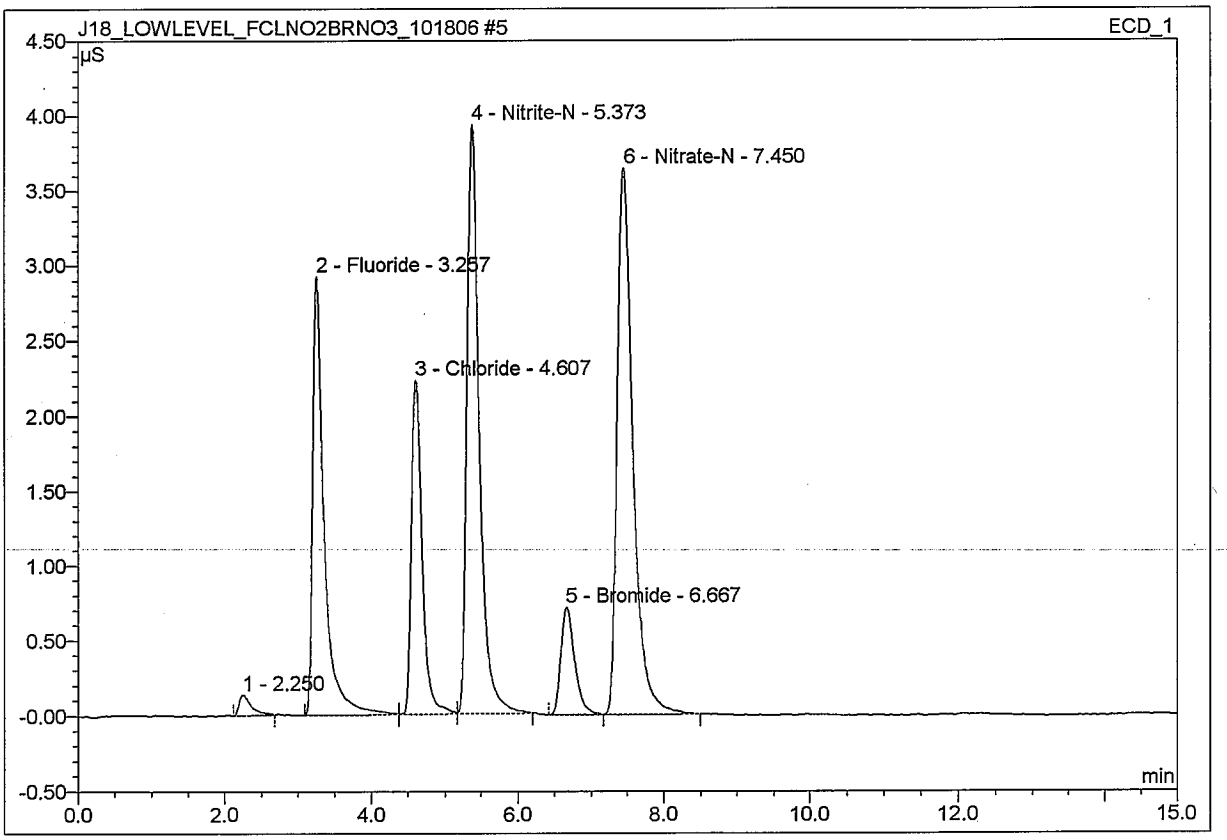
Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 10:07**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.25	n.a.	0.10012	0.018	1.29	n.a.	BMB
2	3.26	Fluoride	1.39754	0.256	18.63	0.4996	BMB
3	4.61	Chloride	1.09898	0.191	13.89	0.4964	BM
4	5.37	Nitrite-N	1.94194	0.385	27.97	0.5022	M
5	6.67	Bromide	0.35570	0.078	5.68	0.4998	MB
6	7.46	Nitrate-N	1.76858	0.448	32.55	0.4985	BMB

5 CAL STD #5 ICWS-8919

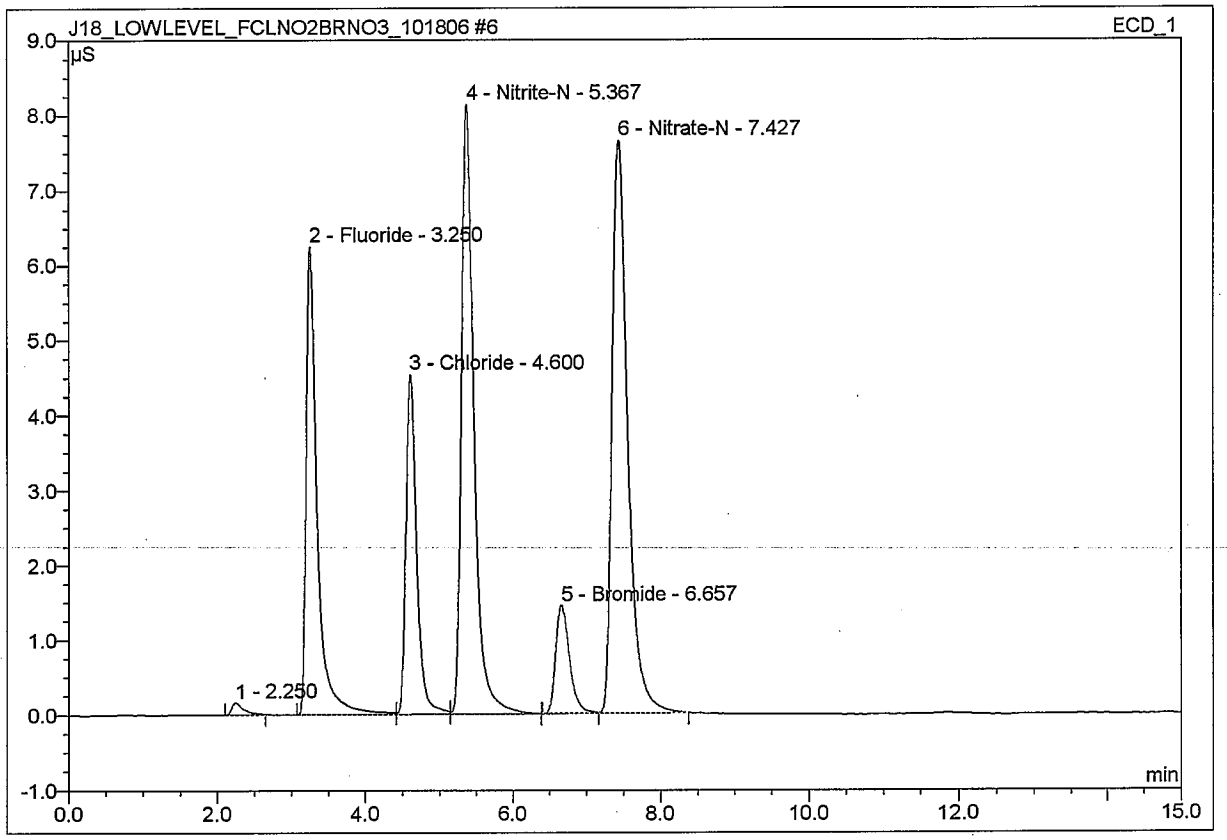
Sample Name:	**CAL STD #5 ICWS-8919**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 10:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.25	n.a.	0.13527	0.026	0.94	n.a.	BMB
2	3.26	Fluoride	2.91620	0.530	19.16	1.0032	BM
3	4.61	Chloride ✓	2.22320	0.373	13.49	0.9966	M
4	5.37	Nitrite-N	3.92501	0.773	27.95	0.9983	MB
5	6.67	Bromide	0.71491	0.156	5.62	1.0005	Ru
6	7.45	Nitrate-N	3.63765	0.908	32.83	0.9998	BMB

6 CAL STD #6 ICWS-8920

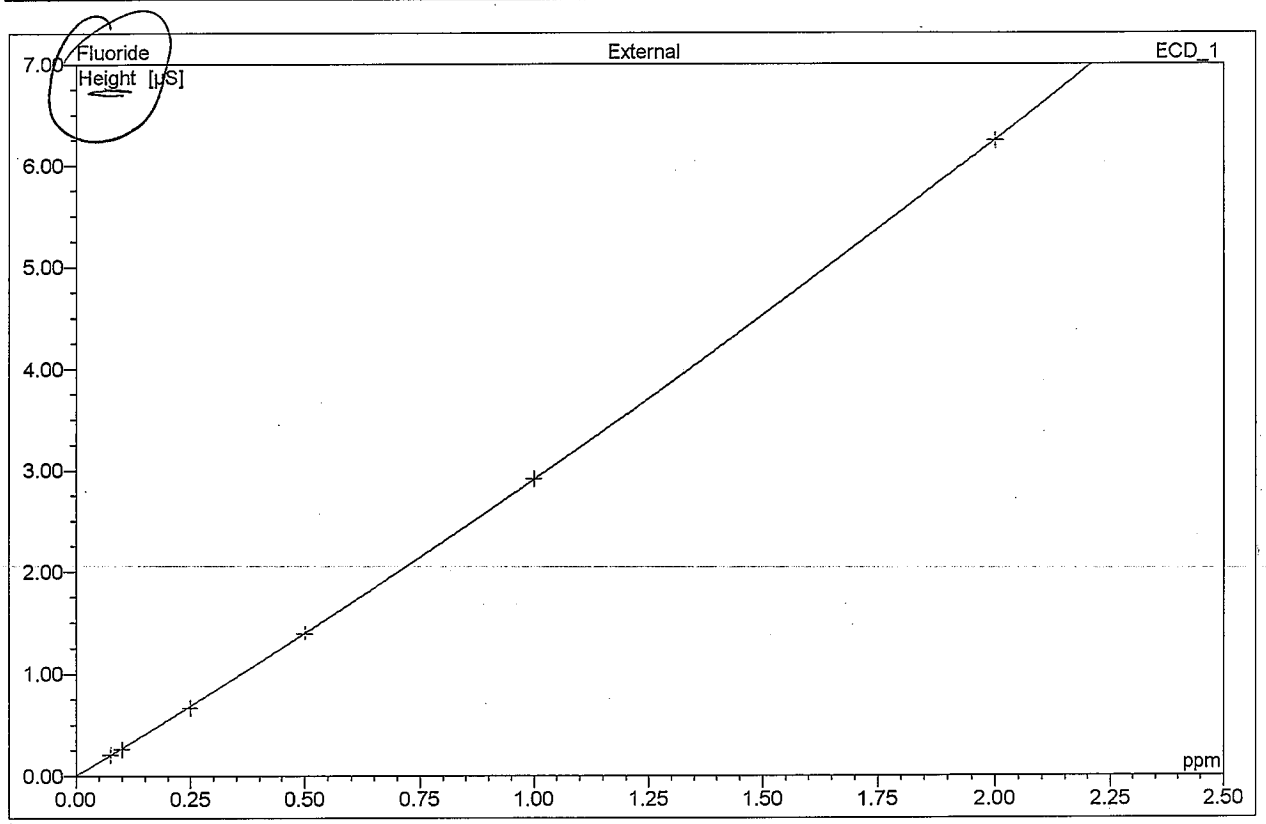
Sample Name:	**CAL STD #6 ICWS-8920**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 10:41**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.25	n.a.	0.15975	0.030	0.53	n.a.	BMB
2	3.25	Fluoride	6.24513	1.086	19.22	1.9994	BM
3	4.60	Chloride	4.53115	0.754	13.35	2.0009	M
4	5.37	Nitrite-N	8.12633	1.598	28.28	2.0003	M
5	6.66	Bromide	1.44051	0.306	5.42	1.9999	Ru
6	7.43	Nitrate-N	7.63891	1.876	33.19	2.0001	MB

4 ~~CAL STD #4 ICWS-8918~~ DKW 10/19/06

Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

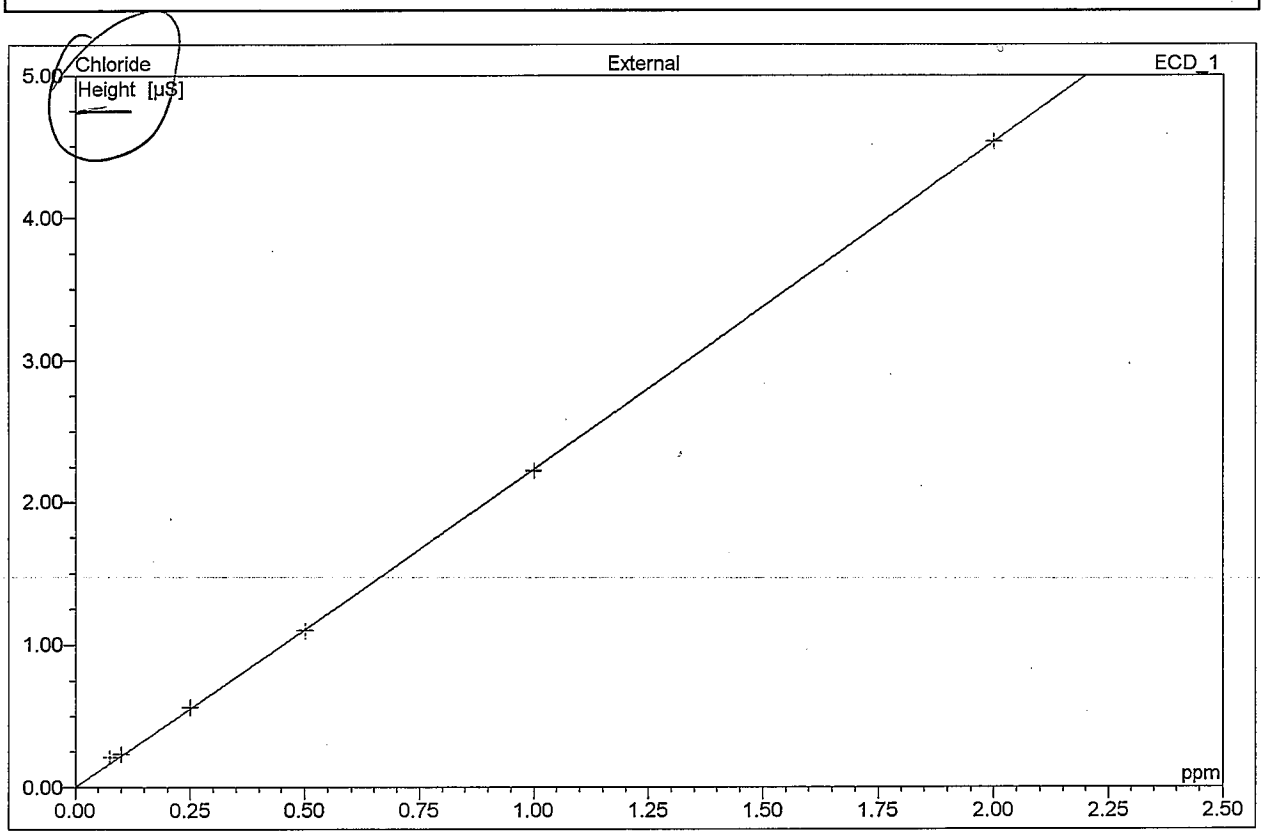


No.	Ret.Time min	Peak Name	Cal.Type	Points	R-Square	Offset	Slope	Curve
1	2.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2	3.26	Fluoride	Quad	6	1.0000	0.000000	2.68877	0.217432
3	4.61	Chloride	Quad	6	0.9998	0.000000	2.19733	0.033578
4	5.37	Nitrite-N	Quad	6	1.0000	0.000000	3.80119	0.130678
5	6.67	Bromide	Quad	6	1.0000	0.000000	0.70878	0.005755
6	7.46	Nitrate-N	Quad	6	1.0000	0.000000	3.45770	0.180759
Average:					1.0000	0.0000	2.5708	0.1136

Operator:kaukerc Timebase:ICS1500 Sequence:J18_LOWLEVEL_FCLNO2BRNO3_101806 Page 1-1
10/18/2006 11:02 AM

~~4 CAL STD #4 ICWS-8918~~ DKW 10/19/06

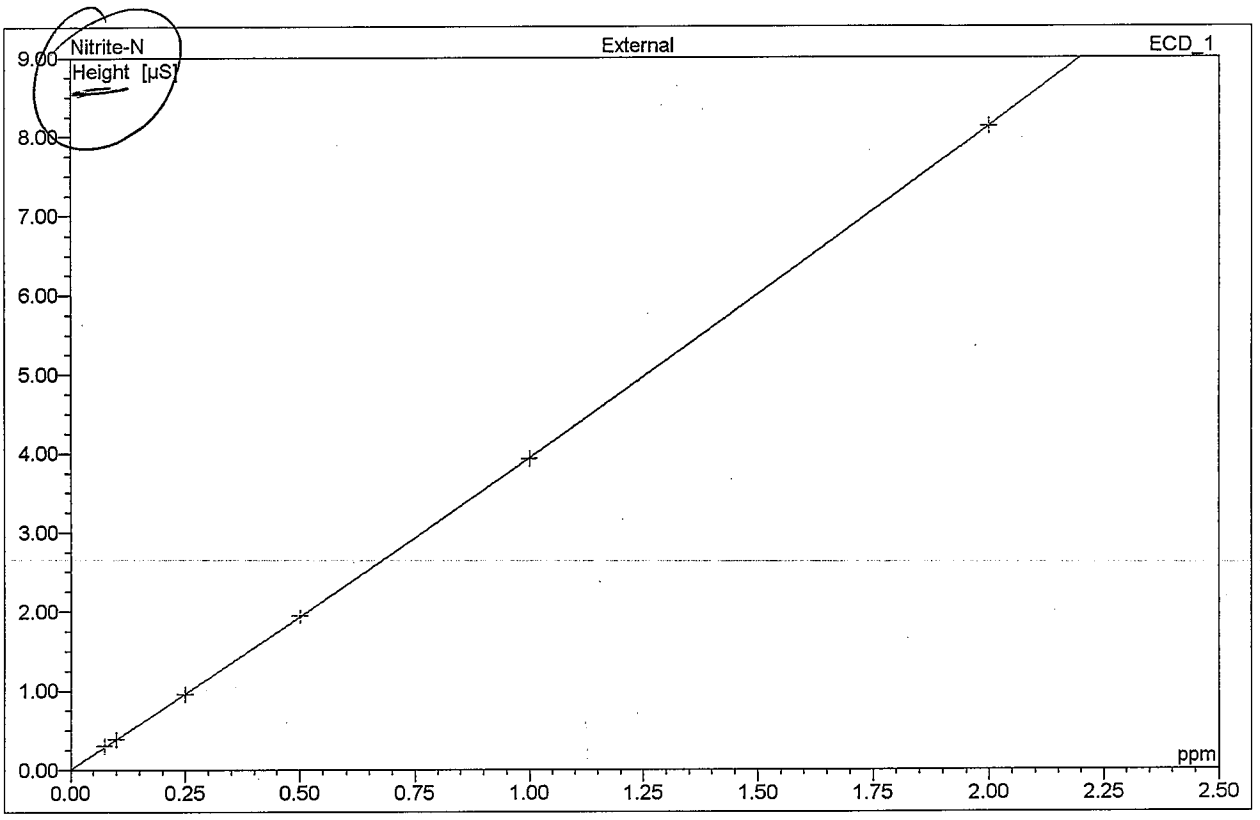
Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	R-Square	Offset	Slope	Curve
1	2.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2	3.26	Fluoride	Quad	6	1.0000	0.000000	2.68877	0.217432
3	4.61	Chloride	Quad	6	✓ 0.9998	0.000000	2.19733	0.033578
4	5.37	Nitrite-N	Quad	6	1.0000	0.000000	3.80119	0.130678
5	6.67	Bromide	Quad	6	1.0000	0.000000	0.70878	0.005755
6	7.46	Nitrate-N	Quad	6	1.0000	0.000000	3.45770	0.180759
Average:					1.0000	0.0000	2.5708	0.1136

~~4 CAL STD #4 ICWS-8918~~ DPW 10/19/06

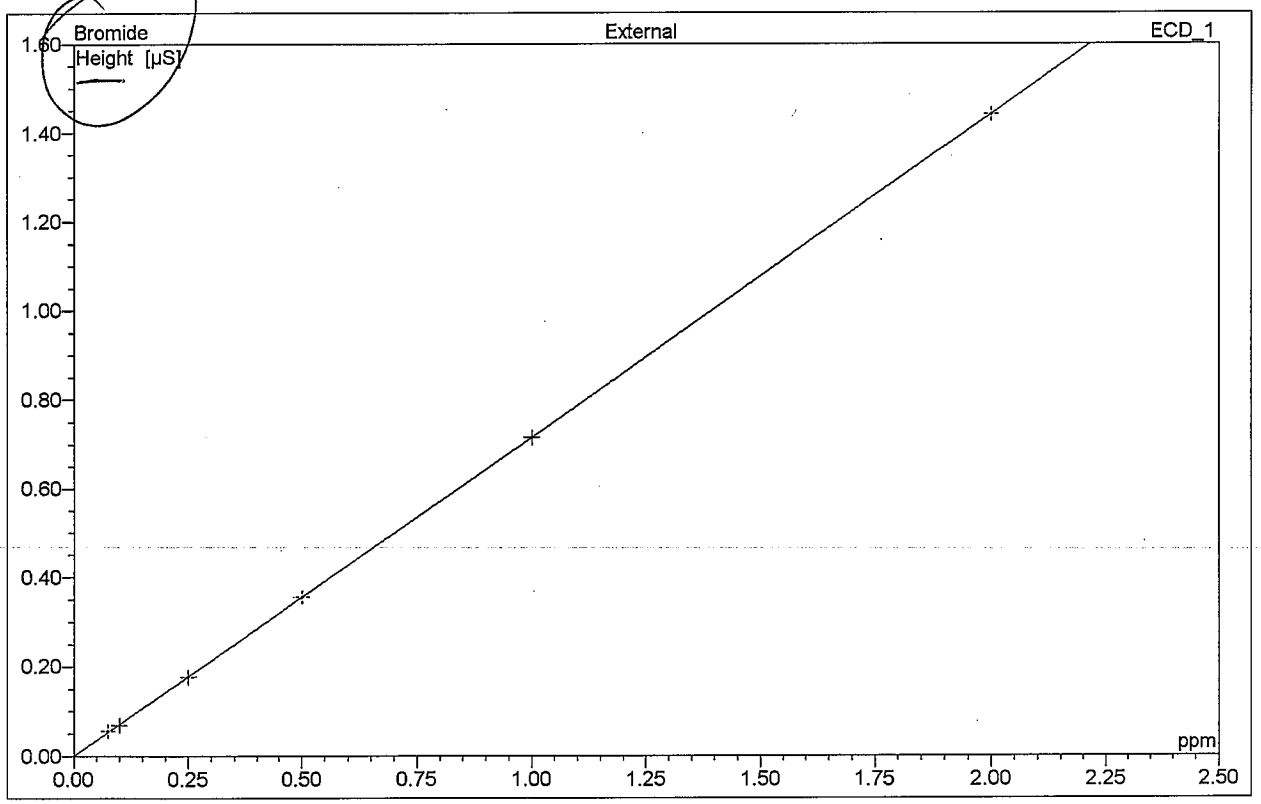
Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	R-Square	Offset	Slope	Curve
1	2.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2	3.26	Fluoride	Quad	6	1.0000	0.000000	2.68877	0.217432
3	4.61	Chloride	Quad	6	0.9998	0.000000	2.19733	0.033578
4	5.37	Nitrite-N	Quad	6	1.0000	0.000000	3.80119	0.130678
5	6.67	Bromide	Quad	6	1.0000	0.000000	0.70878	0.005755
6	7.46	Nitrate-N	Quad	6	1.0000	0.000000	3.45770	0.180759
Average:					1.0000	0.0000	2.5708	0.1136

~~4 CAL STD #4 ICWS-8918~~ DKW 10/19/06

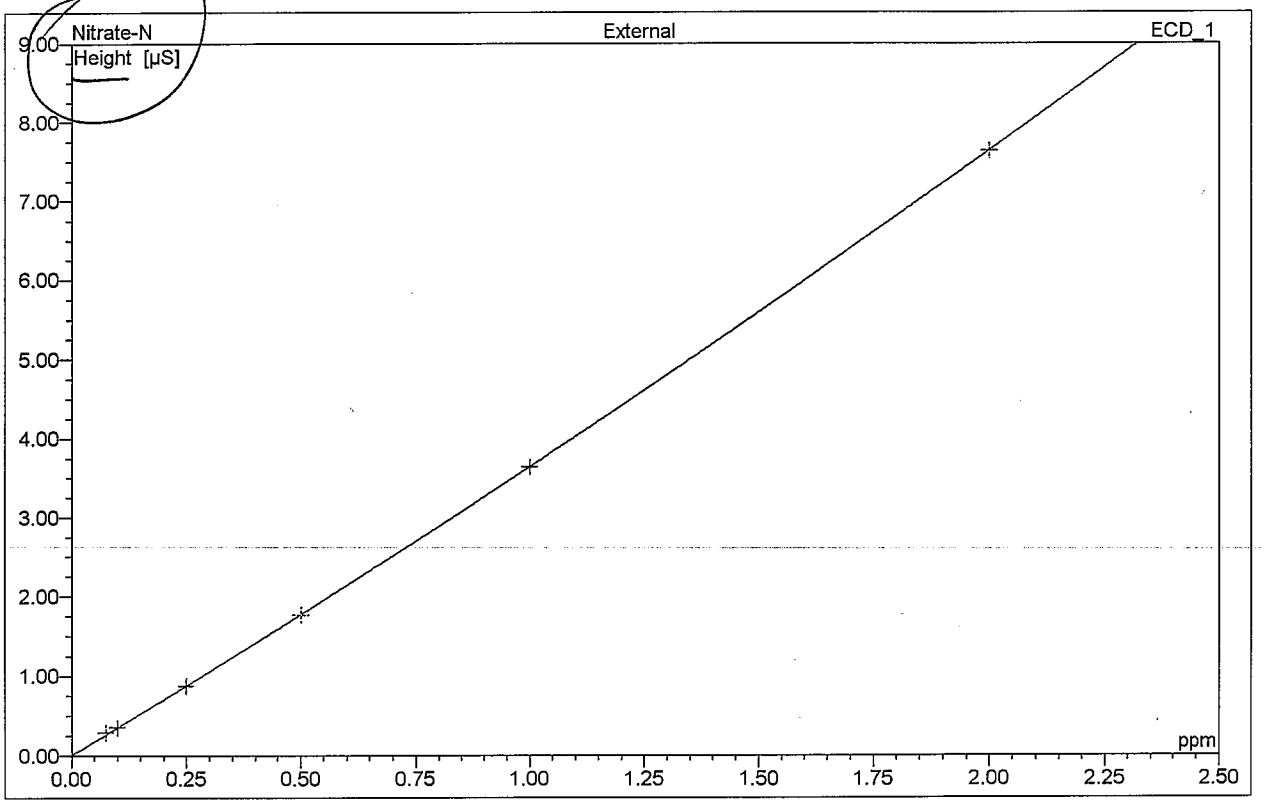
Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**###############**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	R-Square	Offset	Slope	Curve
1	2.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2	3.26	Fluoride	Quad	6	1.0000	0.000000	2.68877	0.217432
3	4.61	Chloride	Quad	6	0.9998	0.000000	2.19733	0.033578
4	5.37	Nitrite-N	Quad	6	1.0000	0.000000	3.80119	0.130678
5	6.67	Bromide	Quad	6	✓ 1.0000	0.000000	0.70878	0.005755
6	7.46	Nitrate-N	Quad	6	1.0000	0.000000	3.45770	0.180759
Average:					1.0000	0.0000	2.5708	0.1136

~~4 CAL STD #4 ICWS-8918~~ DFW 10/19/06

Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**###############**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	R-Square	Offset	Slope	Curve
1	2.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2	3.26	Fluoride	Quad	6	1.0000	0.000000	2.68877	0.217432
3	4.61	Chloride	Quad	6	0.9998	0.000000	2.19733	0.033578
4	5.37	Nitrite-N	Quad	6	1.0000	0.000000	3.80119	0.130678
5	6.67	Bromide	Quad	6	1.0000	0.000000	0.70878	0.005755
6	7.46	Nitrate-N	Quad	6	✓ 1.0000	0.000000	3.45770	0.180759
Average:					1.0000	0.0000	2.5708	0.1136

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 9/25/06 Chemist: DKW Expiration Date: 12/25/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-8837	F-	17125	ERA	12/31/07	1000 ppm	5.	50	100. mg/L (ppm)
2. (intermed. calib. source)	Cl-	36065		6/30/07				
3.	NO2N	17075		7/31/07				
4.	BR-	27025		2/28/07				
5.	NO3N-	17026		2/28/08				
6. ICWI-8838	F-	1-38F-2	SPEX	8/15/07	1000 ppm	5.	50	100. ppm (mg/L)
7. (intermed 2nd source)	Cl-	1-5CL-2		3/15/07				
8.	NO2N-	1-13NO2N-2		9/15/07				
9.	BR-	1-1BR-2		4/30/07				
10.	NO3N-	1-27NO3N-2		5/15/07				
11.								
12.								
13.								
14.								

Reviewed By: _____

WC031R3.DOC, 8/28/03

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 10/18/06 Chemist: CWF Expiration Date: 10/19/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-8915	F-	ICWI-	CWF 10/18/06 ~~8838~~ 8837	12/25/06	100 ppm	0.075	100ml	0.075 ppm
2. (Cal Std 1)	Cl-							
3.	NO2-N							
4.	Br-							
5.	NO3-N							
6. ICWS-8916	F-					0.100		0.100 ppm
7. (Cal Std 2)	Cl-							
8.	NO2-N							
9.	Br-							
10.	NO3-N							
11. ICWS 8917	F-					0.250		0.250 ppm
12. (Cal Std 3)	Cl-							
13.	NO2-N							
14.	Br-							
	NO3-N							

Reviewed By: _____

WC031R3.DOC, 8/28/03

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 10/18/06 Chemist: CWK Expiration Date: 10/19/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-8918	F-	ICWI-	8837	12/25/06	100 ppm	0.500	100 ml	0.50 ppm
2. (Cal std 4)	Cl-							
3.	NO_2-N							
4.	Br-							
5.	NO_3-N							
6. ICWS-8919	F-					1.00		1.0 ppm
7. (Cal std 5)	Cl-							
8.	NO_2-N							
9.	Br-							
10.	NO_3-N							
11. ICWS-8920	F-					2.00		2.0 ppm
12. (Cal std 6)	Cl-							
13.	NO_2-N							
14.	Br-							
	NO_3-N							

Reviewed By: _____

STL Knoxville IC Initial Calibration Data Review / Narrative Checklist
Methods: 300.0, 9056, 9057 and 26A, SOP: KNOX-WC-0005, Rev. 8

DX600 (ARAGORN)

Analysis Date:	12/14/06	File ID:	L14A_LOW_AIR_ANIONS_121406

Initial Calibration Review Items	N/A	Yes	No	If No, why is data reportable?	2nd √
1. Were at least 5 levels of each analyte analyzed?		✓			✓
2. Is low level standard concentration ≤ RL?		✓			✓
3. Are the correlation coefficients (r) ≥0.995; r^2≥0.990?		✓			✓
4. For method 300.0, was the calibration curve processed using linear reqression?	✓				N/A
5. For manual integrated standards, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system	✓

Analyst: [signature] Date: 12/15/06

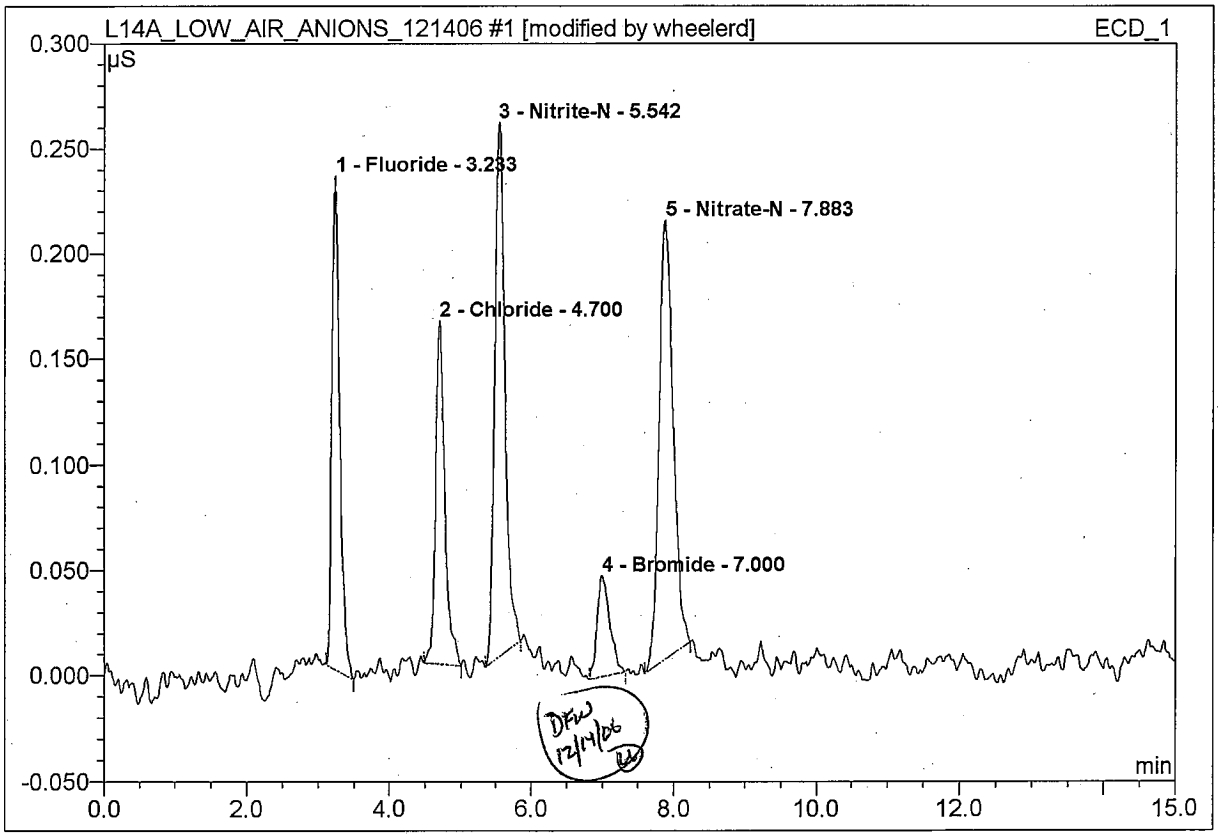
Comments: Low level anion calibration for air analysis —
Range = 0.075 – 2 ppm F⁻; Cl⁻; NO2N⁻; NO3N⁻; BR⁻
— Quad fit using peak height vs. amount —

2nd Level Reviewer: [signature] Date: 12/15/06

Comments:

1 CAL STD 1 = ICWS-9045 @ (0.075ppm)

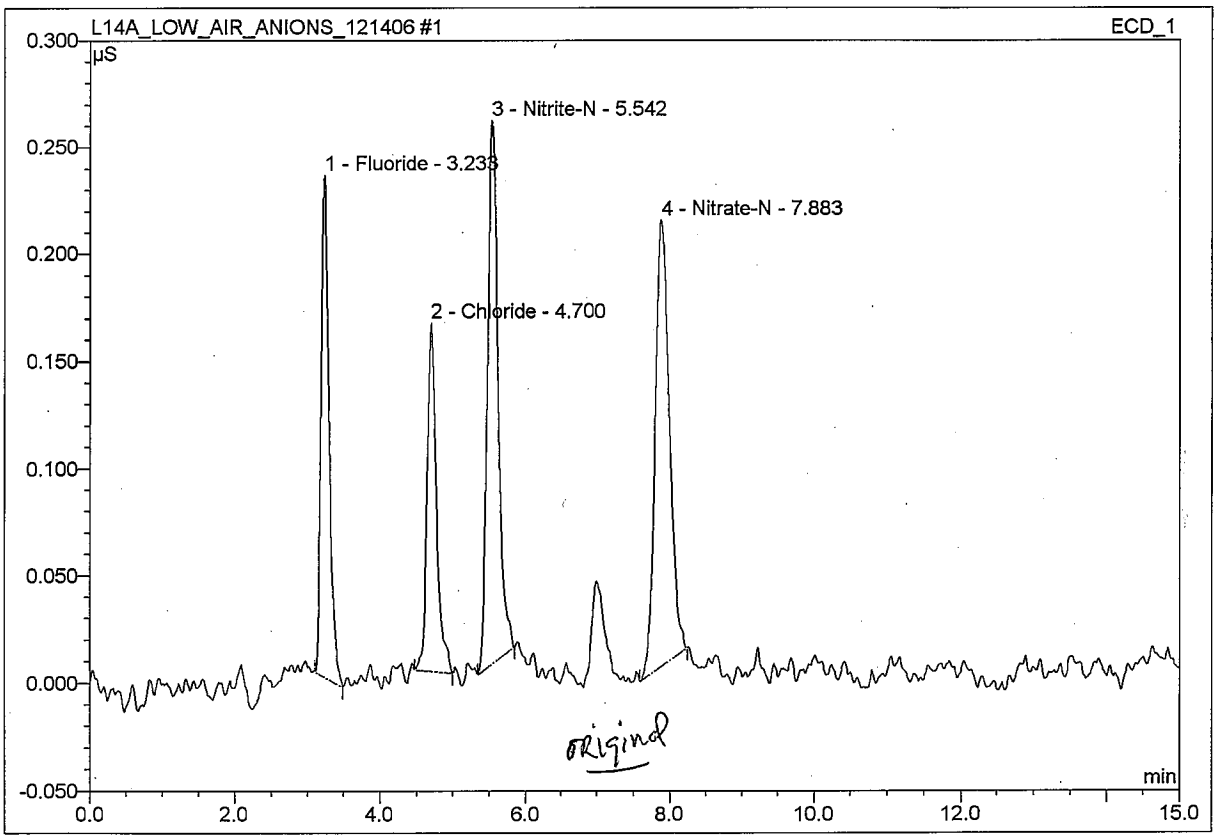
Sample Name:	**CAL STD 1 = ICWS-9045 @ (0.075ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**98**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 16:54**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.23417	0.030	19.30	0.0748	BMB
2	4.70	Chloride	0.16248	0.024	15.76	0.0868	BMB
3	5.54	Nitrite-N	0.25345	0.043	27.70	0.0748	BMB
4	7.00	Bromide	0.04768	0.010	6.42	0.0837	BMB*
5	7.88	Nitrate-N	0.20803	0.048	30.83	0.0756	BMB

1 CAL STD 1 = ICWS-9045 @ (0.075ppm)

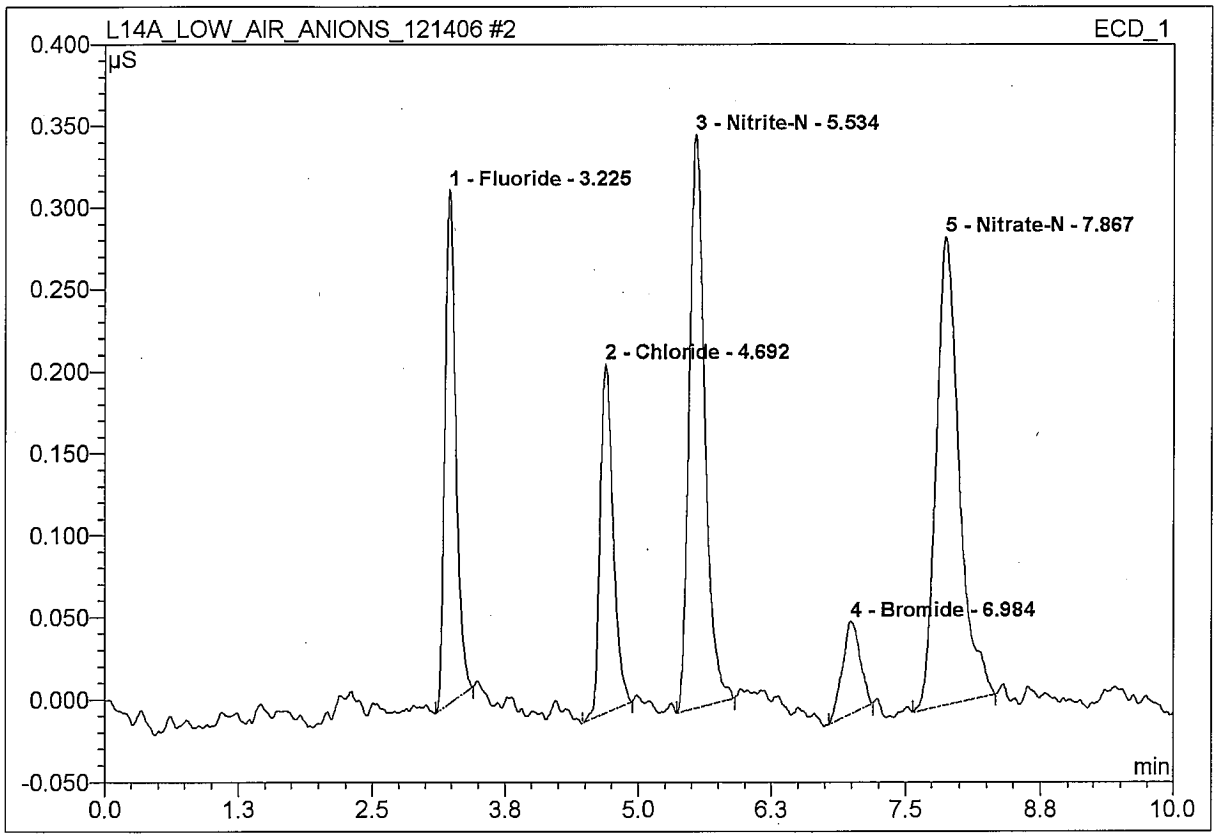
Sample Name:	**CAL STD 1 = ICWS-9045 @ (0.075ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**98**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 16:54**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.23417	0.030	20.62	n.a.	BMB
2	4.70	Chloride	0.16248	0.024	16.84	n.a.	BMB
3	5.54	Nitrite-N	0.25345	0.043	29.60	n.a.	BMB
4	7.88	Nitrate-N	0.20803	0.048	32.94	n.a.	BMB

2 CAL STD 2 = ICWS-9046 @ (0.10ppm)

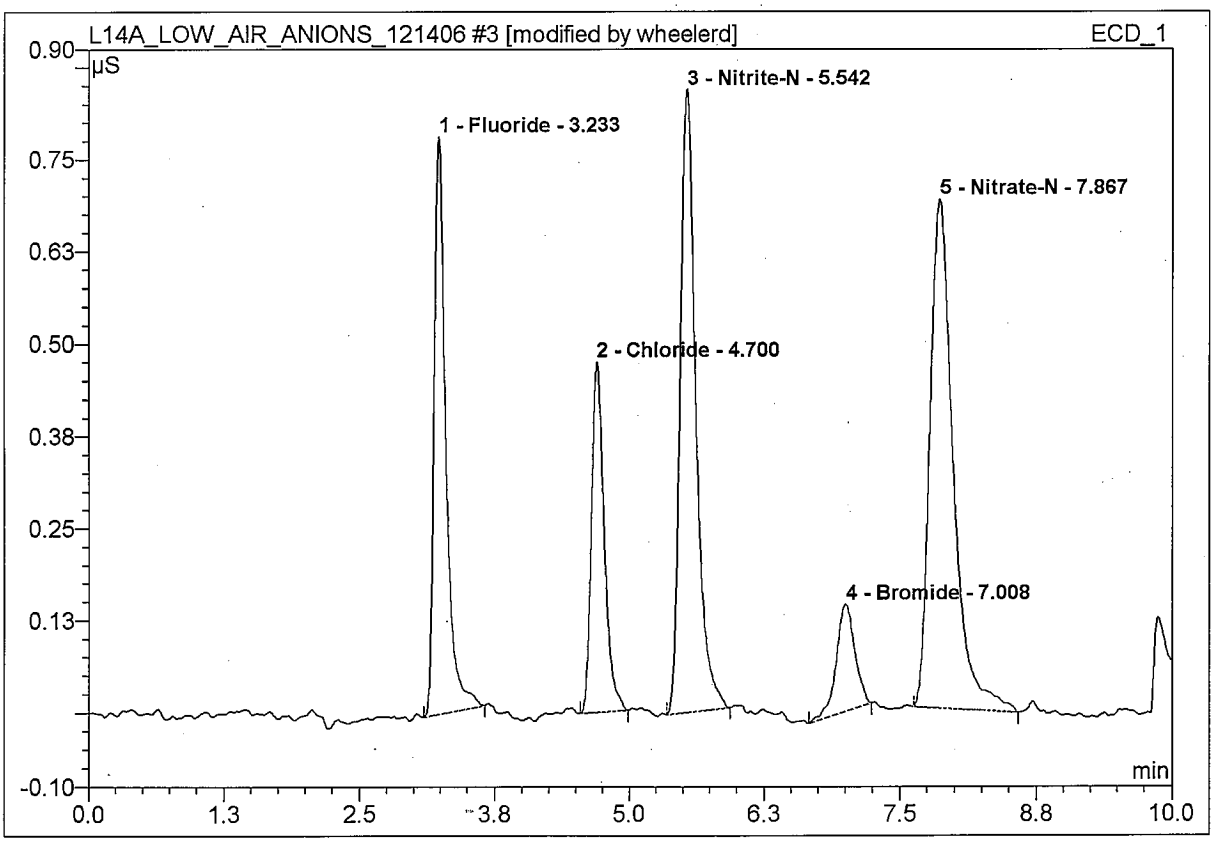
Sample Name:	**CAL STD 2 = ICWS-9046 @ (0.10ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**99**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 17:11**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.31346	0.037	18.04	0.0999	BMB
2	4.69	Chloride	0.21253	0.030	14.47	0.1134	BMB
3	5.53	Nitrite-N	0.34978	0.059	28.59	0.1031	BMB
4	6.98	Bromide	0.05646	0.011	5.19	0.0991	BMB
5	7.87	Nitrate-N	0.28533	0.070	33.71	0.1036	BMB

3 CAL STD 3 = ICWS-9047 @ (0.25ppm)

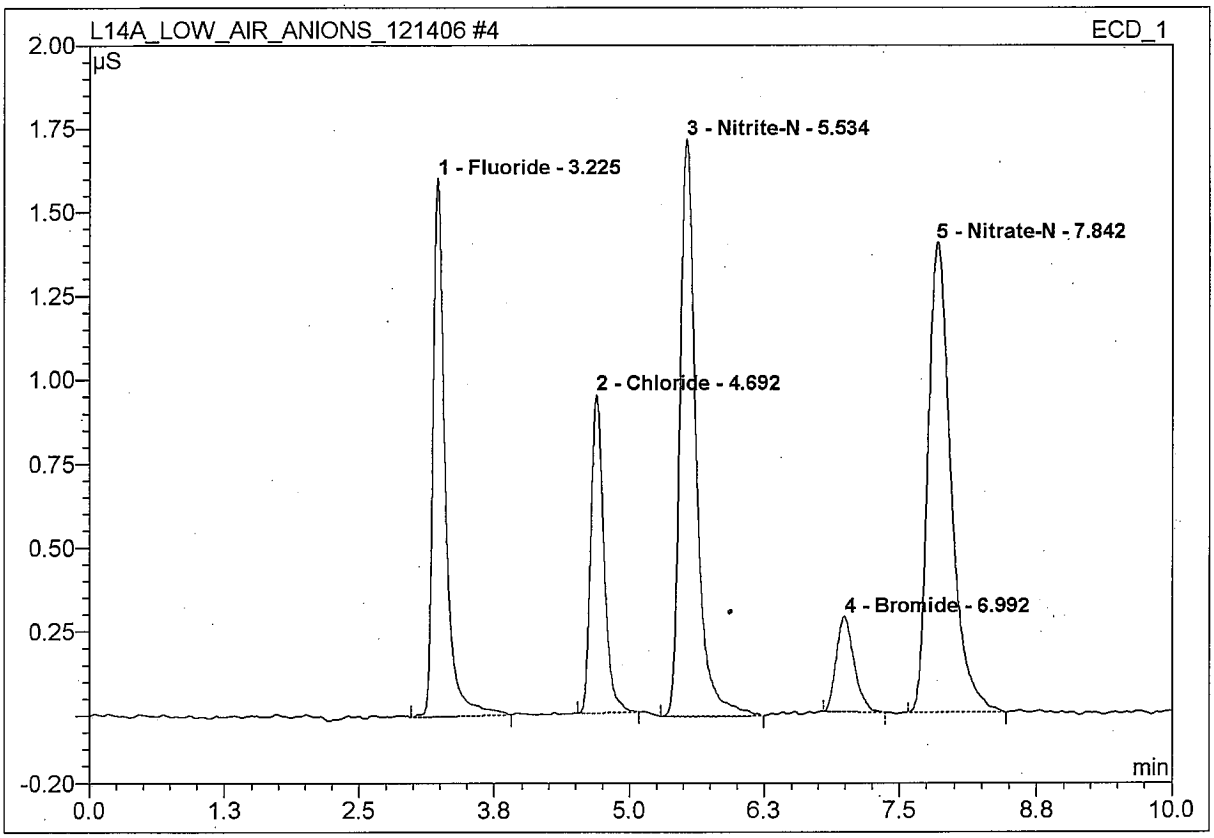
Sample Name:	**CAL STD 3 = ICWS-9047 @ (0.25ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**100**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 17:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.78262	0.100	19.79	0.2477	BMB
2	4.70	Chloride	0.47425	0.066	13.11	0.2518	BMB
3	5.54	Nitrite-N	0.84353	0.144	28.39	0.2473	BMB
4	7.01	Bromide	0.14435	0.029	5.64	0.2526	BMB
5	7.87	Nitrate-N	0.68927	0.167	33.06	0.2483	BMB

4 CAL STD 4 = ICWS-9048 @ (0.50ppm)

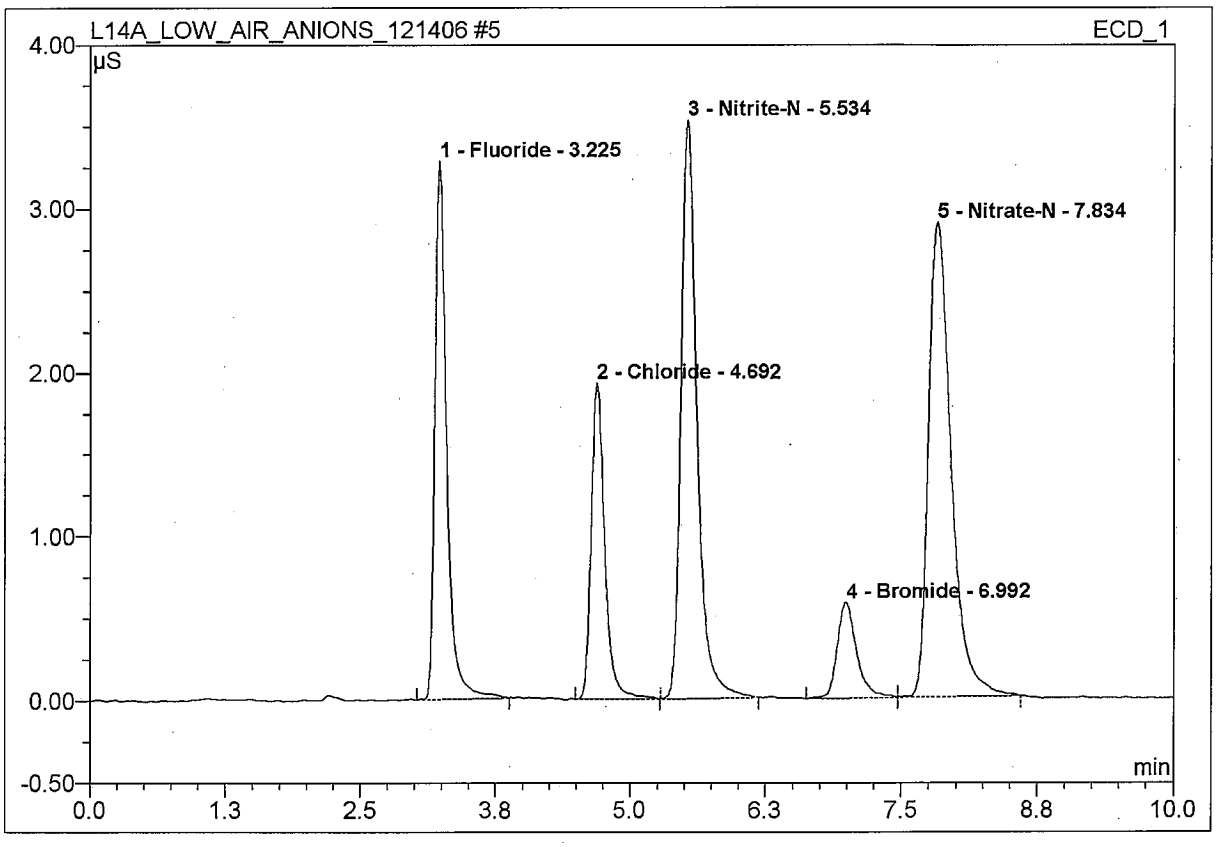
Sample Name:	**CAL STD 4 = ICWS-9048 @ (0.50ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**101**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 17:36**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	1.60279	0.210	20.40	0.5010	BMB
2	4.69	Chloride	0.94632	0.132	12.83	0.4981	BMB
3	5.53	Nitrite-N	1.71930	0.302	29.30	0.4988	BMB
4	6.99	Bromide	0.28167	0.054	5.25	0.4908	BMB
5	7.84	Nitrate-N	1.39855	0.332	32.22	0.4972	BMB

5 CAL STD 5 = ICWS-9049 @ (1.ppm)

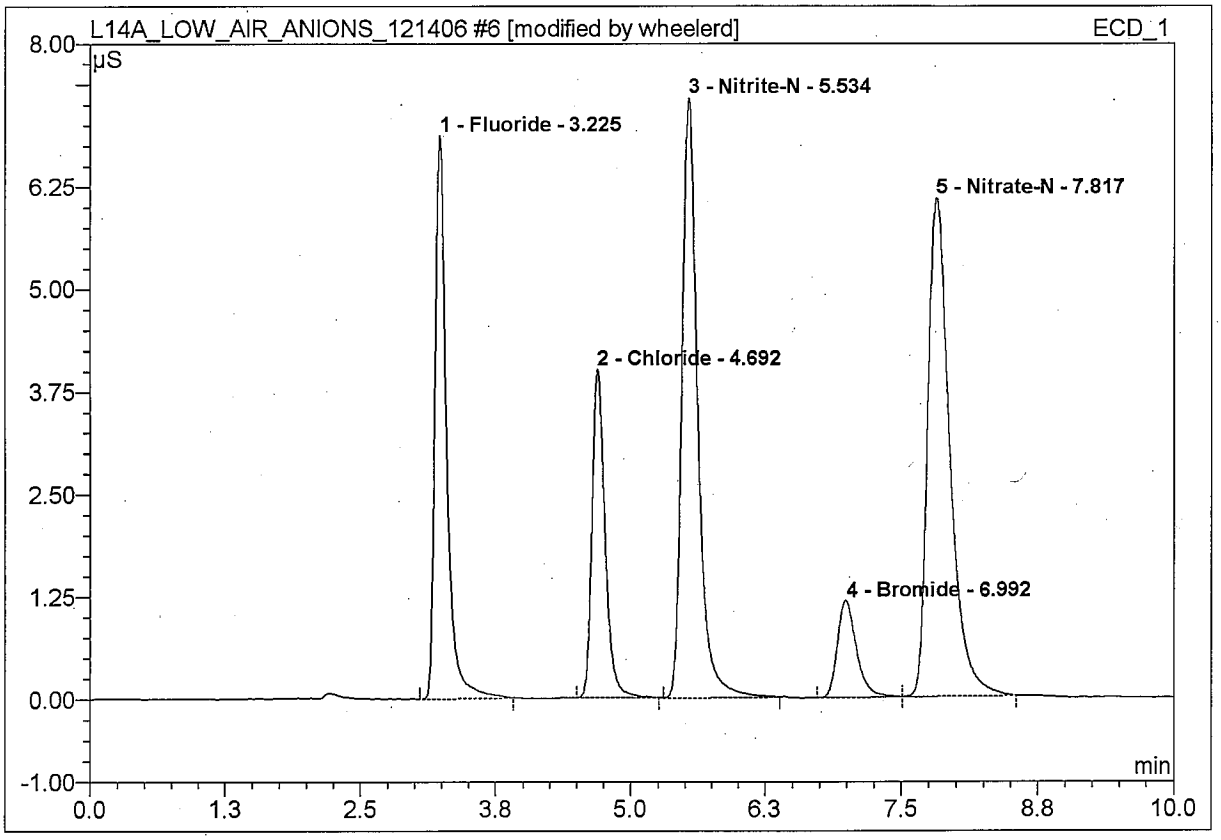
Sample Name:	**CAL STD 5 = ICWS-9049 @ (1.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**102**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 17:48**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	3.27751	0.412	19.61	1.0002	BMB
2	4.69	Chloride	1.92630	0.278	13.23	0.9967	BMB
3	5.53	Nitrite-N	3.52256	0.606	28.87	1.0015	BMB
4	6.99	Bromide	0.58187	0.122	5.80	1.0046	BM
5	7.83	Nitrate-N	2.89372	0.682	32.48	1.0020	MB

6 CAL STD 6 = ICWS-9050 @ (2.ppm)

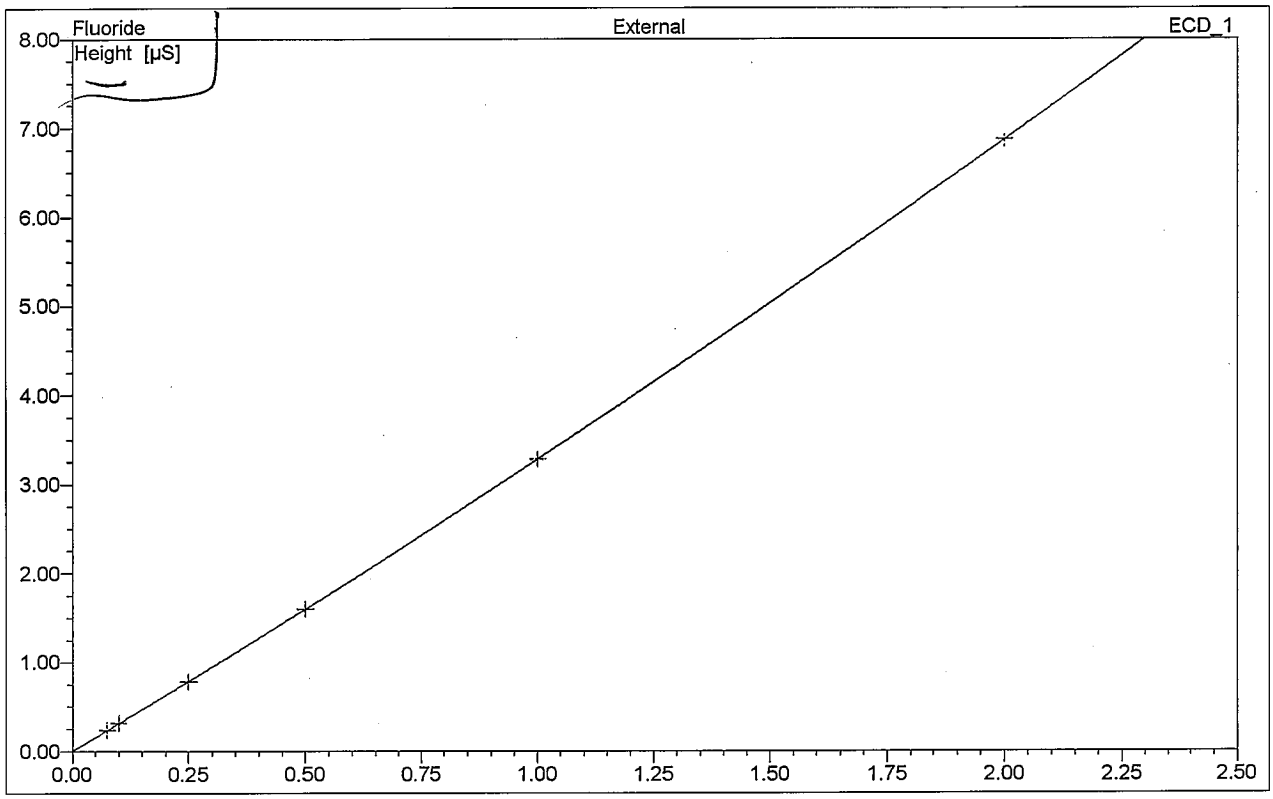
Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 18:01**	*Sample.Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	6.86489	0.858	19.88	1.9999	BMB
2	4.69	Chloride	3.99899	0.564	13.08	2.0008	BMB
3	5.53	Nitrite-N	7.31424	1.247	28.92	1.9998	BMB
4	6.99	Bromide	1.17848	0.240	5.56	1.9994	BM
5	7.82	Nitrate-N	6.07244	1.404	32.55	1.9997	MB

~~6 CAL STD 6 = ICWS-9050 @ (2.ppm)~~ DKW 12/15/06

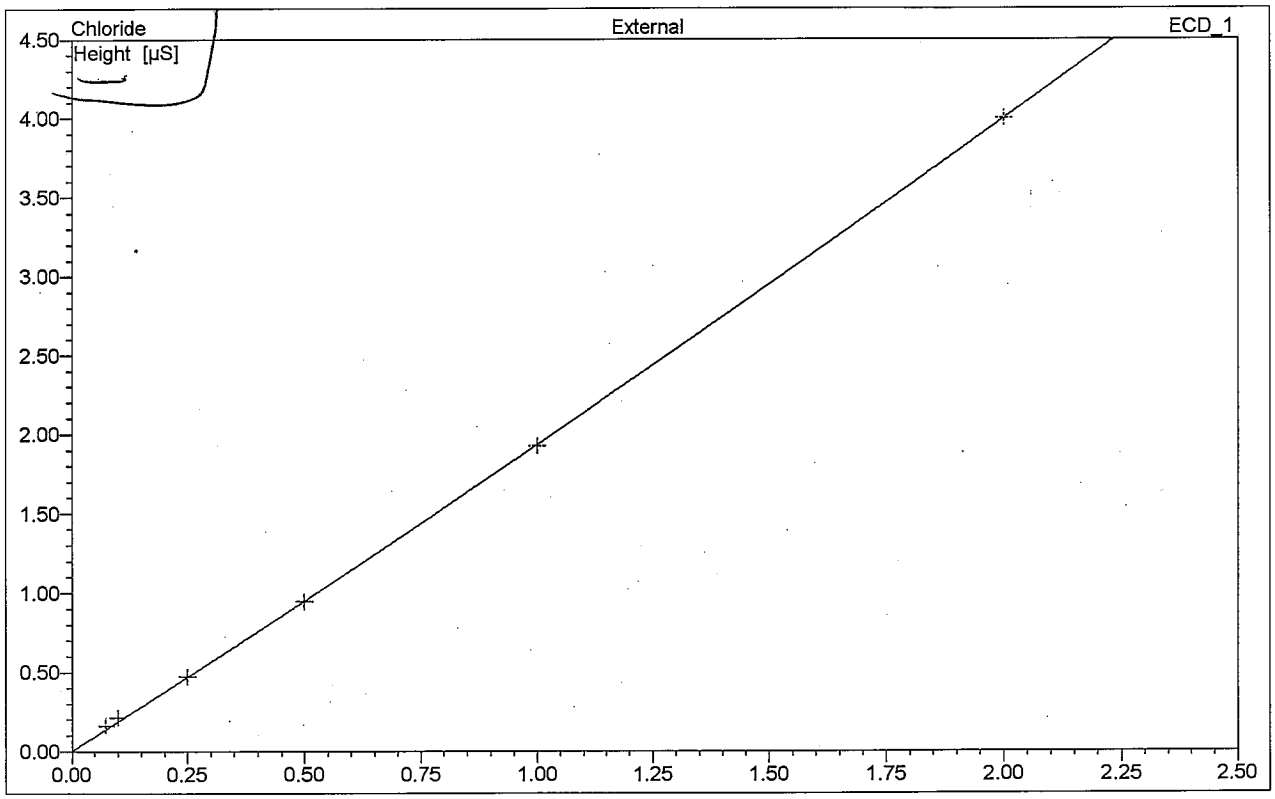
Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9997	0.0000	3.120830	0.155880
2	4.69	Chloride	Quad	6	0.9997	0.0000	1.867234	0.065694
3	5.53	Nitrite-N	Quad	6	0.9998	0.0000	3.376824	0.140386
4	6.99	Bromide	Quad	6	0.9999	0.0000	0.568855	0.010287
5	7.82	Nitrate-N	Quad	6	0.9997	0.0000	2.738783	0.148955
Average:					0.9998	0.0000	2.3345	0.1042

~~6 CAL STD 6 = ICWS-9050 @ (2.ppm)~~ DKW 12/15/06

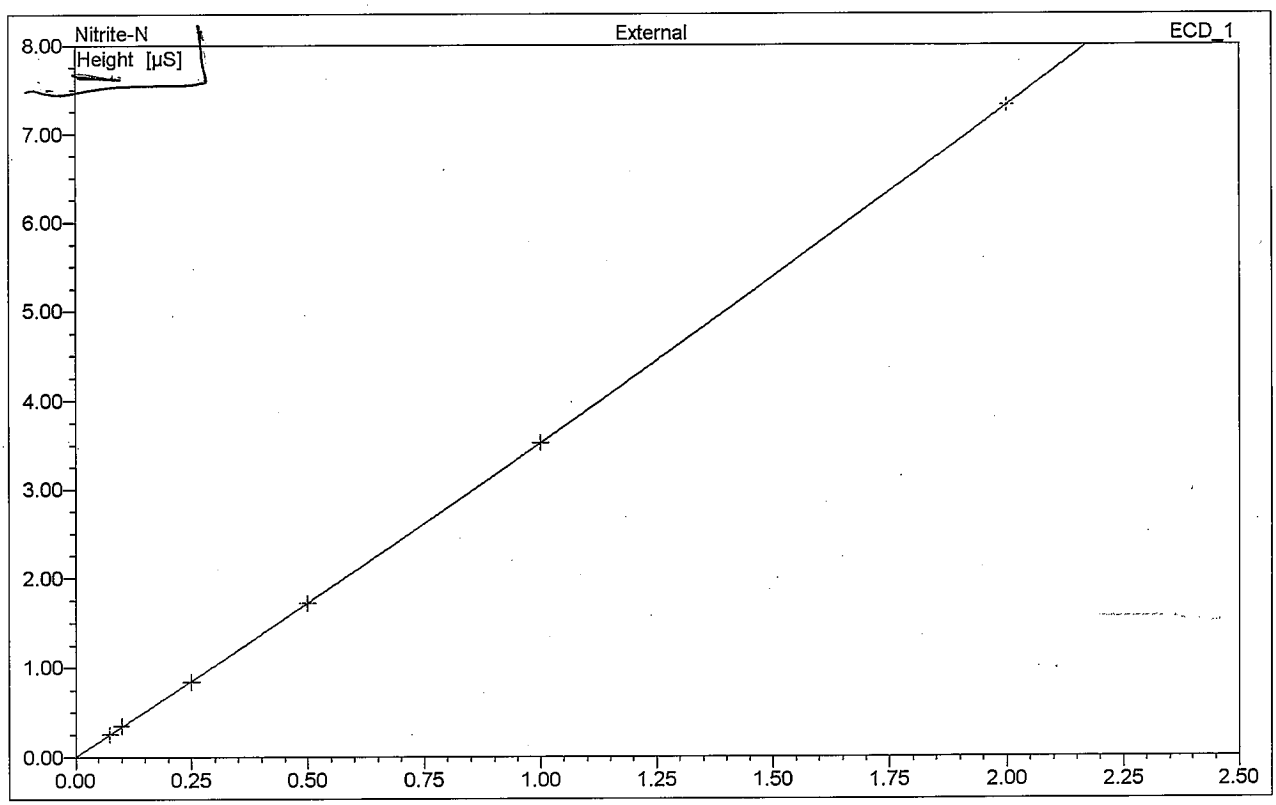
Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9997	0.0000	3.120830	0.155880
2	4.69	Chloride	Quad	6	0.9997	0.0000	1.867234	0.065694
3	5.53	Nitrite-N	Quad	6	0.9998	0.0000	3.376824	0.140386
4	6.99	Bromide	Quad	6	0.9999	0.0000	0.568855	0.010287
5	7.82	Nitrate-N	Quad	6	0.9997	0.0000	2.738783	0.148955
Average:					0.9998	0.0000	2.3345	0.1042

~~6 CAL STD 6 = ICWS-9050 @ (2.ppm)~~ DKW 12/15/06

Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**

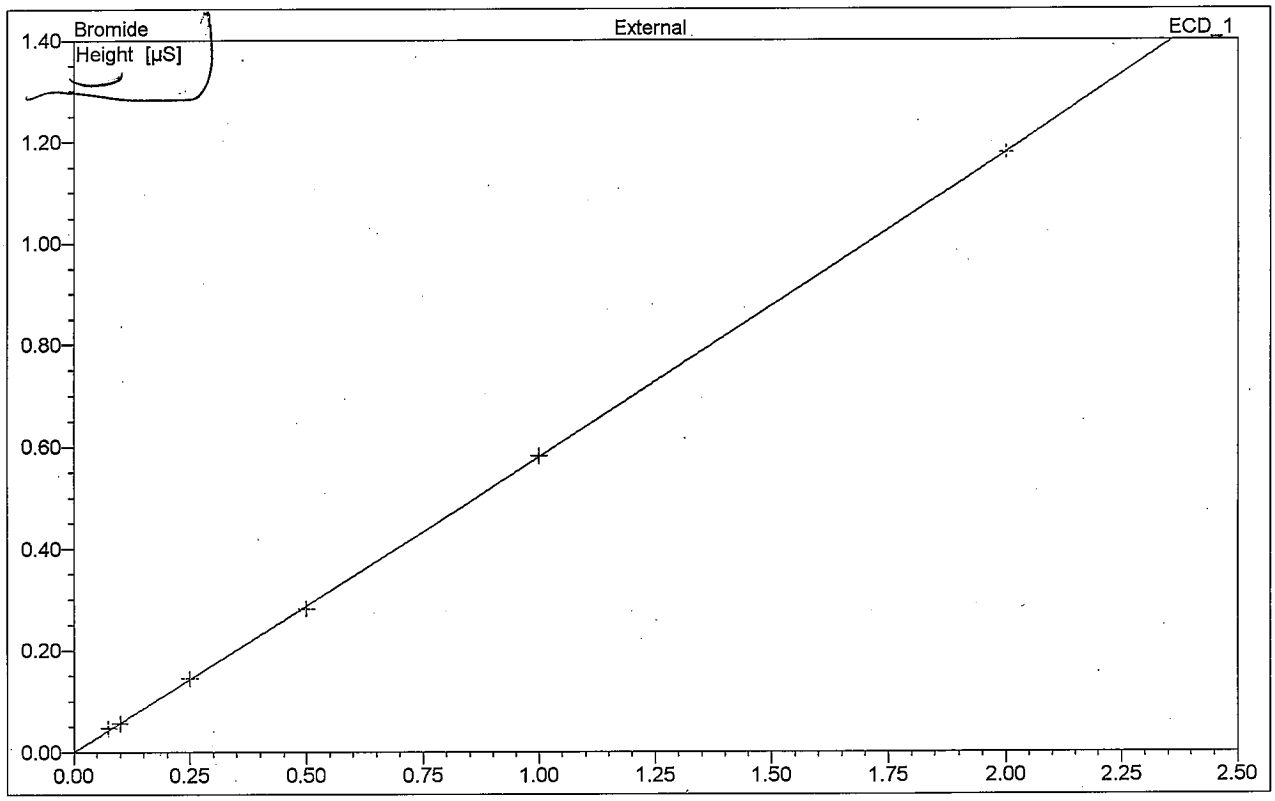


No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9997	0.0000	3.120830	0.155880
2	4.69	Chloride	Quad	6	0.9997	0.0000	1.867234	0.065694
3	5.53	Nitrite-N	Quad	6	0.9998	0.0000	3.376824	0.140386
4	6.99	Bromide	Quad	6	0.9999	0.0000	0.568855	0.010287
5	7.82	Nitrate-N	Quad	6	0.9997	0.0000	2.738783	0.148955
Average:					0.9998	0.0000	2.3345	0.1042

~~6 CAL STD 6 = ICWS-9050 @ (2.ppm)~~

DKW 12/15/06

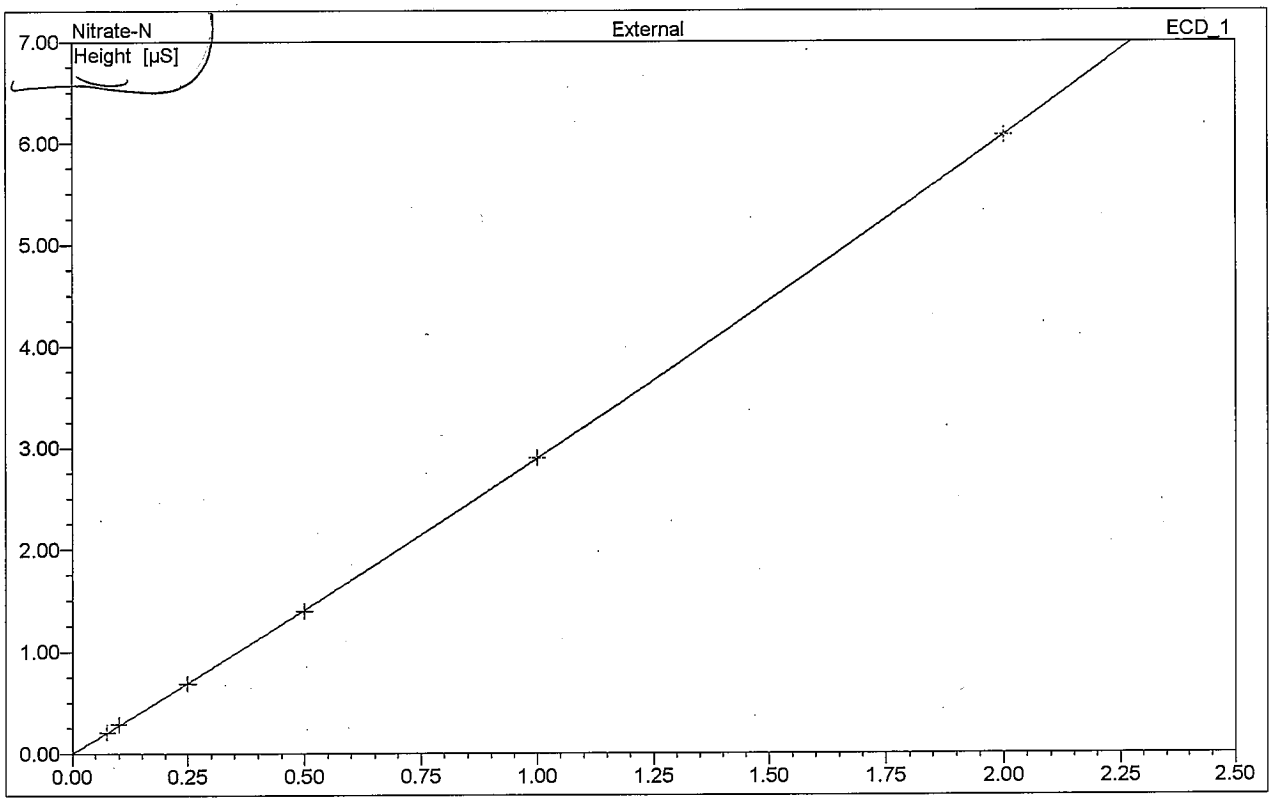
Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**###############**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9997	0.0000	3.120830	0.155880
2	4.69	Chloride	Quad	6	0.9997	0.0000	1.867234	0.065694
3	5.53	Nitrite-N	Quad	6	0.9998	0.0000	3.376824	0.140386
4	6.99	Bromide	Quad	6	0.9999	0.0000	0.568855	0.010287
5	7.82	Nitrate-N	Quad	6	0.9997	0.0000	2.738783	0.148955
Average:					0.9998	0.0000	2.3345	0.1042

~~6 CAL STD 6 = ICWS-9050 @ (2.ppm)~~ DKW 12/15/06

Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**###############**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9997	0.0000	3.120830	0.155880
2	4.69	Chloride	Quad	6	0.9997	0.0000	1.867234	0.065694
3	5.53	Nitrite-N	Quad	6	0.9998	0.0000	3.376824	0.140386
4	6.99	Bromide	Quad	6	0.9999	0.0000	0.568855	0.010287
5	7.82	Nitrate-N	Quad	6	0.9997	0.0000	2.738783	0.148955
Average:					0.9998	0.0000	2.3345	0.1042

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 9/25/06 Chemist: DKW Expiration Date: 12/25/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-8837	F-	17125	ERA	12/31/07	1000 ppm	5.	50	100. mg/L (ppm)
2. (Intermed. calib. source)	Cl-	36065		6/30/07				
3.	NO2N	17075		7/31/07				
4.	BR-	27025		2/28/07				
5.	NO3N-	17026		2/28/08				
6. ICWI-8838	F-	1-38F-2	SPEX	8/15/07	1000 ppm	5.	50	100. ppm (mg/L)
7. (intermed 2nd source)	Cl-	1-5CL-2		3/15/07				
8.	NO2N-	1-13NO2N-2		9/15/07				
9.	BR-	1-1BR-2		4/30/07				
10.	NO3N-	1-27NO3N-2		5/15/07				
11.								
12.								
13.								
14.								

Reviewed By: DW 10/5/06

WC031R3.DOC, 8/28/03

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/14/06 Chemist: DRW Expiration Date: 12/15/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9045	F-	ICWI-	8837	12/25/06	100. ppm	0.075	100.	0.075 ppm ✓
2. (Cal 1)	Cl-							
3.	NO2N-							
4.	BR-							
5.	NO3N-							
6. ICWS-9046	F-					0.100		0.100 ppm ✓
7. (Cal 2)	Cl-							
8.	NO2N-							
9.	BR-							
10.	NO3N-							
11. ICWS-9047	F-					0.250		0.250 ppm ✓
12. (Cal 3)	Cl-							
13.	NO2N-							
14. (DRW 12/14/06)	~~NO3~~ BR							
15	NO3N-							

Reviewed By: RW 12/15/06

WC031R3.DOC, 8/28/03

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/14/06 Chemist: DFW Expiration Date: 12/15/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9048	F-	ICWI-	8837	12/25/06	100 PPM	0.500	100.	0.500 ppm
2. (col 4)	Cl-							
3.	NO2N-							
4.	BR-							
5.	NO3N-							
6. ICWS-9049	F-					1.		1. ppm
7. (col 5)	Cl-							
8. (+ ccw)	NO2N-							
9.	BR-							
10.	NO3N-							
11. ICWS-9050)	F-					2.		2. ppm
12. (col 6)	Cl-							
13.	NO2N-							
14.	BR-							
15	NO3N-							

Reviewed By: RW 12/15/06

WC031R3.DOC, 8/28/03

STL Knoxville Anions in Air Data Review / Narrative Checklist for Methods 9056/9057/26A, SOP KNOX-WC-0005, Rev. 8

Front Half

Lot #:	H6L110105, H6L110106	Analysis Date:	12/18/06	File ID:	L18A_LOWAIR_ANIONS_121806	ICAL File ID:	L14A_LOW AIR_ANIONS_121406

Review Items	NA	Yes	No	If No, why is data reportable?	2nd ✓
1. Were PM checklists (L40), Lot Summary and any applicable QAS reviewed?		✓			✓
2. ICV within 90-110%R?		✓			✓
3. ICB/CCB < 1/2 RL?		✓		☐ **[ccb1] No analyte > MDL in associated samples.**	✓
4. CCVs/CCBs run after every 10 samples, and at end of sequence?		✓			✓
5. Is %D ≤10% for each CCV?		✓			✓
6. If CCV failed, was it rerun only once?	✓				N/A
7. LCS/LCSD analytes within 90-110%R? *If no, list LCS ID:*		✓		☐ **[lcs3] LCS recovery >upper control limit & sample results <RL.**	✓
8. Method blank < 1/2 RL? *If no, list blank ID:*		✓		☐ **[mb3] No analyte > RL in associated samples.** ☐ [mb7] Sample results > 10x higher than blank.	✓
9. Matrix spikes run at required frequency?		✓			✓
10. Matrix spikes within 75-125% recovery? *If no, list MS ID:* _____		✓		☐ [air ms1] MS %R slightly outside limits for 1 sample. ☐ [air ms2] MS %R slightly outside limits for >1 sample. ☐ Air train reagent blank – spike result not reported.	✓
11. Were MS run #'s assigned to all matrix spikes except reagent blanks?		✓			✓
12. Sample analyses done within holding time (HT)? *If no, list samples:*		✓		☐ [ht1] HT expired upon receipt. ☐ *[ht2] Analysis requested after HT expired.*	✓
13. Were results processed using correct ICAL?		✓			✓
14. Are positive results within the calibration range?		✓			✓
15. Is integration acceptable for all samples, QC samples and standards?		✓			✓
16. For manual integrated standards and QC samples, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system.	✓
17. Calculations checked for error? (Document manual calculation checks.)		✓			✓
18. Were spreadsheets checked for transcription errors?		✓			✓
19. Final report/F6 correct? (Verify results, RLs, units, qualifiers, DFs, dates, spikes.)		✓			✓
20. Are all nonconformances documented and discussed in narrative?	✓			List NCM #:	✓
21. Appropriate air train autotext selected for narrative?		✓		☐ [air1] Cl^- reported as HCl and Cl_2. ☐ [air2] Cl^- reported as HCl only. ☐ [air3] Cl^-, F^- reported as HCl, Cl_2, HF. ☑ [air4] Cl^-, F^-, Br^- reported as HCl, Cl_2, HF, HBr, Br_2. ☐ [air5] Cl^-, F^-, NO_2^-, NO_3^- reported as HCl, Cl_2, HF, HNO_2, HNO_3. ☐ [air6] Cl^-, F^-, Br^-, I^- reported as HCl, Cl_2, HF, HBr, Br_2, I^-. ☐ [air7] Cl^-, F^-, NO_2^-, NO_3^- reported as Cl^-, F^-, NO_2^-, NO_3^-.	✓
22. Sample pH adjustment included in narrative?	✓			☐ [air pH] Sample pH adjusted prior to analysis.	N/A
23. Audit sample results included in narrative?	✓			☐ [audit2] Audit results in mg/L.	N/A

1st Level Reviewer: D. Wh	Date: 12/29/06	2nd Level Reviewer:	Date:
JK7JR - 1/10 - MS (Br⁻)		JL69FIAC: HBr - 0.7219 ug/ml X 100 ml X 80.9119/79.904 = 73.1006 ug ✓	
p. height = Ø + Ø.568855 (.1878) + Ø.010287 (.1878)²			
" " = Ø + Ø.1068 + Ø.0004			
" " = Ø.1072			

Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6361376
Prep Date: 12/18/2006 0800
Comp Date: 12/18/2006 0800

Analyte: Hydrogen Fluoride
CAS #: 7664-39-3
QuantIMS #: 5646

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 600

Reviewed by: RMW
Date: 12/29/06
MW Factor: 1.053051836

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	1		4M	0.1	0.050	JK7JR1AD	480	10	0.0000	ND	505.4649	252.7324	5,054.65	121806	1126
H6L110105	1	S	4M	0.1	0.050	JK7JR1AG	480	10	2.0606	1041.5609	505.4649	252.7324	5,054.65	121806	1243
H6L110105	1	D	4M	0.1	0.050	JK7JR1AH	480	10	2.0802	1051.4680	505.4649	252.7324	5,054.65	121806	1300
H6L110105	3		4M	0.1	0.050	JK7JX1AD	465	10	0.0000	ND	489.6691	244.8346	4,896.69	121806	1447
H6L110105	5		4M	0.1	0.050	JK7J11AD	600	10	0.0000	ND	631.8311	315.9156	6,318.31	121806	1504
H6L110106	2		4M	0.1	0.050	JK7J71AD	425	10	0.0000	ND	447.5470	223.7735	4,475.47	121806	1144
H6L110106	2	S	4M	0.1	0.050	JK7J71AG	425	10	2.1079	943.3844	447.5470	223.7735	4,475.47	121806	1410
H6L110106	2	D	4M	0.1	0.050	JK7J71AH	425	10	2.1436	959.3618	447.5470	223.7735	4,475.47	121806	1428
H6L110106	6		4M	0.1	0.050	JK7KG1AD	400	10	0.0000	ND	421.22	210.61	4,212.21	121806	1521
H6L110106	10		4M	0.1	0.050	JK7KT1AD	363	10	0.3969	ND	382.26	191.13	3,822.58	121806	1539
H6L110106	13		4M	0.1	0.050	JK7K01AD	100	10	0.0000	ND	105.31	52.65	1,053.05	121806	1556
H6L110106	13	S	4M	0.1	0.050	JK7K01AF	100	10	1.9596	206.3560	105.31	52.65	1,053.05	121806	1614
H6L110106	16		4M	0.1	0.050	JK7K41AD	100	10	0.0000	ND	105.31	52.65	1,053.05	121806	1631
H6L110106	16	S	4M	0.1	0.050	JK7K41AF	100	10	2.0853	219.5929	105.31	52.65	1,053.05	121806	1649
H6L270000	376	B	4M	0.1	0.050	JL69G1AA	100	1	0.0000	ND	10.53	5.27	105.31	121806	1052
H6L270000	376	C	4M	0.1	0.050	JL69G1AC	100	1	0.7480	78.7683	10.53	5.27	105.31	121806	1017
H6L270000	376	L	4M	0.1	0.050	JL69G1AD	100	1	0.7519	79.1790	10.53	5.27	105.31	121806	1034

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JL69G1AC	0.75	105.31	78.98
LCSD	ICWI-8838	100.00	0.750	100.0	JL69G1AD	0.75	105.31	78.98
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7JR1AG	0.20	5,054.65	1,010.93
MSD (1)	ICWI-8838	100.00	0.020	10.0	JK7JR1AH	0.20	5,054.65	1,010.93
MS (2)	ICWI-8838	100.00	0.020	10.0	JK7J71AG	0.20	4,475.47	895.09
MSD (2)	ICWI-8838	100.00	0.020	10.0	JK7J71AH	0.20	4,475.47	895.09
MS (3)	ICWI-8838	100.00	0.020	10.0	JK7K01AF	0.20	1,053.05	210.61
MSD (3)								
MS (4)	ICWI-8838	100.00	0.020	10.0	JK7K41AF	0.20	1,053.05	210.61
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6363098
Prep Date: 12/18/2006 0800
Comp Date: 12/18/2006 0800

Analyte: Hydrogen Chloride
CAS #: 7647-01-0
QuantIMS #: 2702

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 600

Reviewed by: RMW
Date: 12/29/06
MW Factor: 1.028429188

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	1		4L	0.1	0.042	JK7JR1AA	480	20	0.1989	ND	987.2920	414.6626	9,872.92	121806	1208
H6L110105	1	S	4L	0.1	0.042	JK7JR1AJ	480	20	4.1992	2072.9183	987.2920	414.6626	9,872.92	121806	1318
H6L110106	13		4L	0.1	0.042	JK7K01AA	100	20	0.0000	ND	205.6858	86.3881	2,056.86	121806	1741
H6L110106	16		4L	0.1	0.042	JK7K41AA	100	10	0.0000	ND	102.8429	43.1940	1,028.43	121806	1631
H6L110106	16	S	4L	0.1	0.042	JK7K41AG	100	10	2.2346	229.8128	102.8429	43.1940	1,028.43	121806	1649
H6L290000	98	B	4L	0.1	0.042	JL8TM1AA	100	1	0.0000	ND	10.2843	4.3194	102.84	121806	1052
H6L290000	98	C	4L	0.1	0.042	JL8TM1AC	100	1	0.7502	77.1528	10.2843	4.3194	102.84	121806	1017
H6L290000	98	L	4L	0.1	0.042	JL8TM1AD	100	1	0.7593	78.0886	10.2843	4.3194	102.84	121806	1034

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JL8TM1AC	0.75	102.84	77.13
LCSD	ICWI-8838	100.00	0.750	100.0	JL8TM1AD	0.75	102.84	77.13
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7JR1AJ	0.20	9,872.92	1,974.58
MSD (1)								
MS (2)	ICWI-8838	100.00	0.020	10.0	JK7K41AG	0.20	1,028.43	205.69
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6361375
Prep Date: 12/18/2006 0800
Comp Date: 12/18/2006 0800

Analyte: Hydrogen Bromide
CAS #: 10035-10-6
QuantIMS #: 5645

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 600

Reviewed by: RMW
Date: 12/29/06
MW Factor: 1.012613887

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	1		4J	0.1	0.050	JK7JR1AC	480	10	0.0000	ND	486.0547	243.0273	4,860.55	121806	1126
H6L110105	1	S	4J	0.1	0.050	JK7JR1AE	480	10	1.8777	912.6648	486.0547	243.0273	4,860.55	121806	1243
H6L110105	1	D	4J	0.1	0.050	JK7JR1AF	480	10	1.8730	910.3804	486.0547	243.0273	4,860.55	121806	1300
H6L110105	3		4J	0.1	0.050	JK7JX1AC	465	10	0.0000	ND	470.8655	235.4327	4,708.65	121806	1447
H6L110105	5		4J	0.1	0.050	JK7J11AC	600	10	0.0000	ND	607.5683	303.7842	6,075.68	121806	1504
H6L110106	2		4J	0.1	0.050	JK7J71AC	425	10	0.0000	ND	430.3609	215.1805	4,303.61	121806	1144
H6L110106	2	S	4J	0.1	0.050	JK7J71AE	425	10	2.0871	898.2062	430.3609	215.1805	4,303.61	121806	1410
H6L110106	2	D	4J	0.1	0.050	JK7J71AF	425	10	2.1017	904.4895	430.3609	215.1805	4,303.61	121806	1428
H6L110106	6		4J	0.1	0.050	JK7KG1AC	400	10	0.0000	ND	405.05	202.52	4,050.46	121806	1521
H6L110106	10		4J	0.1	0.050	JK7KT1AC	363	10	0.0000	ND	367.58	183.79	3,675.79	121806	1539
H6L110106	13		4J	0.1	0.050	JK7K01AC	100	10	0.0000	ND	101.26	50.63	1,012.61	121806	1556
H6L110106	13	S	4J	0.1	0.050	JK7K01AE	100	10	2.0459	207.1707	101.26	50.63	1,012.61	121806	1614
H6L110106	16		4J	0.1	0.050	JK7K41AC	100	10	0.0000	ND	101.26	50.63	1,012.61	121806	1631
H6L110106	16	S	4J	0.1	0.050	JK7K41AE	100	10	1.9983	202.3506	101.26	50.63	1,012.61	121806	1649
H6L270000	375	B	4J	0.1	0.050	JL69F1AA	100	1	0.0000	ND	10.13	5.06	101.26	121806	1052
H6L270000	375	C	4J	0.1	0.050	JL69F1AC	100	1	0.7219	73.1006	10.13	5.06	101.26	121806	1017
H6L270000	375	L	4J	0.1	0.050	JL69F1AD	100	1	0.7410	75.0347	10.13	5.06	101.26	121806	1034

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JL69F1AC	0.75	101.26	75.95
LCSD	ICWI-8838	100.00	0.750	100.0	JL69F1AD	0.75	101.26	75.95
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7JR1AE	0.20	4,860.55	972.11
MSD (1)	ICWI-8838	100.00	0.020	10.0	JK7JR1AF	0.20	4,860.55	972.11
MS (2)	ICWI-8838	100.00	0.020	10.0	JK7J71AE	0.20	4,303.61	860.72
MSD (2)	ICWI-8838	100.00	0.020	10.0	JK7J71AF	0.20	4,303.61	860.72
MS (3)	ICWI-8838	100.00	0.020	10.0	JK7K01AE	0.20	1,012.61	202.52
MSD (3)								
MS (4)	ICWI-8838	100.00	0.020	10.0	JK7K41AE	0.20	1,012.61	202.52
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
Dionex IC Runlog Cover Page

Analyst:	DEW	Date:	12/18/06	Sequence ID:	L18A_LOW_AIR_ANIONS_121806

Instrument:	☑ DX-600	Method:	☐ KNOX-WC-0003, SW-846 0061/7199
"Aragorn"	☐ ICS-1500		☐ KNOX-WC-0005, ☐ SW-846 9056 ☐ EPA 300.0 ☐ SW-846 9057-Mod ☑ EPA 26A-Mod
	☐ DX-320		☐ KNOX-WC-0014, EPA 314.0

Preventive Maintenance	Instrument Conditions		
Daily:	Flow Rate =	1.00	mL/min
☐ Check pump and gas pressure	Pressure =	2200.	psi
☐ Check all lines for crimping, leaks and discoloration	Conductance =	22.8	µS
As Needed:	Suppressor Current =	43.	mA
☐ Change column and guard column	Eluent Generator =	N/A	mM KOH
☐ Change column and/or guard column bed support			
☐ Clean conductivity cell			
☐ De-gas pump head when flow is erratic			
☐ Check/replace eluant end line filter			

MS/MSD Spike Information

WO #	Compound	Spike ID	Parent Conc.	Spike Added (mL)	Final Volume (mL)	Final Conc.
JK7JR	F^-	ICWI-8838	100. ppm	0.02	10 ml	0.20 ppm
	Cl^-					
	Br^-					
JK7J7	F^-					
	Cl^-					
	Br^-					
JK7K0	F^-					
	Cl^-					
	Br^-					
JK7K4	F^-					
	Cl^-					
	Br^-					
				DEW 12/28/06		

Comments:

HF Batch - 6361376
HBr Batch - 6361375

☐ Sodium Thiosulfate added to NaOH impinger samples.

Sequence: L18A_LOW_AIR_ANIONS_121806
Operator: wheelerd

Printed: 12/19/2006 7:35:58 AM

DEW 12/19/06

Title:
Datasource: Aragorn_net
Location: IC_ARAGORN
Timebase: IC_Aragorn
#Samples: 36

Created: 12/18/2006 10:16:29 AM by wheelerd
Last Update: 12/19/2006 7:35:45 AM by wheelerd

No.	Name	Sample ID	Inj. Vol.	Inj. Date/Time	Dil. Factor	*Multiplier [Liters]	Weight
1	CAL STD 1 = ICWS-9045 @ (0.075ppm)		50.0	12/14/2006 4:54:12 PM	1.0000		1.0000
2	CAL STD 2 = ICWS-9046 @ (0.10ppm)		50.0	12/14/2006 5:11:38 PM	1.0000		1.0000
3	CAL STD 3 = ICWS-9047 @ (0.25ppm)		50.0	12/14/2006 5:24:03 PM	1.0000		1.0000
4	CAL STD 4 = ICWS-9048 @ (0.50ppm)		50.0	12/14/2006 5:36:29 PM	1.0000		1.0000
5	CAL STD 5 = ICWS-9049 @ (1.ppm)		50.0	12/14/2006 5:48:54 PM	1.0000		1.0000
6	CAL STD 6 = ICWS-9050 @ (2.ppm)		50.0	12/14/2006 6:01:20 PM	1.0000		1.0000
7	ICV/LCS= ICWS-9056		50.0	12/18/2006 10:17:27 AM	1.0000		1.0000
8	ICV/LCSD= ICWS-9057		50.0	12/18/2006 10:34:53 AM	1.0000		1.0000
9	ICB/ METHOD BLANK		50.0	12/18/2006 10:52:18 AM	1.0000		1.0000
10	H6L110105-JK7JR-1/10		50.0	12/18/2006 11:26:40 AM	10.0000		1.0000
11	H6L110106-JK7J7-1/10		50.0	12/18/2006 11:44:06 AM	10.0000		1.0000
12	H6L110105-JK7JR-1/20		50.0	12/18/2006 12:08:40 PM	20.0000		1.0000
13	H6L110105-JK7JR-1/10-MS		50.0	12/18/2006 12:43:28 PM	10.0000		1.0000
14	H6L110105-JK7JR/1/10-MSD		50.0	12/18/2006 1:00:54 PM	10.0000		1.0000
15	H6L110105-JK7JR-1/20-MS		50.0	12/18/2006 1:18:20 PM	20.0000		1.0000
16	CCV = ICWS-9058		50.0	12/18/2006 1:35:45 PM	1.0000		1.0000
17	CCB		50.0	12/18/2006 1:53:11 PM	1.0000		1.0000
18	H6L110106-JK7J7-1/10-MS		50.0	12/18/2006 2:10:37 PM	10.0000		1.0000
19	H6L110106-JK7J7-1/10-MSD		50.0	12/18/2006 2:28:03 PM	10.0000		1.0000
20	H6L110105-JK7JX-1/10		50.0	12/18/2006 2:47:03 PM	10.0000		1.0000
21	H6L110105-JK7J1-1/10		50.0	12/18/2006 3:04:28 PM	10.0000		1.0000
22	H6L110106-JK7KG-1/10		50.0	12/18/2006 3:21:54 PM	10.0000		1.0000
23	H6L110105-JK7KT-1/10		50.0	12/18/2006 3:39:19 PM	10.0000		1.0000
24	H6L110106-JK7K0-1/10		50.0	12/18/2006 3:56:45 PM	10.0000		1.0000
25	H6L110106-JK7K0-1/10-MS		50.0	12/18/2006 4:14:11 PM	10.0000		1.0000
26	H6L110106-JK7K4-1/10		50.0	12/18/2006 4:31:36 PM	10.0000		1.0000
27	H6L110106-JK7K4-1/10-MS		50.0	12/18/2006 4:49:02 PM	10.0000		1.0000
28	CCV= ICWS-9058		50.0	12/18/2006 5:06:27 PM	1.0000		1.0000
29	CCB		50.0	12/18/2006 5:23:52 PM	1.0000		1.0000
30	H6L110106-JK7K0-1/20		50.0	12/18/2006 5:41:18 PM	20.0000		1.0000
31	H6L110106-JK7K0-1/20-MS		50.0	12/18/2006 5:58:43 PM	20.0000		1.0000
32	H6L110106-JK7K0-1/40		50.0	12/18/2006 6:16:09 PM	40.0000		1.0000
33	H6L110106-JK7K0-1/40-MS		50.0	12/18/2006 6:33:34 PM	40.0000		1.0000
34	CCV= ICWS-9058		50.0	12/18/2006 6:50:59 PM	1.0000		1.0000
35	CCB		50.0	12/18/2006 7:08:24 PM	1.0000		1.0000
36	SHUTDOWN		50.0	12/18/2006 7:25:50 PM	1.0000		1.0000

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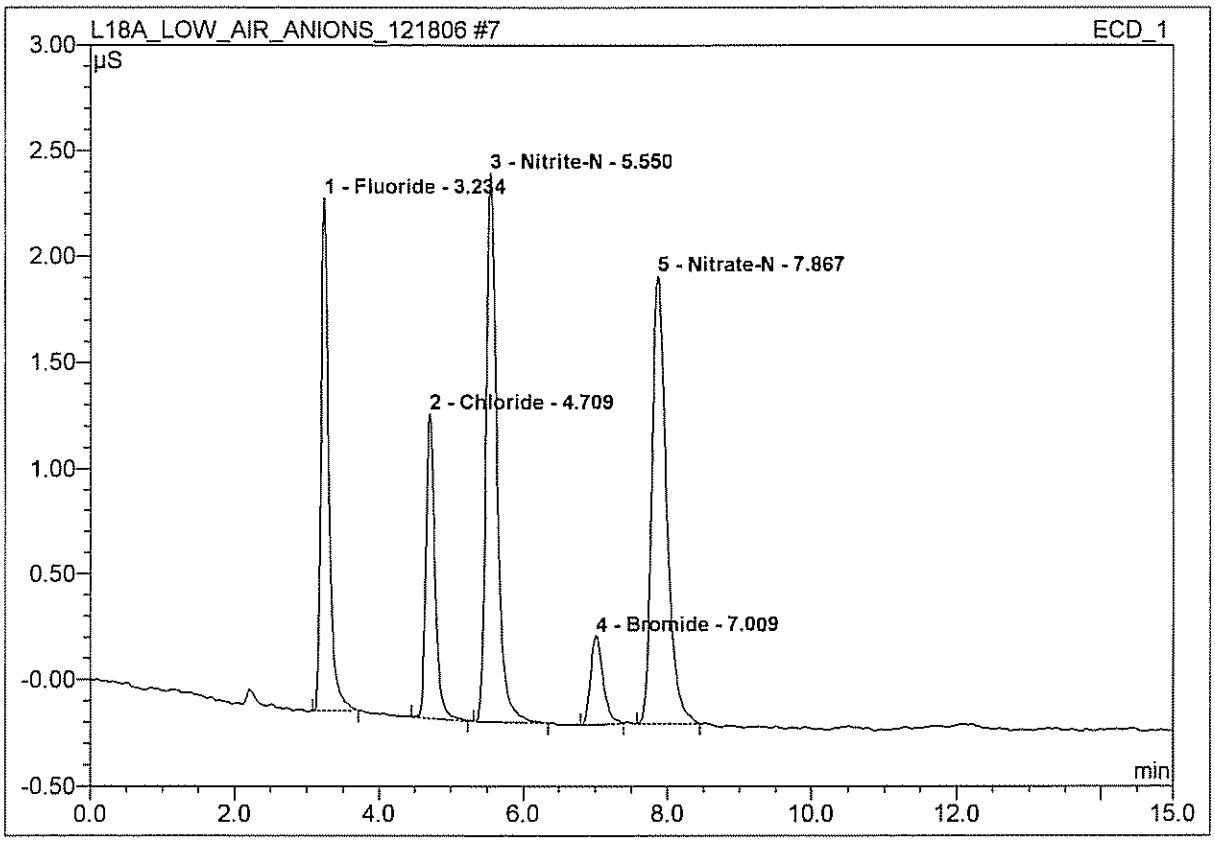
7 ICV/LCS= ICWS-9056

Sample Name:	**ICV/LCS= ICWS-9056**	*Injection Volume:*	**50.0**
Vial Number:	**104**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 10:17**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

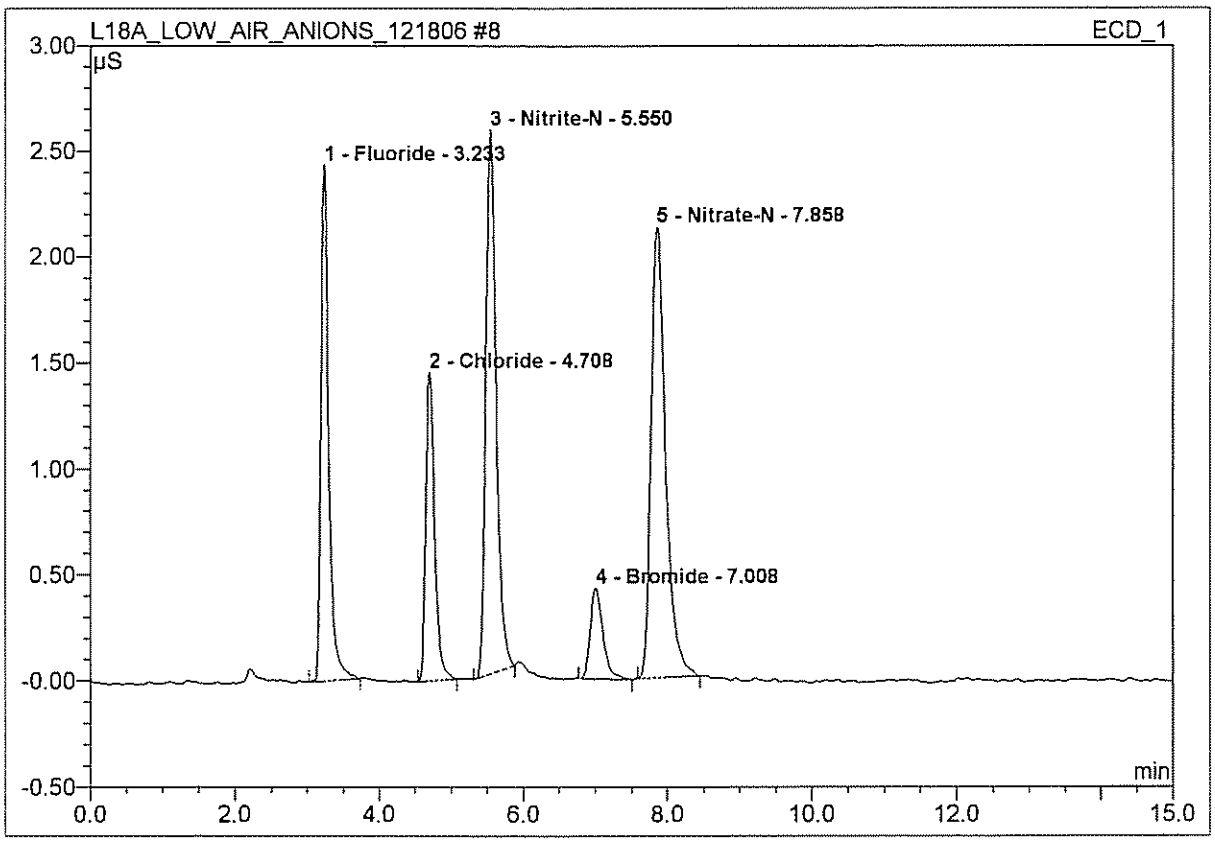


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	2.42157	0.305	19.82	0.7480	BMB
2	4.71	Chloride	1.43770	0.207	13.45	0.7502	BMB
3	5.55	Nitrite-N	2.59076	0.450	29.23	0.7442	BMB
4	7.01	Bromide	0.41601	0.083	5.39	0.7219	BMB
5	7.87	Nitrate-N	2.11264	0.495	32.11	0.7415	BMB

HF - JL69G-1AC
HBr - JL69F-1AC
HCl - JL8TM-1AC

8 ICV/LCSD= ICWS-9057

Sample Name:	**ICV/LCSD= ICWS-9057**	*Injection Volume:*	**50.0**
Vial Number:	**105**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 10:34**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

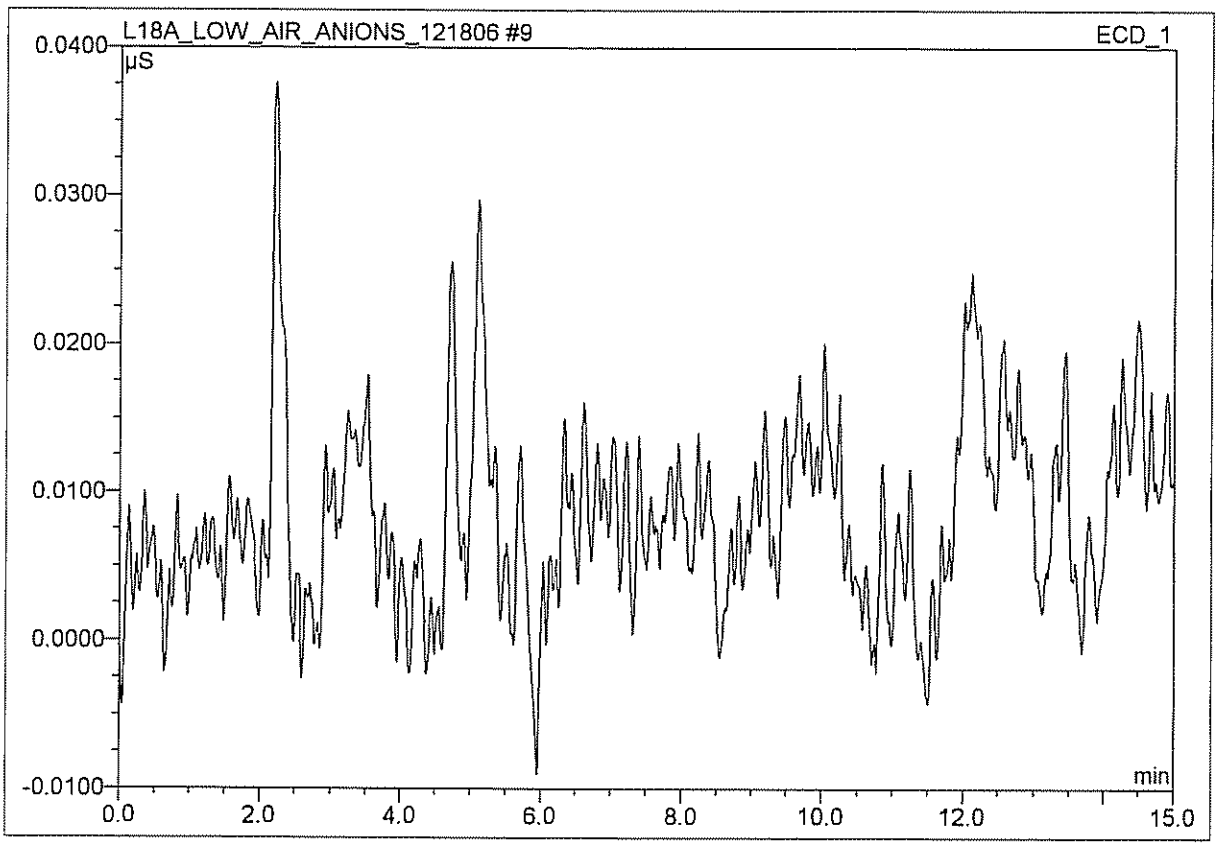


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	2.43474	0.307	20.23	0.7519	BMB ✓
2	4.71	Chloride	1.45569	0.205	13.51	0.7593	BMB ✓
3	5.55	Nitrite-N	2.56761	0.424	27.92	0.7377	BMB
4	7.01	Bromide	0.42719	0.086	5.70	0.7410	BMB ✓
5	7.86	Nitrate-N	2.12412	0.495	32.64	0.7454	BMB

HF - JL69G-1AD
HBr - JL69F-1AD
HCl - JL8TM-1AD

9 ICB/ METHOD BLANK

Sample Name:	**ICB/ METHOD BLANK**	*Injection Volume:*	**50.0**
Vial Number:	**139**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 10:52**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



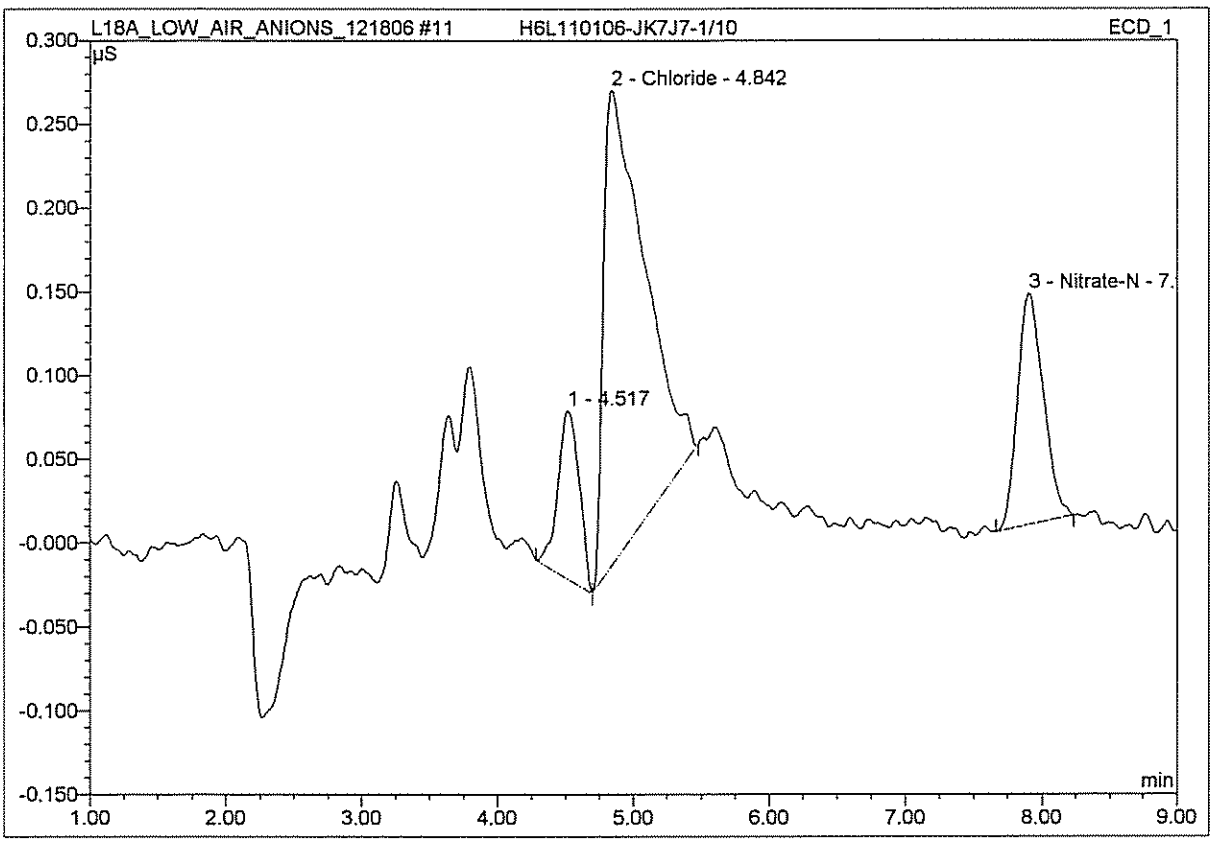
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

HF- JL69G-1AA
HBr- JL69F-1AA
HCl- JL8TM-1AA

11 H6L110106-JK7J7-1/10

Sample Name:	**H6L110106-JK7J7-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**141**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 11:44**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

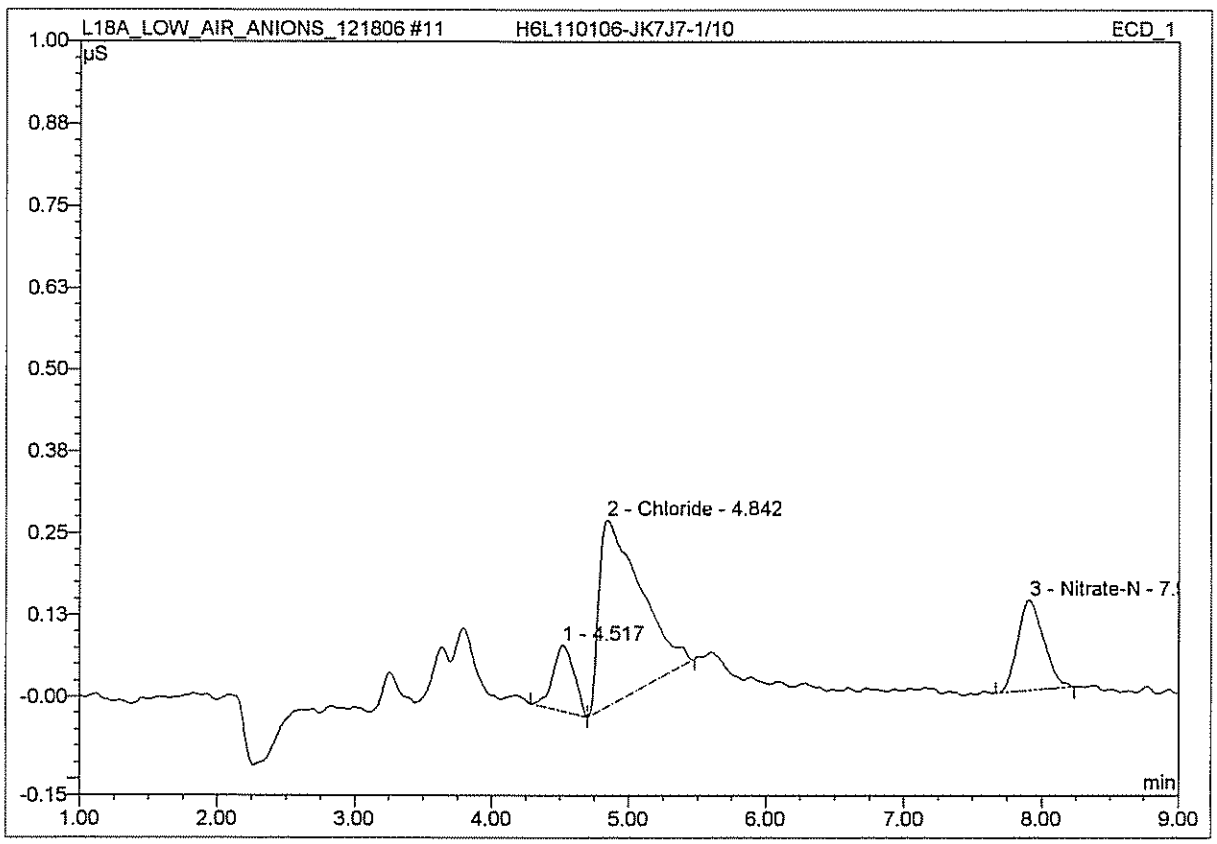


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.52	n.a.	0.10057	0.018	0.03	n.a.	BMb
2	4.84	Chloride	0.28417	0.098	0.13	1.5138	bMB
3	7.91	Nitrate-N	0.13805	0.030	0.04	0.5027	BMB
4	10.79	n.a.	0.19479	0.056	0.08	n.a.	BMB
5	11.87	n.a.	##########	72.927	99.72	n.a.	BMB

HF-ND ✓
HBr-ND ✓

11 H6L110106-JK7J7-1/10

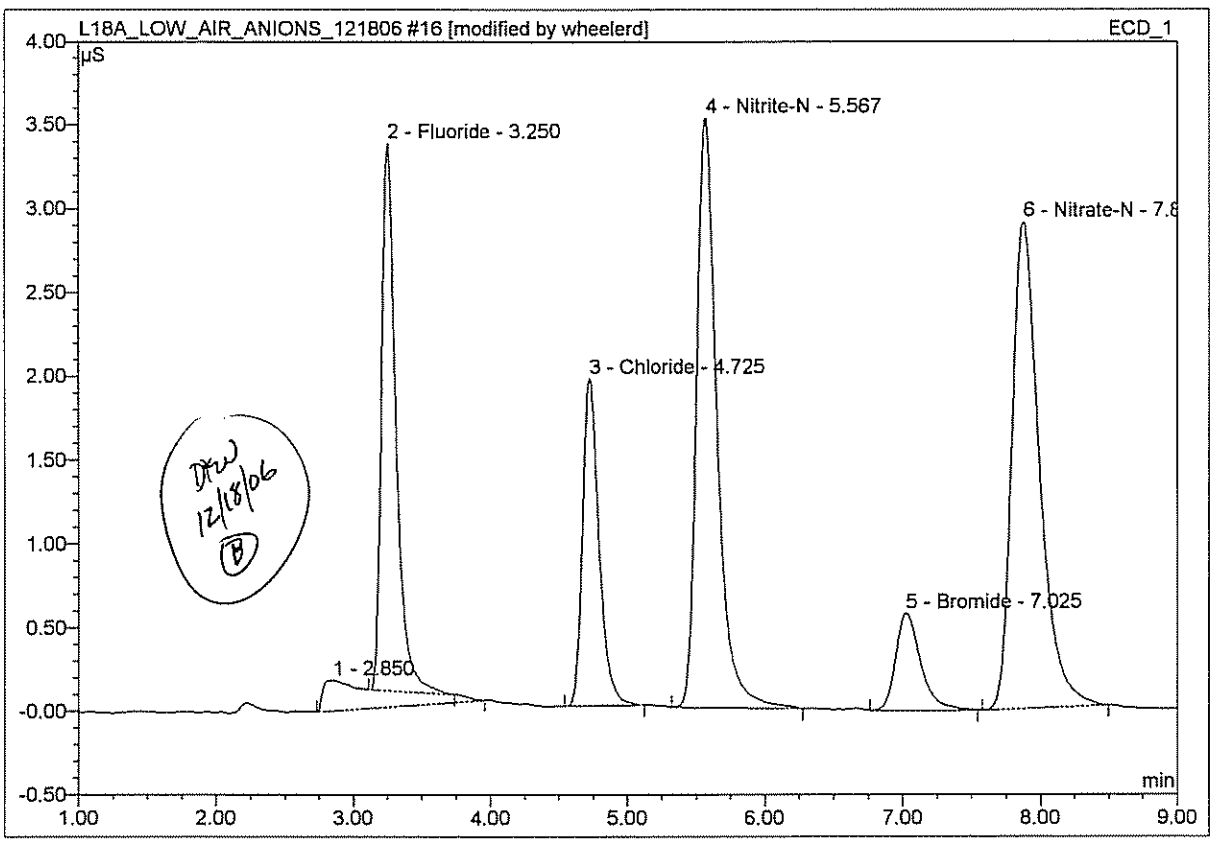
Sample Name:	**H6L110106-JK7J7-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**141**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 11:44**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.52	n.a.	0.10057	0.018	0.03	n.a.	BMb
2	4.84	Chloride	0.28417	0.098	0.13	1.5138	bMB
3	7.91	Nitrate-N	0.13805	0.030	0.04	0.5027	BMB
4	10.79	n.a.	0.19479	0.056	0.08	n.a.	BMB
5	11.87	n.a.	##########	72.927	99.72	n.a.	BMB

16 CCV = ICWS-9058

Sample Name:	**CCV = ICWS-9058**	*Injection Volume:*	**50.0**
Vial Number:	**147**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 13:35**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

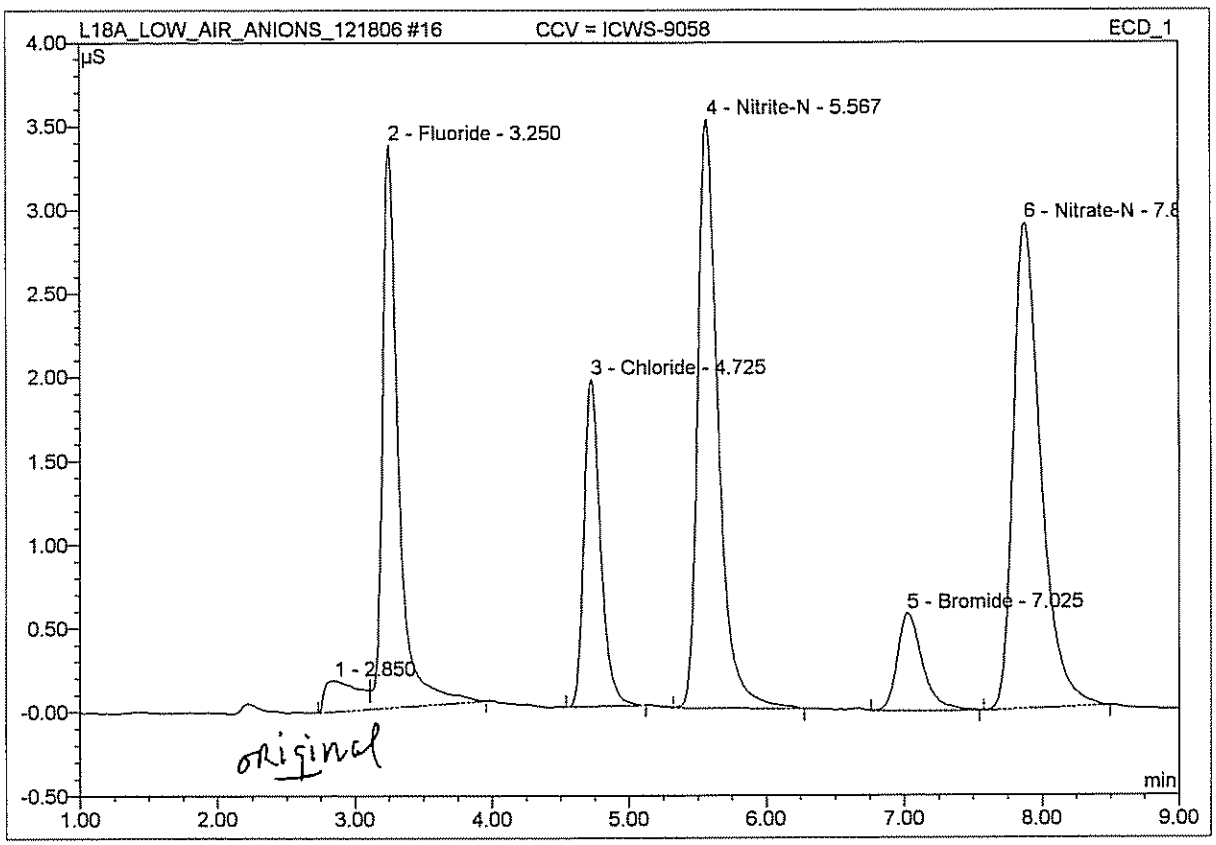


DKW 12/18/06 B

No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.85	n.a.	0.18302	0.106	4.79	n.a.	BMB*
2	3.25	Fluoride	3.26791	0.404	18.23	0.9974	Rd*
3	4.73	Chloride	1.95319	0.274	12.36	1.0101	BMB
4	5.57	Nitrite-N	3.51969	0.608	27.45	1.0007	BMB
5	7.03	Bromide	0.58477	0.123	5.55	1.0095	BMB
6	7.88	Nitrate-N	2.90661	0.677	30.56	1.0062	BMB
7	12.05	n.a.	0.07024	0.023	1.05	n.a.	BMB

16 CCV = ICWS-9058

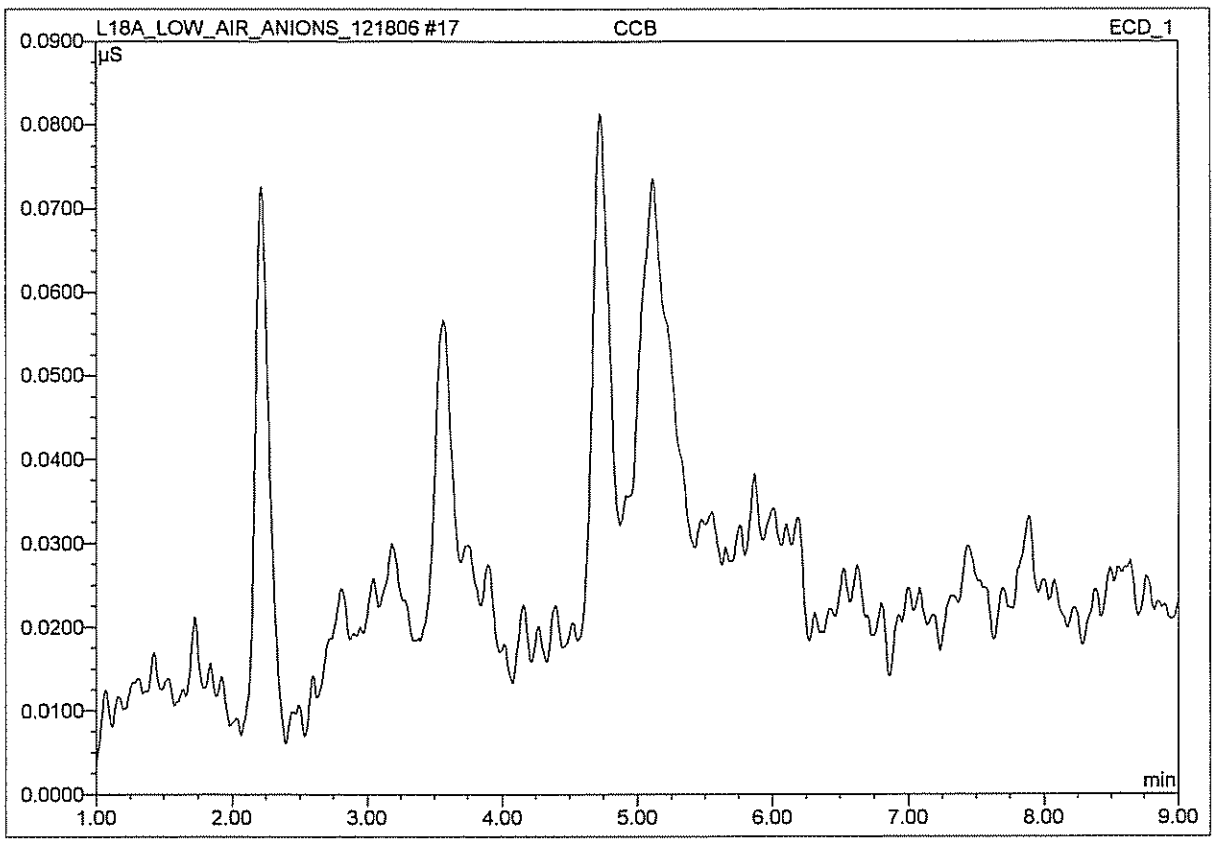
Sample Name:	**CCV = ICWS-9058**	*Injection Volume:*	**50.0**
Vial Number:	**147**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 13:35**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.85	n.a.	0.18302	0.052	2.35	n.a.	BM
2	3.25	Fluoride	3.36406	0.458	20.68	1.0254	MB
3	4.73	Chloride	1.95319	0.274	12.36	1.0101	BMB
4	5.57	Nitrite-N	3.51969	0.608	27.45	1.0007	BMB
5	7.03	Bromide	0.58477	0.123	5.55	1.0095	BMB
6	7.88	Nitrate-N	2.90661	0.677	30.56	1.0062	BMB
7	12.05	n.a.	0.07024	0.023	1.05	n.a.	BMB

17 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**148**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 13:53**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

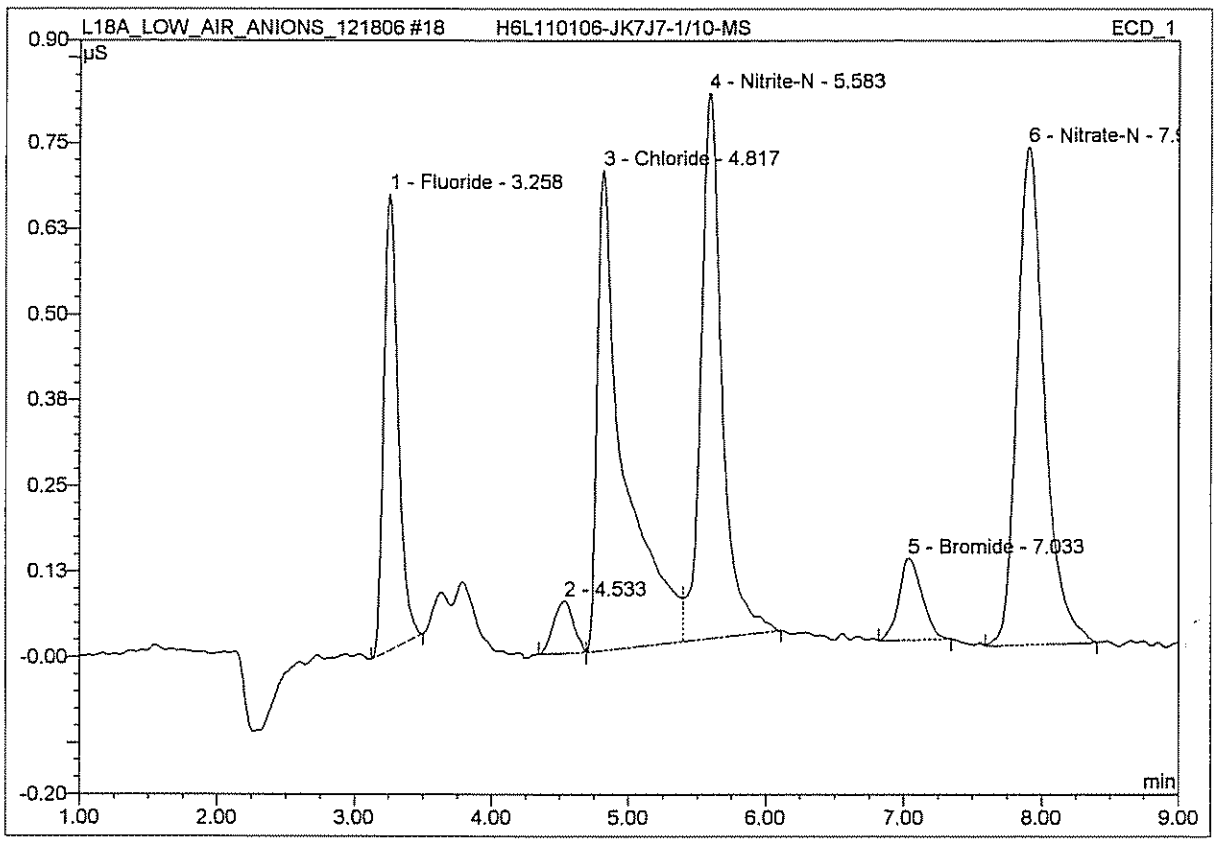


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

18 H6L110106-JK7J7-1/10-MS

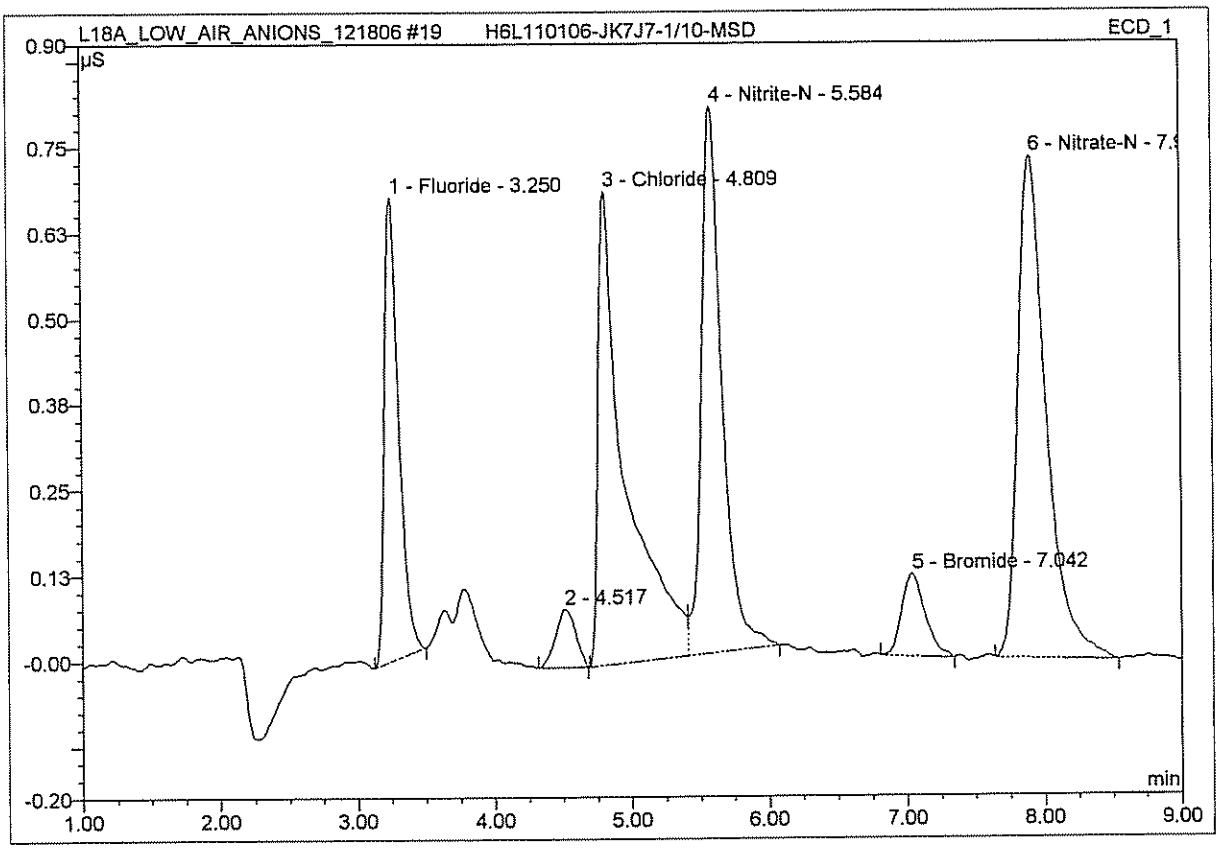
Sample Name:	**H6L110106-JK7J7-1/10-MS**	*Injection Volume:*	**50.0**
Vial Number:	**149**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 14:10**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.26	Fluoride	0.66476	0.081	0.11	2.1079	BMB
2	4.53	n.a.	0.07663	0.013	0.02	n.a.	BMb
3	4.82	Chloride	0.70076	0.158	0.21	3.7046	bM
4	5.58	Nitrite-N	0.79567	0.143	0.19	2.3336	MB
5	7.03	Bromide	0.11918	0.023	0.03	2.0871	BMB
6	7.90	Nitrate-N	0.72528	0.168	0.23	2.6111	BMB
7	10.77	n.a.	0.15082	0.045	0.06	n.a.	BMB
8	11.86	n.a.	##########	73.413	99.15	n.a.	BMB

19 H6L110106-JK7J7-1/10-MSD

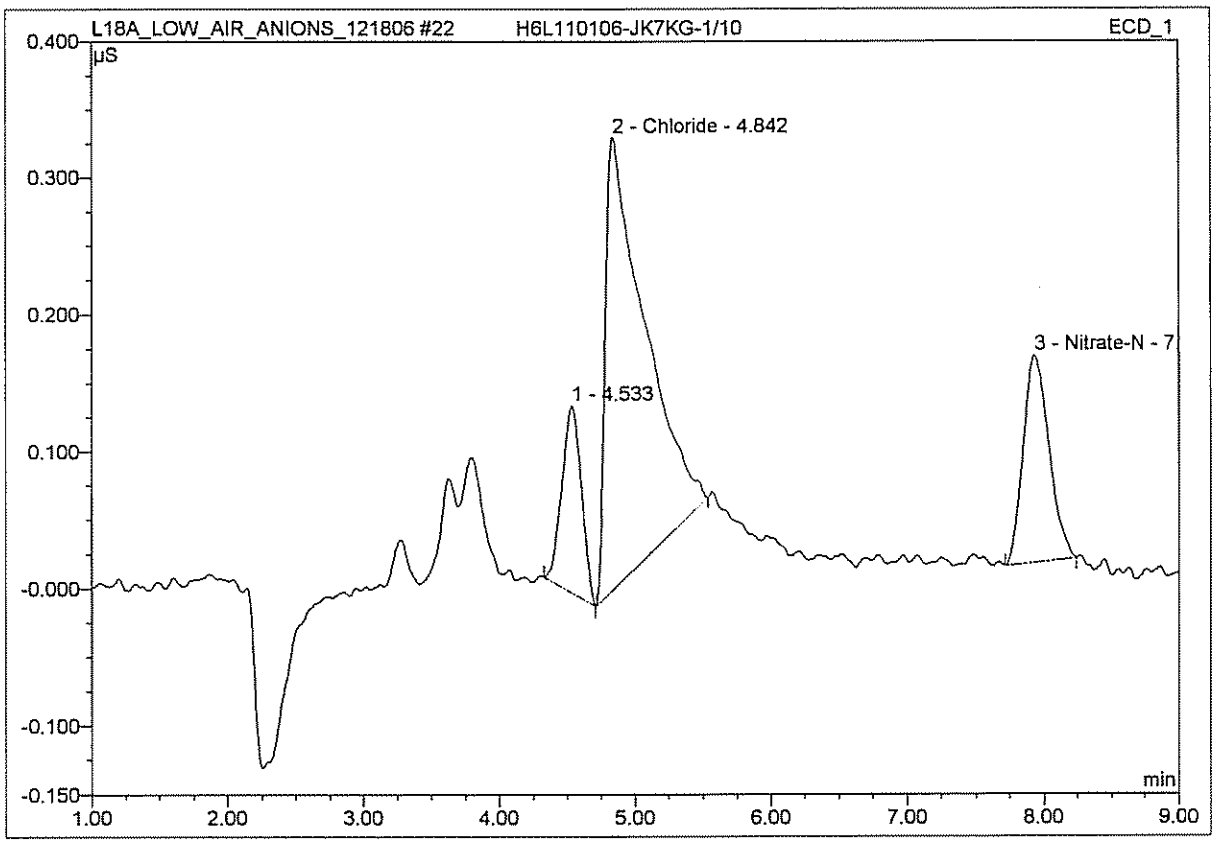
Sample Name:	**H6L110106-JK7J7-1/10-MSD**	*Injection Volume:*	**50.0**
Vial Number:	**150**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 14:28**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.25	Fluoride	0.67613	0.083	0.11	2.1436	BMB
2	4.52	n.a.	0.08511	0.014	0.02	n.a.	BMB
3	4.81	Chloride	0.69145	0.160	0.22	3.6560	BM
4	5.58	Nitrite-N	0.79716	0.139	0.19	2.3380	MB
5	7.04	Bromide	0.12001	0.023	0.03	2.1017	BMB
6	7.90	Nitrate-N	0.73241	0.175	0.24	2.6364	BMB
7	10.79	n.a.	0.13646	0.039	0.05	n.a.	BMB
8	11.86	n.a.	##########	73.451	99.15	n.a.	BMB

22 H6L110106-JK7KG-1/10

Sample Name:	**H6L110106-JK7KG-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**153**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 15:21**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



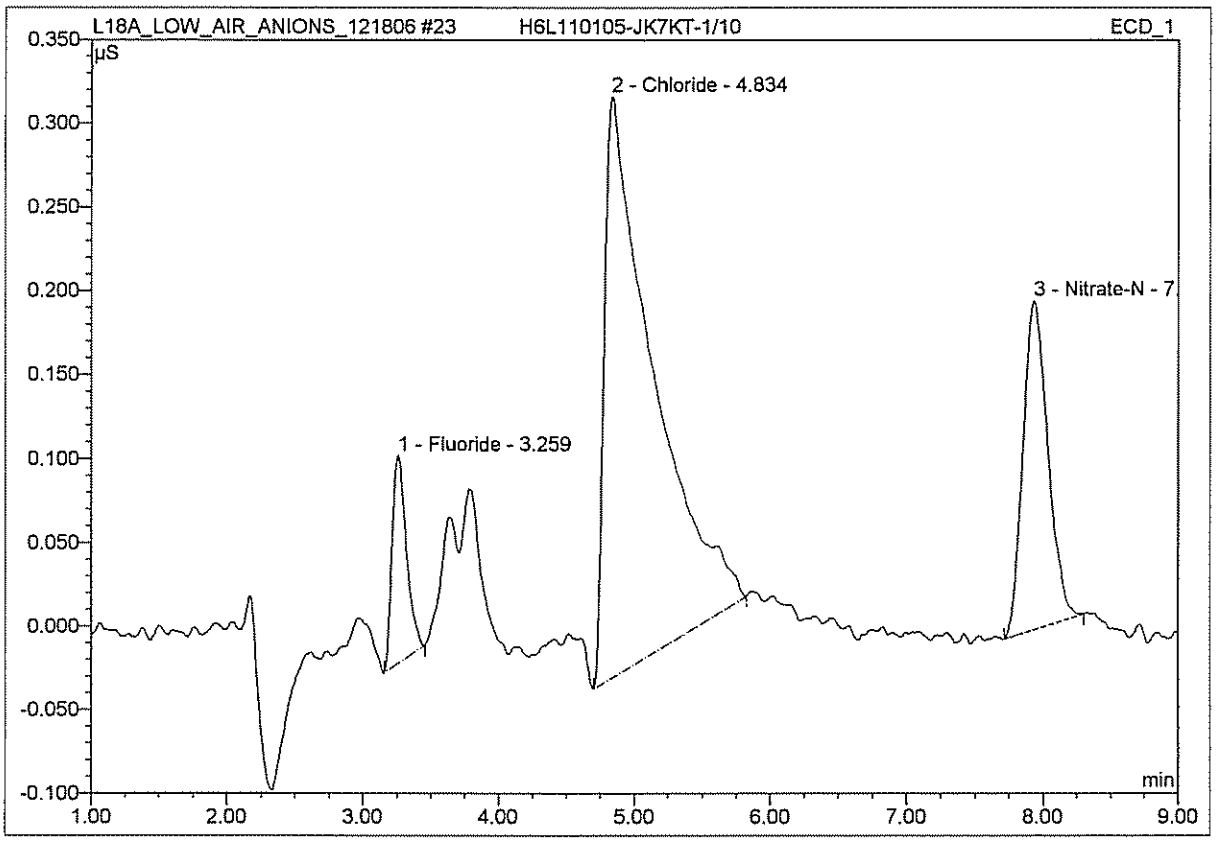
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.53	n.a.	0.13641	0.023	0.03	n.a.	BMB
2	4.84	Chloride	0.32998	0.111	0.14	1.7564	BMB
3	7.93	Nitrate-N	0.15141	0.033	0.04	0.5512	BMB
4	10.79	n.a.	1.62974	0.480	0.62	n.a.	BMB
5	11.86	n.a.	##########	76.555	99.16	n.a.	bMB

HF - ND ✓
HBr - ND ✓

6 ew 12/21/06

23 H6L110105-JK7KT-1/10

Sample Name:	**H6L110105-JK7KT-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**161**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 15:39**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

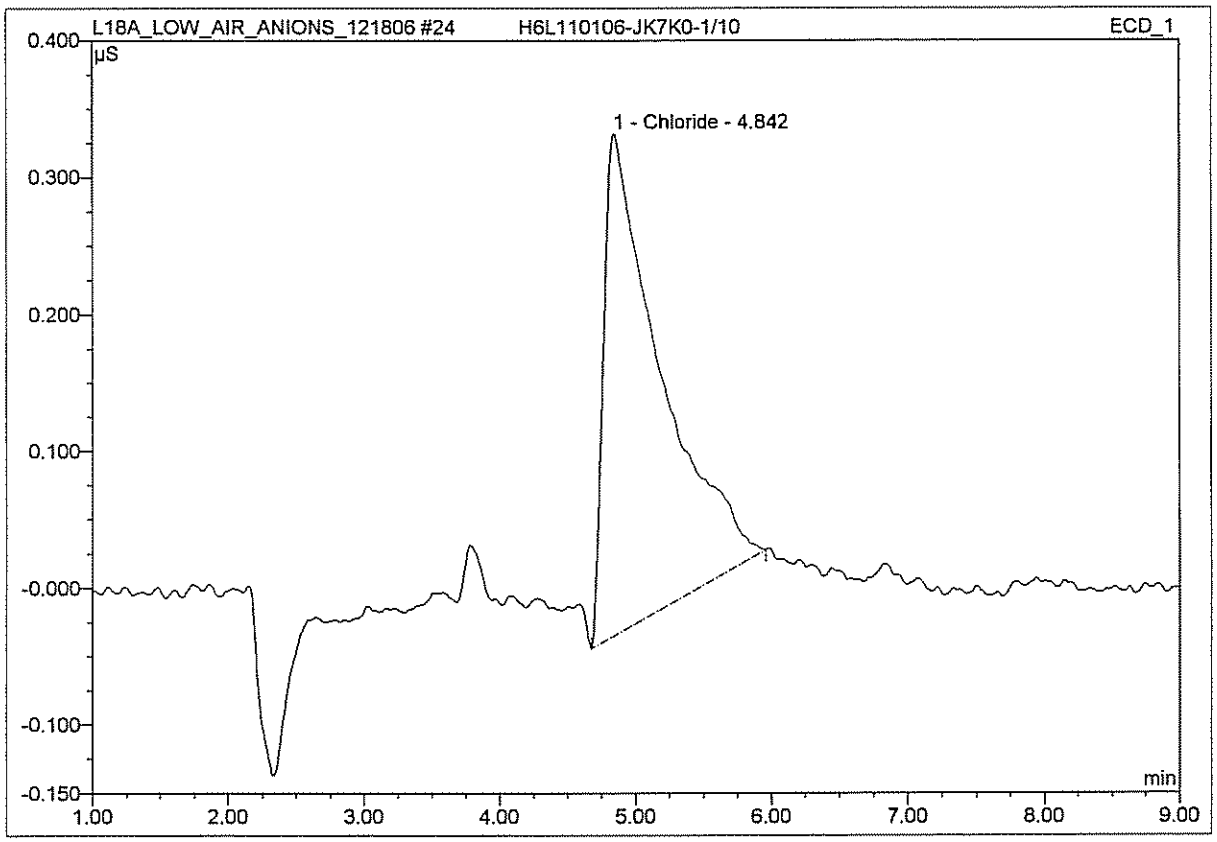


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.26	Fluoride	0.12412	0.015	0.02	0.3969	BMB
2	4.83	Chloride	0.34716	0.144	0.17	1.8472	BMB
3	7.93	Nitrate-N	0.19611	0.042	0.05	0.7133	BMB
4	10.19	n.a.	0.06112	0.018	0.02	n.a.	BMB
5	11.83	n.a.	##########	86.331	99.75	n.a.	BMB

HBr - ND

24 H6L110106-JK7K0-1/10

Sample Name:	**H6L110106-JK7K0-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**162**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 15:56**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

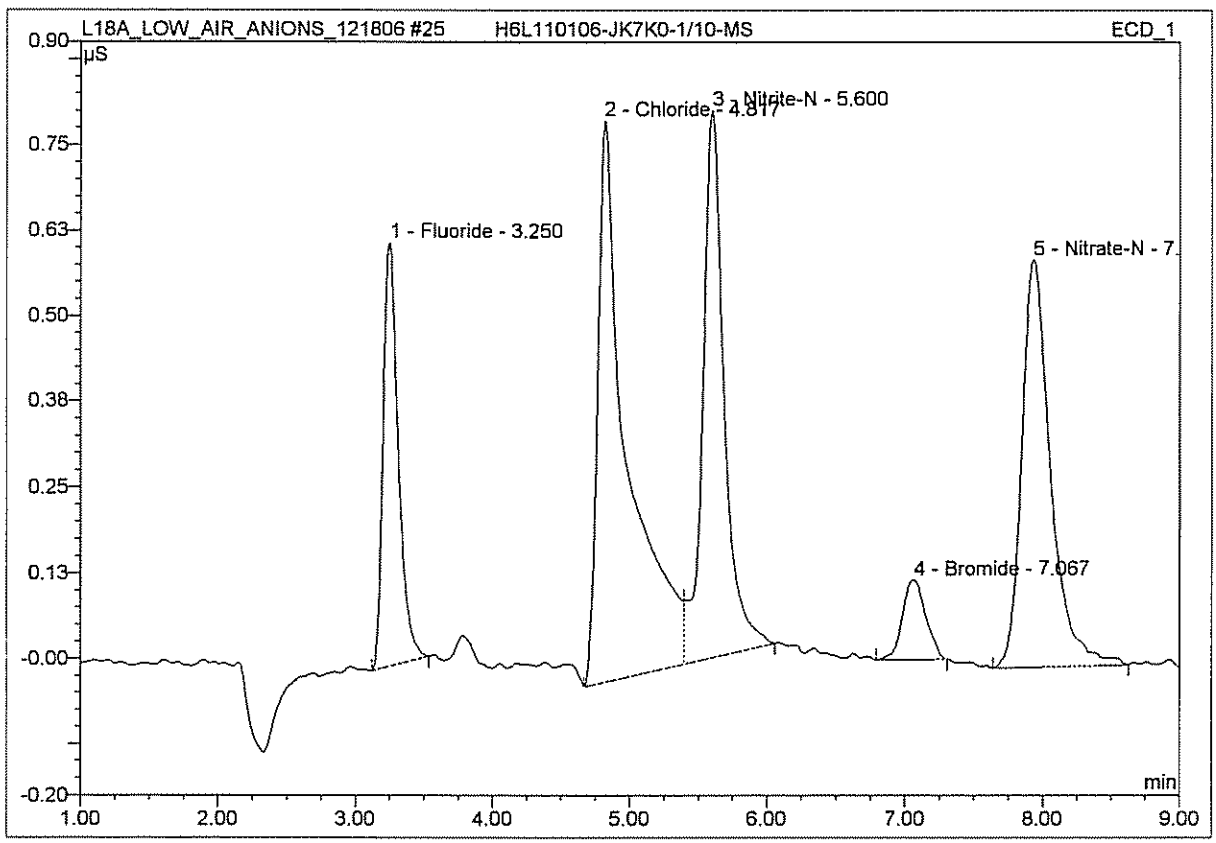


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.84	Chloride	0.36692	0.177	0.16	1.9517	BMB
2	11.78	n.a.	##########	112.940	99.84	n.a.	BMB

HF - ND ✓
HBr - ND ✓

25 H6L110106-JK7K0-1/10-MS

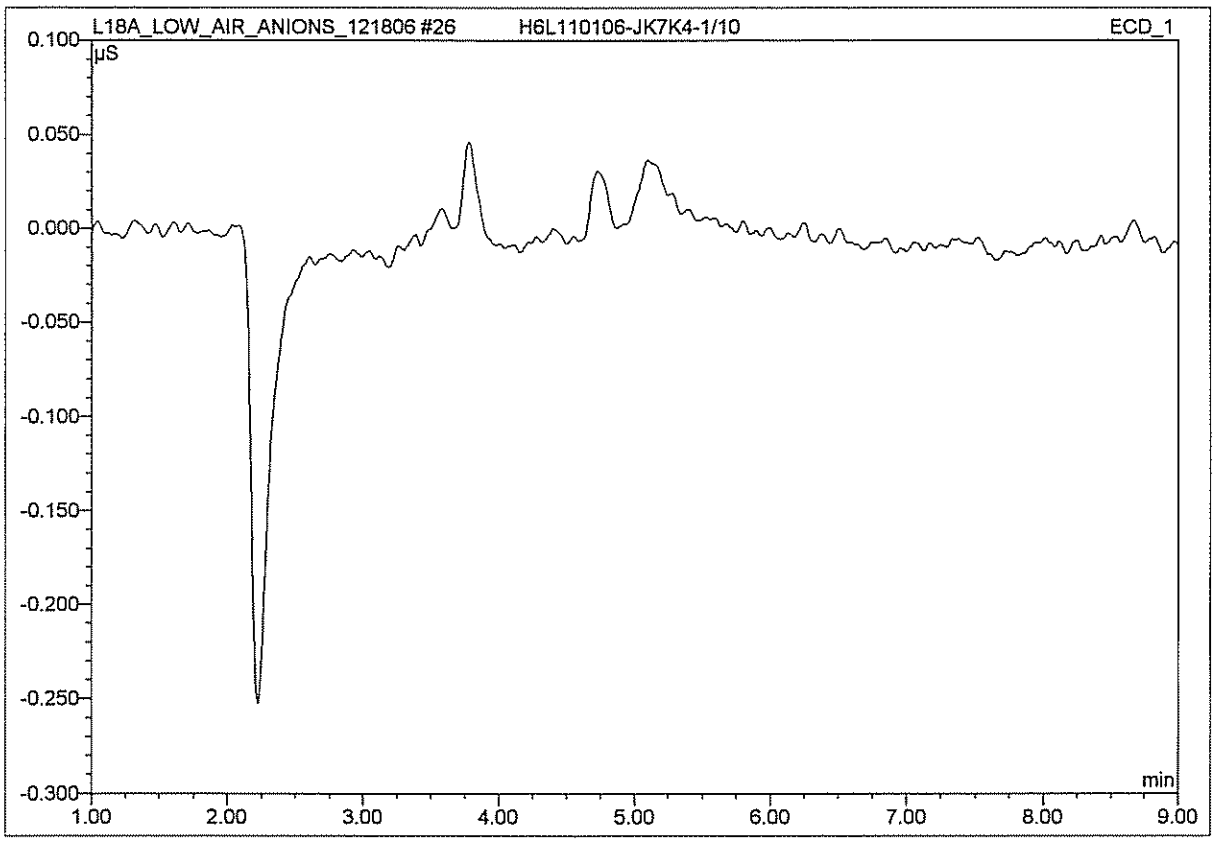
Sample Name:	**H6L110106-JK7K0-1/10-MS**	*Injection Volume:*	**50.0**
Vial Number:	**163**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 16:14**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.25	Fluoride	0.61755	0.080	0.07	1.9596	BMB
2	4.82	Chloride	0.81881	0.204	0.18	4.3195	BM
3	5.60	Nitrite-N	0.79855	0.145	0.13	2.3420	MB
4	7.07	Bromide	0.11681	0.023	0.02	2.0459	BMB
5	7.93	Nitrate-N	0.59481	0.145	0.13	2.1467	BMB
6	11.78	n.a.	#########	113.040	99.47	n.a.	BMB

26 H6L110106-JK7K4-1/10

Sample Name:	**H6L110106-JK7K4-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**164**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 16:31**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

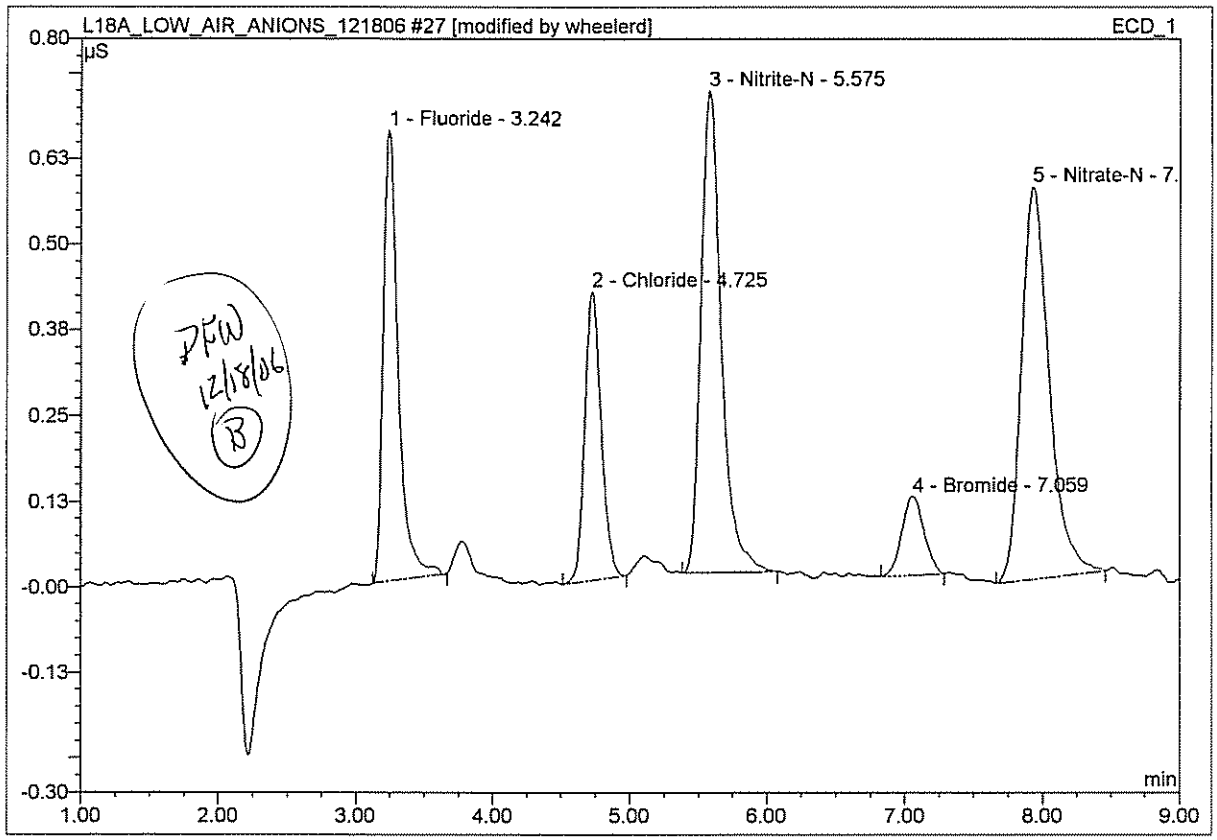


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	12.08	n.a.	0.16774	0.068	100.00	n.a.	BMB

All ND ✓

27 H6L110106-JK7K4-1/10-MS

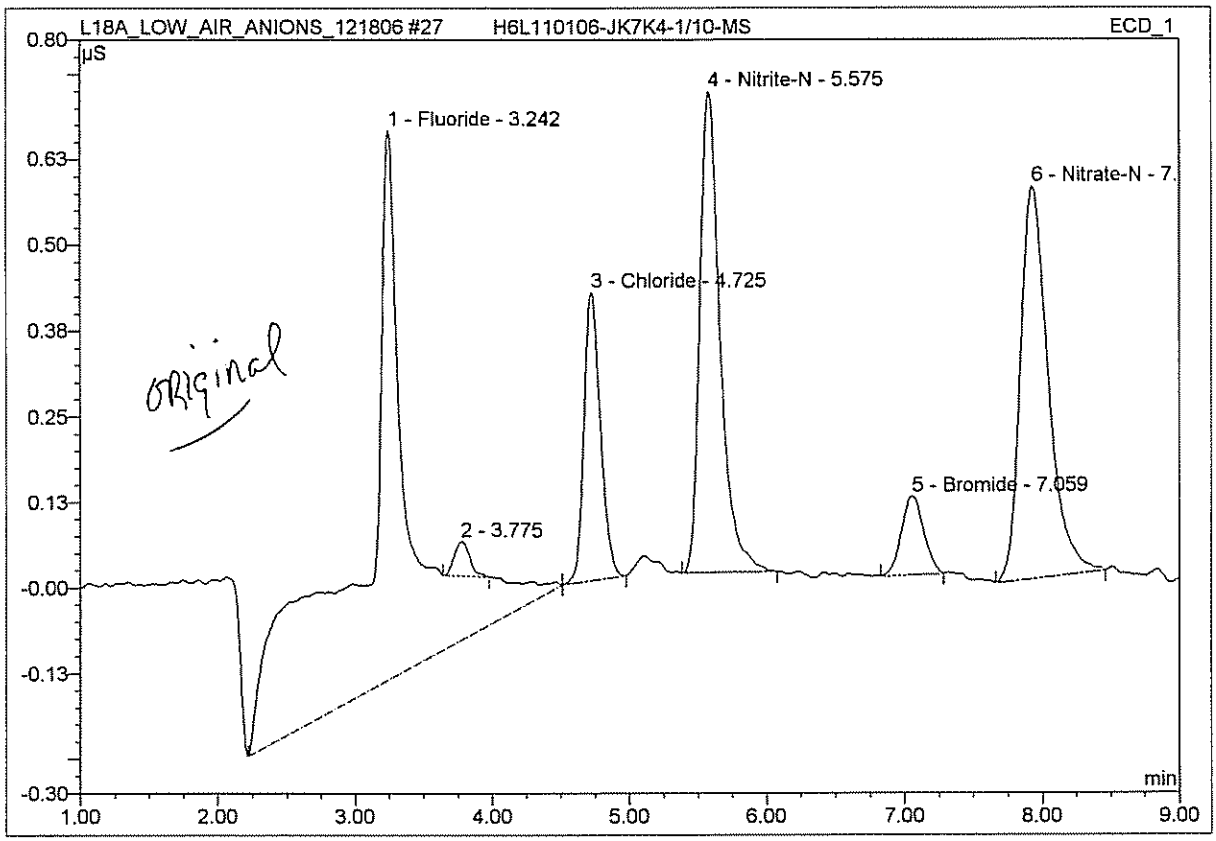
Sample Name:	**H6L110106-JK7K4-1/10-MS**	*Injection Volume:*	**50.0**
Vial Number:	**165**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 16:49**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.24	Fluoride	0.65758	0.084	18.29	2.0853	BMB*
2	4.73	Chloride	0.42054	0.058	12.74	2.2346	BMB*
3	5.58	Nitrite-N	0.70290	0.121	26.39	2.0638	BMB
4	7.06	Bromide	0.11409	0.021	4.66	1.9983	BMB
5	7.93	Nitrate-N	0.57178	0.135	29.45	2.0645	BMB
6	12.08	n.a.	0.08212	0.039	8.47	n.a.	BMB

27 H6L110106-JK7K4-1/10-MS

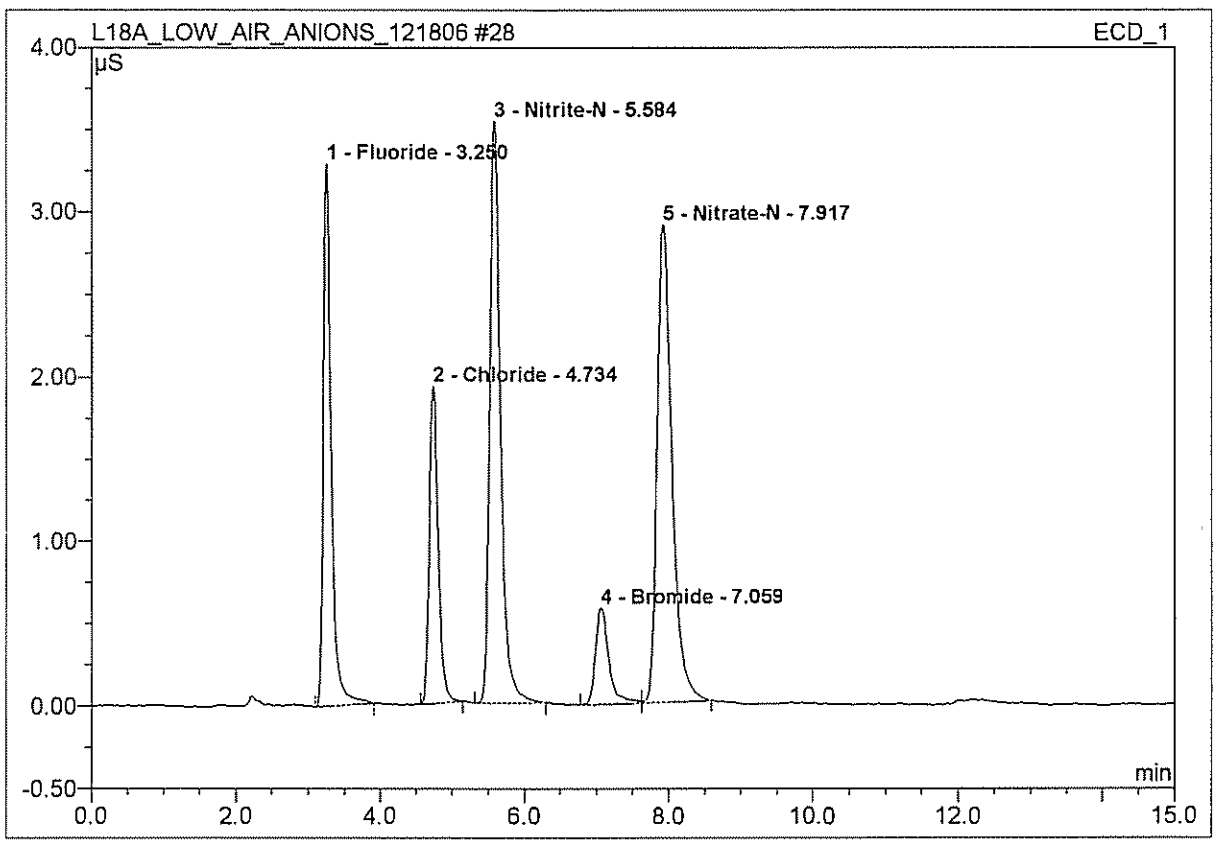
Sample Name:	**H6L110106-JK7K4-1/10-MS**	*Injection Volume:*	**50.0**
Vial Number:	**165**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 16:49**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.24	Fluoride	0.80083	0.347	47.67	2.5340	BMB
2	3.78	n.a.	0.05067	0.007	0.92	n.a.	Rd
3	4.73	Chloride	0.42054	0.058	8.02	2.2346	bMB
4	5.58	Nitrite-N	0.70290	0.121	16.60	2.0638	BMB
5	7.06	Bromide	0.11409	0.021	2.93	1.9983	BMB
6	7.93	Nitrate-N	0.57178	0.135	18.53	2.0645	BMB
7	12.08	n.a.	0.08212	0.039	5.33	n.a.	BMB

28 CCV= ICWS-9058

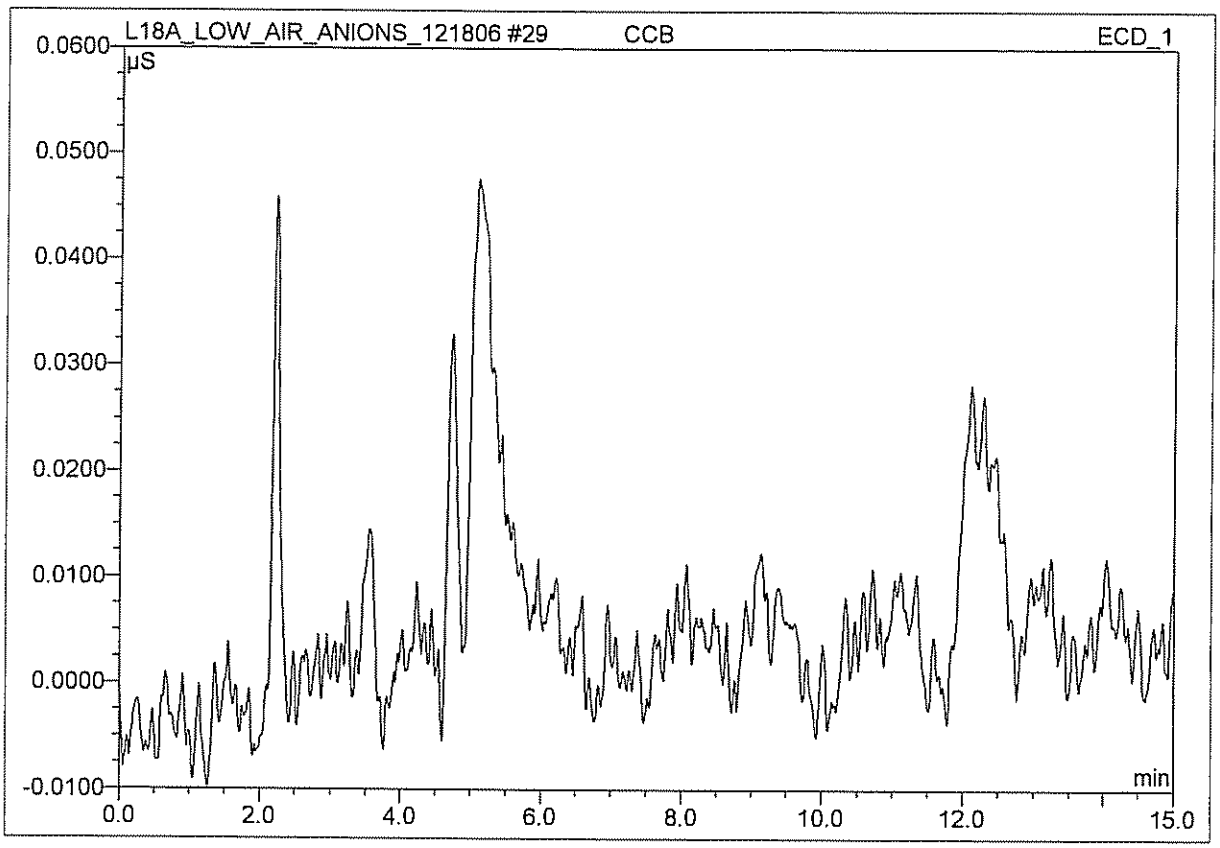
Sample Name:	**CCV= ICWS-9058**	*Injection Volume:*	**50.0**
Vial Number:	**166**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 17:06**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.25	Fluoride	3.29330	0.422	19.95	1.0048	BMB
2	4.73	Chloride	1.92845	0.274	12.94	0.9978	BMB
3	5.58	Nitrite-N	3.53011	0.610	28.81	1.0035	BMB
4	7.06	Bromide	0.58345	0.124	5.88	1.0073	BM
5	7.92	Nitrate-N	2.89375	0.686	32.42	1.0020	MB

29 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**167**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 17:23**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

STL Knoxville Anions in Air Data Review / Narrative Checklist for Methods 9056/9057/26A, SOP KNOX-WC-0005, Rev. 8

Lot #:	~~H6L160118~~ RMW 12/28/06 H6L110106	Analysis Date:	12/19/06	File ID:	L19A-LOW-AIR-ANIONS-121906	ICAL File ID:	L14A-LOW-AIR-ANIONS-121406

Review Items	NA	Yes	No	If No, why is data reportable?	2nd ✓
1. Were PM checklists (L40), Lot Summary and any applicable QAS reviewed?		✓			✓
2. ICV within 90-110%R?		✓			✓
3. ICB/CCB < 1/2 RL?		✓		☐ **[ccb1] No analyte > MDL in associated samples.**	✓
4. CCVs/CCBs run after every 10 samples, and at end of sequence?		✓			✓
5. Is %D ≤10% for each CCV?		✓			✓
6. If CCV failed, was it rerun only once?	✓				N/A
7. LCS/LCSD analytes within 90-110%R? *If no, list LCS ID:*		✓		☐ **[lcs3] LCS recovery >upper control limit & sample results <RL.**	✓
8. Method blank < 1/2 RL? *If no, list blank ID:*		✓		☐ **[mb3] No analyte > RL in associated samples.** ☐ [mb7] Sample results > 10x higher than blank.	✓
9. Matrix spikes run at required frequency?		✓			✓
10. Matrix spikes within 75-125% recovery? *If no, list MS ID:* _____		✓		☐ [air ms1] MS %R slightly outside limits for 1 sample. ☐ [air ms2] MS %R slightly outside limits for >1 sample. ☐ Air train reagent blank – spike result not reported.	✓
11. Were MS run #'s assigned to all matrix spikes except reagent blanks?		✓			✓
12. Sample analyses done within holding time (HT)? *If no, list samples:*		✓		☐ [ht1] HT expired upon receipt. ☐ *[ht2] Analysis requested after HT expired.*	✓
13. Were results processed using correct ICAL?		✓			✓
14. Are positive results within the calibration range?		✓			✓
15. Is integration acceptable for all samples, QC samples and standards?		✓			✓
16. For manual integrated standards and QC samples, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system.	✓
17. Calculations checked for error? (Document manual calculation checks.)		✓			✓
18. Were spreadsheets checked for transcription errors?		✓			✓
19. Final report/F6 correct? (Verify results, RLs, units, qualifiers, DFs, dates, spikes.)		✓			✓
20. Are all nonconformances documented and discussed in narrative?	✓			List NCM #:	N/A
21. Appropriate air train autotext selected for narrative?				☐ [air1] Cl^- reported as HCl and Cl_2. ~~☑ [air2] Cl^- reported as HCl only.~~ ~~[illegible]~~ RMW 12/28/06 ☐ [air3] Cl^-, F^- reported as HCl, Cl_2, HF. ☑ [air4] Cl^-, F^-, Br^- reported as HCl, Cl_2, HF, HBr, Br_2. ☐ [air5] Cl^-, F^-, NO_2^-, NO_3^- reported as HCl, Cl_2, HF, HNO_2, HNO_3. ☐ [air6] Cl^-, F^-, Br^-, I^- reported as HCl, Cl_2, HF, HBr, Br_2, I^-. ☐ [air7] Cl^-, F^-, NO_2^-, NO_3^- reported as Cl^-, F^-, NO_2^-, NO_3^-.	air4
22. Sample pH adjustment included in narrative?		✓		☑ [air pH] Sample pH adjusted prior to analysis.	air pH
23. Audit sample results included in narrative?	✓			☐ [audit2] Audit results in mg/L.	N/A

1st Level Reviewer: CWK	Date: 12/22/06	2nd Level Reviewer: R Wagner	Date: 12/28/06

JLMGE 1/20

$y = 0 + 1.867234(0.0599) + 0.065644(0.0599)^2$

$y = 0.111847317 + 0.000235711$

$y = 0.1120$ ✓

Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6356352
Prep Date: 12/19/2006 0800
Comp Date: 12/19/2006 1900

Analyte: Hydrogen Fluoride
CAS #: 7664-39-3
QuantIMS #: 5646

Analyst Initials: CWK
Analyst LIMS Code: 035620
Instr. ID: 600

Reviewed by: RMW
Date: 12/28/06
MW Factor: 1.053051836

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110106	4		4M	0.1	0.050	JK7KA1AD	295	10	0.1814	ND	310.6503	155.3251	3,106.50	121906	0916
H6L110106	4	S	4M	0.1	0.050	JK7KA1AJ	295	10	2.0405	633.8819	310.6503	155.3251	3,106.50	121906	0949
H6L110106	4	D	4M	0.1	0.050	JK7KA1AK	295	10	2.0928	650.1289	310.6503	155.3251	3,106.50	121906	1126
H6L110106	8		4M	0.1	0.050	JK7KN1AD	280	10	0.0000	ND	294.8545	147.4273	2,948.55	121906	1159
H6L110106	12		4M	0.1	0.050	JK7KW1AD	270	10	0.0000	ND	284.3240	142.1620	2,843.24	121906	1306
H6L110106	15		4M	0.1	0.050	JK7K21AD	100	10	0.0000	ND	105.3052	52.6526	1,053.05	121906	1021
H6L110106	15	S	4M	0.1	0.050	JK7K21AG	100	10	2.0623	217.1709	105.3052	52.6526	1,053.05	121906	1054
H6L220000	352	B	4M	0.1	0.050	JL22H1AA	100	1	0.0000	ND	10.5305	5.2653	105.31	121906	0859
H6L220000	352	C	4M	0.1	0.050	JL22H1AC	100	1	0.7680	80.8744	10.53	5.27	105.31	121906	0824
H6L220000	352	L	4M	0.1	0.050	JL22H1AD	100	1	0.7651	80.5690	10.53	5.27	105.31	121906	0842

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JL22H1AC	0.75	105.31	78.98
LCSD	ICWI-8838	100.00	0.750	100.0	JL22H1AD	0.75	105.31	78.98
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7KA1AJ	0.20	3,106.50	621.30
MSD (1)	ICWI-8838	100.00	0.020	10.0	JK7KA1AK	0.20	3,106.50	621.30
MS (2)	ICWI-8838	100.00	0.020	10.0	JK7K21AG	0.20	1,053.05	210.61
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6356350
Prep Date: 12/19/2006 0800
Comp Date: 12/19/2006 1900

Analyte: Chlorine
CAS #: 7782-50-5
QuantIMS #: 515

Analyst Initials: CWK
Analyst LIMS Code: 035620
Instr. ID: 600

Reviewed by: PMW
Date: 12/28/06
MW Factor: 1.0

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110106	4		4K	0.1	0.042	JK7KA1AA	295	10	0.7315	215.7925	295.0000	123.9000	2,950.00	121906	0916
H6L110106	4	S	4K	0.1	0.042	JK7KA1AG	295	10	2.6414	779.2130	295.0000	123.9000	2,950.00	121906	0949
H6L110106	4	D	4K	0.1	0.042	JK7KA1AH	295	10	2.6320	776.4400	295.0000	123.9000	2,950.00	121906	1126
H6L110106	8		4K	0.1	0.042	JK7KN1AA	280	10	0.5403	151.2840	280.0000	117.6000	2,800.00	121906	1159
H6L110106	12		4K	0.1	0.042	JK7KW1AA	270	10	0.5875	158.6250	270.0000	113.4000	2,700.00	121906	1306
H6L110106	15		4K	0.1	0.042	JK7K21AA	100	10	0.4740	47.4000	100.0000	42.0000	1,000.00	121906	1021
H6L110106	15	S	4K	0.1	0.042	JK7K21AF	100	10	2.5056	250.5600	100.0000	42.0000	1,000.00	121906	1054
H6L220000	350	B	4K	0.1	0.042	JL21W1AA	100	1	0.0000	ND	10.0000	4.2000	100.00	121906	0859
H6L220000	350	C	4K	0.1	0.042	JL21W1AC	100	1	0.7699	76.9900	10.00	4.20	100.00	121906	0824
H6L220000	350	L	4K	0.1	0.042	JL21W1AD	100	1	0.7804	78.0400	10.00	4.20	100.00	121906	0842

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JL21W1AC	0.75	100.00	75.00
LCSD	ICWI-8838	100.00	0.750	100.0	JL21W1AD	0.75	100.00	75.00
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7KA1AG	0.20	2,950.00	590.00
MSD (1)	ICWI-8838	100.00	0.020	10.0	JK7KA1AH	0.20	2,950.00	590.00
MS (2)	ICWI-8838	100.00	0.020	10.0	JK7K21AF	0.20	1,000.00	200.00
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6356347
Prep Date: 12/19/2006 0800
Comp Date: 12/19/2006 1900

Analyte: Bromine
CAS #: 7726-95-6
QuantIMS #: 3450

Analyst Initials: CWK
Analyst LIMS Code: 035620
Instr. ID: 600

Reviewed by: RMW
Date: 12/28/06
MW Factor: 1.0

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110106	4		4I	0.1	0.024	JK7KA1AC	295	10	0.0000	ND	295.0000	70.8000	2,950.00	121906	0916
H6L110106	4	S	4I	0.1	0.024	JK7KA1AE	295	10	2.0218	596.4310	295.0000	70.8000	2,950.00	121906	0949
H6L110106	4	D	4I	0.1	0.024	JK7KA1AF	295	10	1.8585	548.2575	295.0000	70.8000	2,950.00	121906	1126
H6L110106	8		4I	0.1	0.024	JK7KN1AC	280	10	0.0000	ND	280.0000	67.2000	2,800.00	121906	1159
H6L110106	12		4I	0.1	0.024	JK7KW1AC	270	10	0.0000	ND	270.0000	64.8000	2,700.00	121906	1306
H6L110106	15		4I	0.1	0.024	JK7K21AC	100	10	0.0000	ND	100.0000	24.0000	1,000.00	121906	1021
H6L110106	15	S	4I	0.1	0.024	JK7K21AE	100	10	1.9455	194.5500	100.0000	24.0000	1,000.00	121906	1054
H6L220000	347	B	4I	0.1	0.024	JL21F1AA	100	1	0.0000	ND	10.0000	2.4000	100.00	121906	0859
H6L220000	347	C	4I	0.1	0.024	JL21F1AC	100	1	0.7718	77.1800	10.00	2.40	100.00	121906	0824
H6L220000	347	L	4I	0.1	0.024	JL21F1AD	100	1	0.7574	75.7400	10.00	2.40	100.00	121906	0842

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JL21F1AC	0.75	100.00	75.00
LCSD	ICWI-8838	100.00	0.750	100.0	JL21F1AD	0.75	100.00	75.00
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7KA1AE	0.20	2,950.00	590.00
MSD (1)	ICWI-8838	100.00	0.020	10.0	JK7KA1AF	0.20	2,950.00	590.00
MS (2)	ICWI-8838	100.00	0.020	10.0	JK7K21AE	0.20	1,000.00	200.00
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
Dionex IC Runlog Cover Page

Analyst:	CWK	Date:	12/19/06	Sequence ID:	L19A - LDW - AIR - ANIONS - 121906

Instrument:	☑ DX-600	Method:	☐ KNOX-WC-0003, SW-846 0061/7199
	☐ ICS-1500		☐ KNOX-WC-0005, ☐ SW-846 9056 ☐ EPA 300.0 ☐ SW-846 9057-Mod ☑ EPA 26A-Mod
	☐ DX-320		☐ KNOX-WC-0014, EPA 314.0

Preventive Maintenance	Instrument Conditions		
Daily:	Flow Rate =	1.00	mL/min
☑ Check pump and gas pressure	Pressure =	2226	psi
☑ Check all lines for crimping, leaks and discoloration	Conductance =	23.1	µS
As Needed:	Suppressor Current =	43	mA
☐ Change column and guard column	Eluent Generator =	—	mM KOH
☐ Change column and/or guard column bed support			
☐ Clean conductivity cell			
☐ De-gas pump head when flow is erratic			
☐ Check/replace eluant end line filter			

MS/MSD Spike Information

WO #	Compound	Spike ID	Parent Conc.	Spike Added (mL)	Final Volume (mL)	Final Conc.
JK7KA	F-	ICWI-8838	100ppm	0.020 ml	10ml	0.20 ppm
|	Cl-	|	|	|	|	|
|	Br-	|	|	|	|	|
JK7K2	F-	|	|	|	|	|
|	Cl-	|	|	|	|	|
|	Br-	|	|	|	|	|
JLMGE	Cl-	|	|	|	|	|

Comments:

Batch HCl for HGL160118: 6356131
Batch Br_2 - 6356347
Batch Cl_2 - 6356350
Batch HF - 6356352

☑ Sodium Thiosulfate added to NaOH impinger samples.

Sequence: L19A_LOW_AIR_ANIONS_121906
Operator: kaukerc

Printed: 12/20/2006 8:10:35 AM

CWK
12/20/06

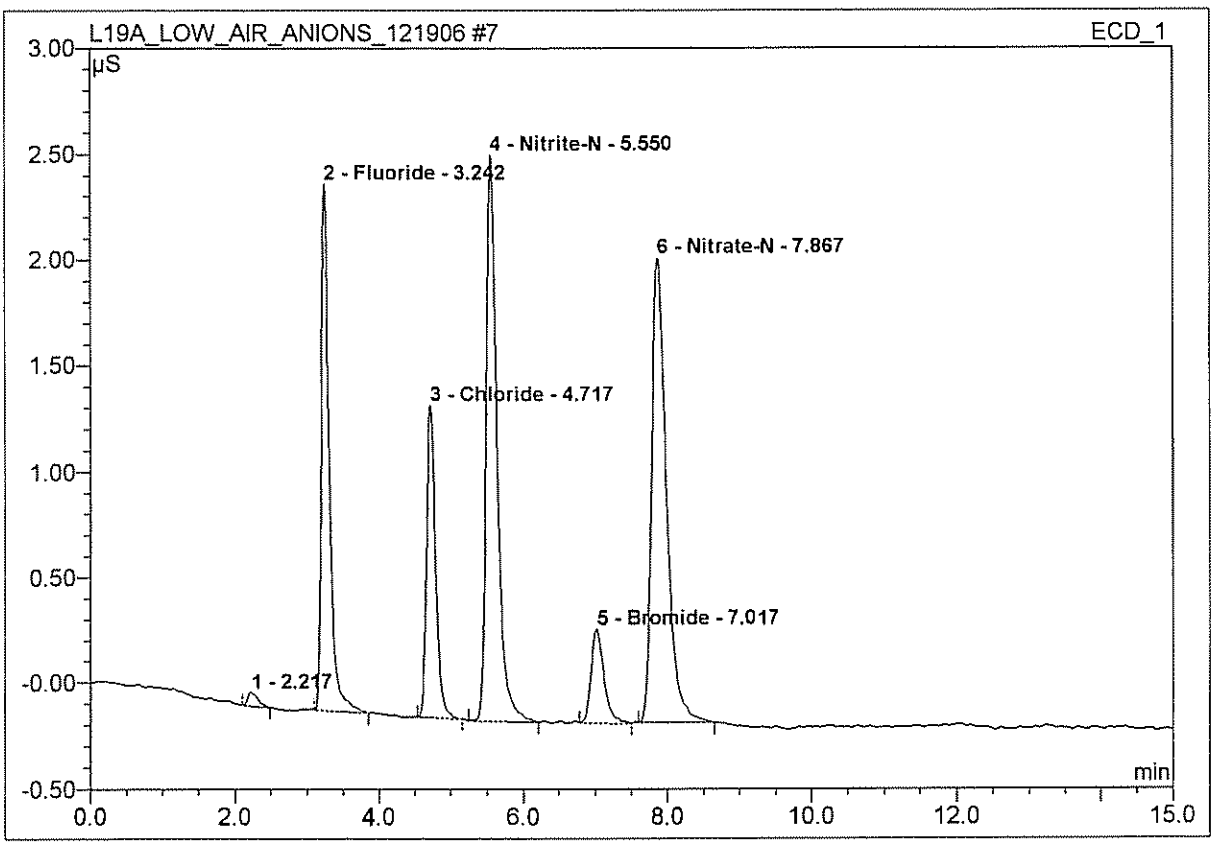
Title:
Datasource: Aragorn_net
Location: IC_ARAGORN
Timebase: IC_Aragorn
#Samples: 38

Created: 12/19/2006 8:06:15 AM by kaukerc
Last Update: 12/19/2006 1:44:16 PM by kaukerc

No.	Name	Sample ID	Inj. Vol.	Inj. Date/Time	Dil. Factor	*Multiplier [Liters]
1	CAL STD 1 = ICWS-9045 @ (0.075ppm)		50.0	12/14/2006 4:54:12 PM	1.0000	
2	CAL STD 2 = ICWS-9046 @ (0.10ppm)		50.0	12/14/2006 5:11:38 PM	1.0000	
3	CAL STD 3 = ICWS-9047 @ (0.25ppm)		50.0	12/14/2006 5:24:03 PM	1.0000	
4	CAL STD 4 = ICWS-9048 @ (0.50ppm)		50.0	12/14/2006 5:36:29 PM	1.0000	
5	CAL STD 5 = ICWS-9049 @ (1.ppm)		50.0	12/14/2006 5:48:54 PM	1.0000	
6	CAL STD 6 = ICWS-9050 @ (2.ppm)		50.0	12/14/2006 6:01:20 PM	1.0000	
7	ICV/LCS= ICWS-9059		50.0	12/19/2006 8:24:36 AM	1.0000	
8	ICV/LCSD= ICWS-9060		50.0	12/19/2006 8:42:02 AM	1.0000	
9	ICB/ METHOD BLANK		50.0	12/19/2006 8:59:27 AM	1.0000	
10	H6L110106 JK7KA 1/10		50.0	12/19/2006 9:16:53 AM	10.0000	
11	H6L110106 JK7KA MS 1/10 0.2 PPM F, CL, BR		50.0	12/19/2006 9:49:19 AM	10.0000	
12	H6L110106 JK7K2 1/10		50.0	12/19/2006 10:21:44 AM	10.0000	
13	H6L110106 JK7K2 MS 1/10 0.2 PPM F, CL, BR		50.0	12/19/2006 10:54:09 AM	10.0000	
14	H6L110106 JK7KA MSD 1/10 0.2 PPM F, CL, BR		50.0	12/19/2006 11:26:35 AM	10.0000	
15	H6L110106 JK7KN 1/10		50.0	12/19/2006 11:59:00 AM	10.0000	
16	CCV = ICWS-9061		50.0	12/19/2006 12:31:25 PM	1.0000	
17	CCB		50.0	12/19/2006 12:48:51 PM	1.0000	
18	H6L110106 JK7KW 1/10		50.0	12/19/2006 1:06:16 PM	10.0000	
19	H6L160118 JLMGE 1/10		50.0	12/19/2006 1:38:41 PM	10.0000	
20	H6L160118 JLMGE 1/20		50.0	12/19/2006 1:56:07 PM	20.0000	
21	H6L160118 JLMGE 1/40		50.0	12/19/2006 2:13:32 PM	40.0000	
22	H6L160118 JLMGE MS 1/10 0.2 PPM CL		50.0	12/19/2006 2:30:57 PM	10.0000	
23	H6L160118 JLMGE MSD 1/10 0.2 PPM CL		50.0	12/19/2006 2:48:23 PM	10.0000	
24	H6L160118 JLMGE MS 1/20 0.2 PPM CL		50.0	12/19/2006 3:05:48 PM	20.0000	
25	H6L160118 JLMGE MSD 1/20 0.2 PPM CL		50.0	12/19/2006 3:23:13 PM	20.0000	
26	H6L160118 JLMGE MS 1/40 0.2 PPM CL		50.0	12/19/2006 3:40:39 PM	40.0000	
27	H6L160118 JLMGE MSD 1/40 0.2 PPM CL		50.0	12/19/2006 3:58:04 PM	40.0000	
28	CCV= ICWS-9061		50.0	12/19/2006 4:15:30 PM	1.0000	
29	CCB		50.0	12/19/2006 4:32:54 PM	1.0000	
30	H6L160118 JLMGG 1/10		50.0	12/19/2006 4:50:20 PM	10.0000	
31	H6L160118 JLMGG 1/20		50.0	12/19/2006 5:07:45 PM	20.0000	
32	H6L160118 JLMGG 1/40		50.0	12/19/2006 5:25:11 PM	40.0000	
33	H6L160118 JLMGJ 1/10		50.0	12/19/2006 5:42:36 PM	10.0000	
34	H6L160118 JLMGJ 1/20		50.0	12/19/2006 6:00:02 PM	20.0000	
35	H6L160118 JLMGJ 1/40		50.0	12/19/2006 6:17:27 PM	40.0000	
36	CCV= ICWS-9061		50.0	12/19/2006 6:34:53 PM	1.0000	
37	CCB		50.0	12/19/2006 6:52:18 PM	1.0000	
38	SHUTDOWN		50.0	12/19/2006 7:09:43 PM	1.0000	

7 ICV/LCS= ICWS-9059

Sample Name:	**ICV/LCS= ICWS-9059**	*Injection Volume:*	**50.0**
Vial Number:	**104**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/19/2006 8:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



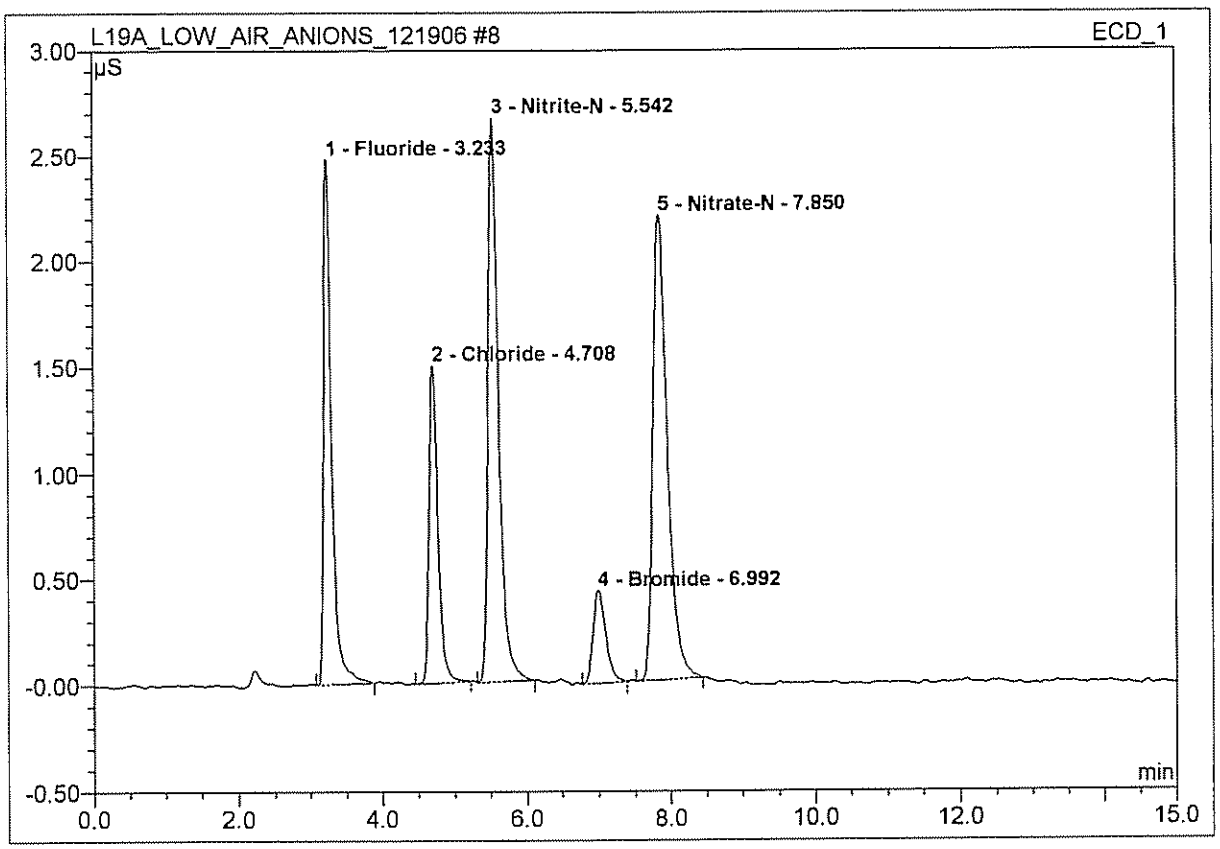
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.22	n.a.	0.06381	0.011	0.66	n.a.	BMB
2	3.24	Fluoride	2.48867	0.321	19.80	0.7680 ✓	BMB
3	4.72	Chloride	1.47644	0.210	12.99	0.7699 ✓	BMB
4	5.55	Nitrite-N	2.67428	0.469	28.97	0.7675	BMB
5	7.02	Bromide	0.44520	0.091	5.65	0.7718 ✓	BMB
6	7.87	Nitrate-N	2.19530	0.517	31.92	0.7694	BMB

Br_2 - JL21F1AAC EW 12/28/06
Cl_2 - JL21W1AC
HF - JL22H1AC

JL1R51AC HCl

8 ICV/LCSD= ICWS-9060

Sample Name:	**ICV/LCSD= ICWS-9060**	*Injection Volume:*	**50.0**
Vial Number:	**105**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/19/2006 8:42**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



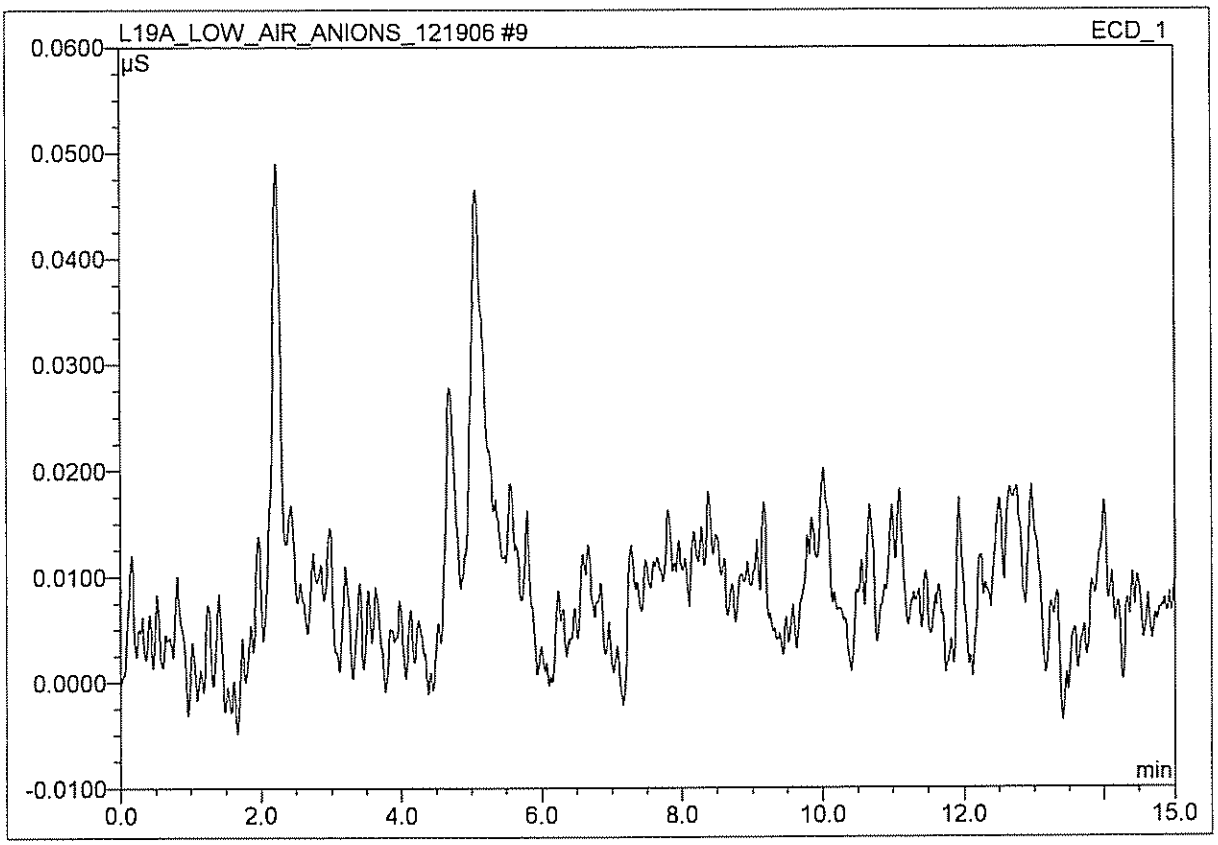
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	2.47891	0.322	20.25	0.7651	BMB
2	4.71	Chloride	1.49722	0.215	13.50	0.7804	BMB
3	5.54	Nitrite-N	2.66310	0.454	28.58	0.7644	BMB
4	6.99	Bromide	0.43676	0.088	5.55	0.7574	BMB
5	7.85	Nitrate-N	2.19377	0.511	32.13	0.7689	BMB

Br_2 - JL21F1AD
Cl_2 - JL21W1AD
HF - JL22H1AD

JL1R51AD HCl

9 ICB/ METHOD BLANK

Sample Name:	**ICB/ METHOD BLANK**	*Injection Volume:*	**50.0**
Vial Number:	**139**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/19/2006 8:59**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.01**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

Br_2 - JL21F1AA

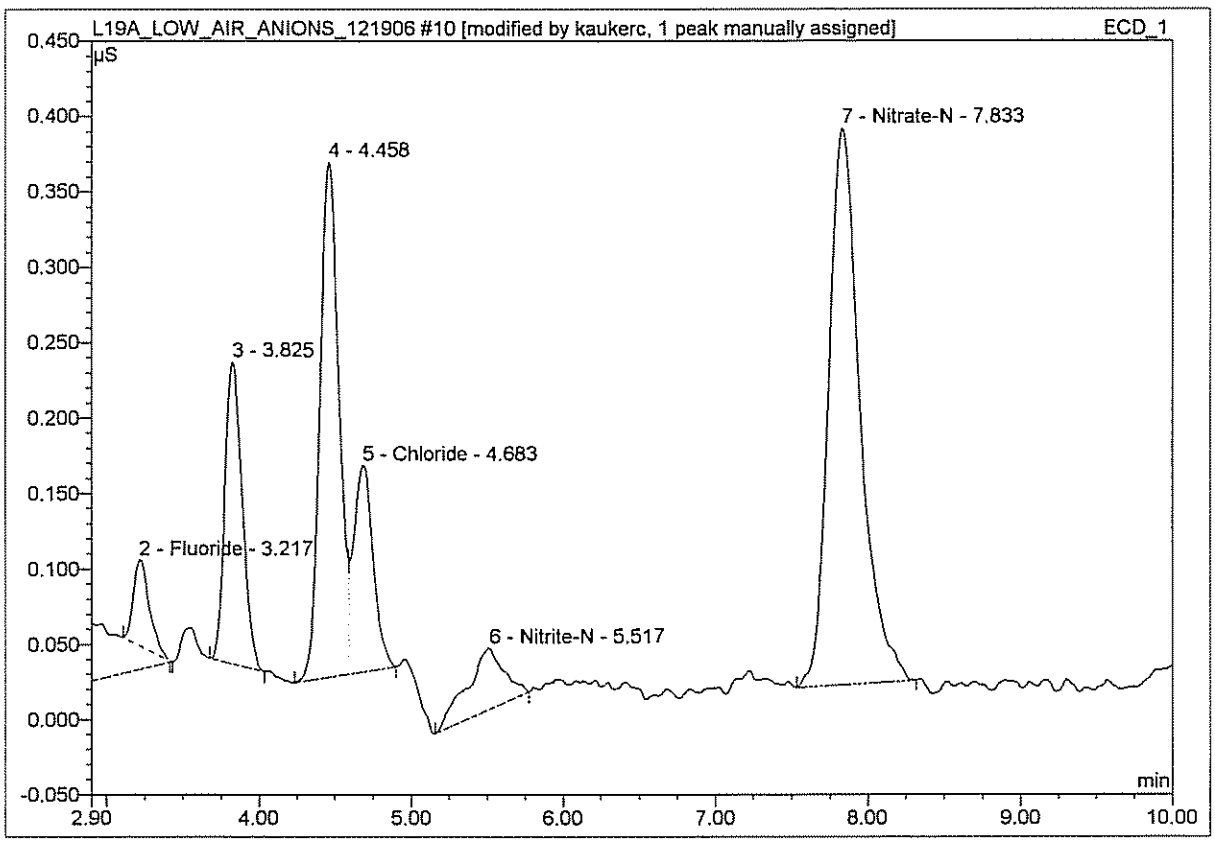
Cl_2 - JL21W1AA

HF - JL22H1AA

JL1R51AA HCl

10 H6L110106 JK7KA 1/10

Sample Name:	**H6L110106 JK7KA 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**140**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 9:16**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.22	n.a.	1.67848	0.308	0.19	n.a.	BMB*
2	3.22	Fluoride	0.05666	0.007	0.00	0.1814	Rd*
3	3.83	n.a.	0.20009	0.026	0.02	n.a.	BMB
4	4.46	n.a.	0.34155	0.050	0.03	n.a.	BM
5	4.68	Chloride	0.13695	0.020	0.01	0.7315	MB^
6	5.52	Nitrite-N	0.04065	0.012	0.01	0.1203	BMB
7	7.83	Nitrate-N	0.36919	0.089	0.05	1.3383	BMB
8	10.66	n.a.	19.82899	5.673	3.51	n.a.	BM
9	11.69	n.a.	##########	103.018	63.80	n.a.	MB
10	21.93	n.a.	56.70455	52.270	32.37	n.a.	BMB

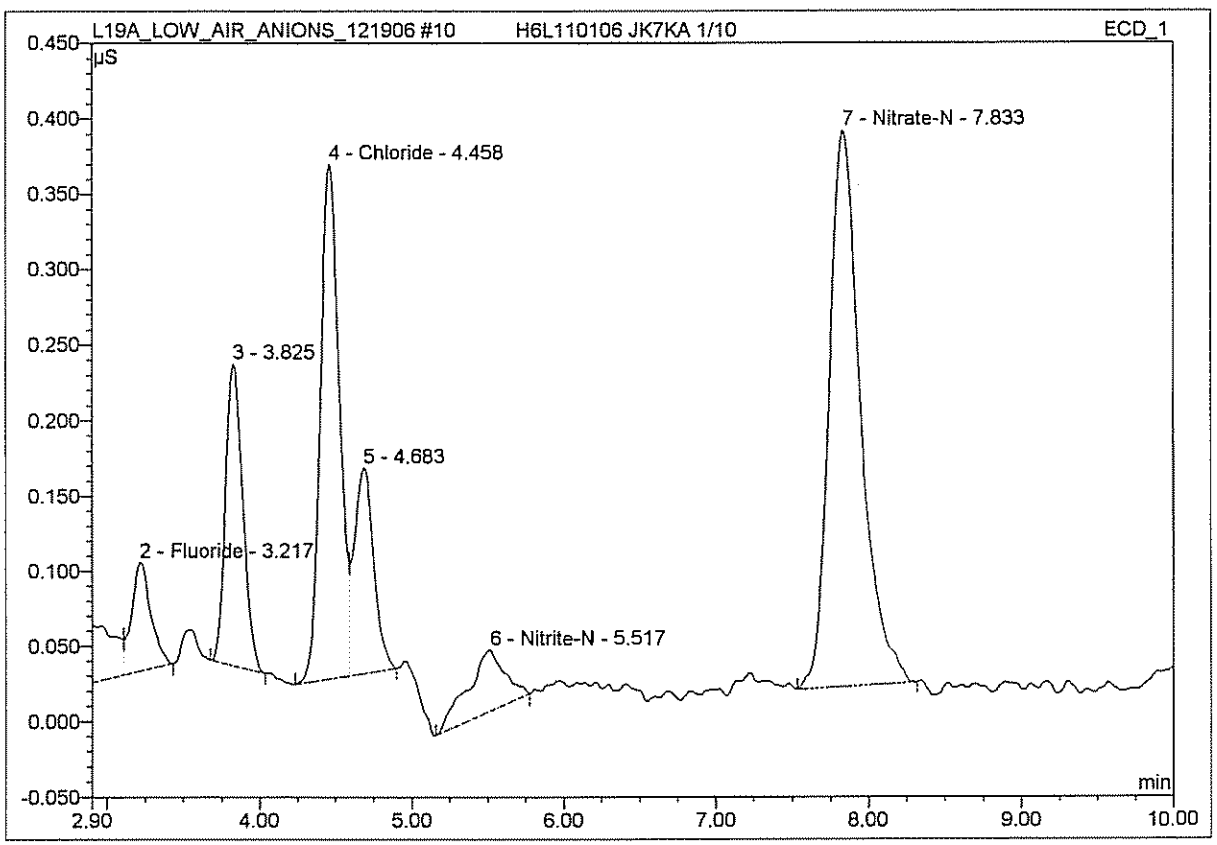
manual integration F.
CWK 12/19/06

default_letter/Integration

Chloride peak misidentified based on spike recovery. Peak manually identified CWK 12/19/06

10 H6L110106 JK7KA 1/10

Sample Name:	**H6L110106 JK7KA 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**140**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 9:16**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**

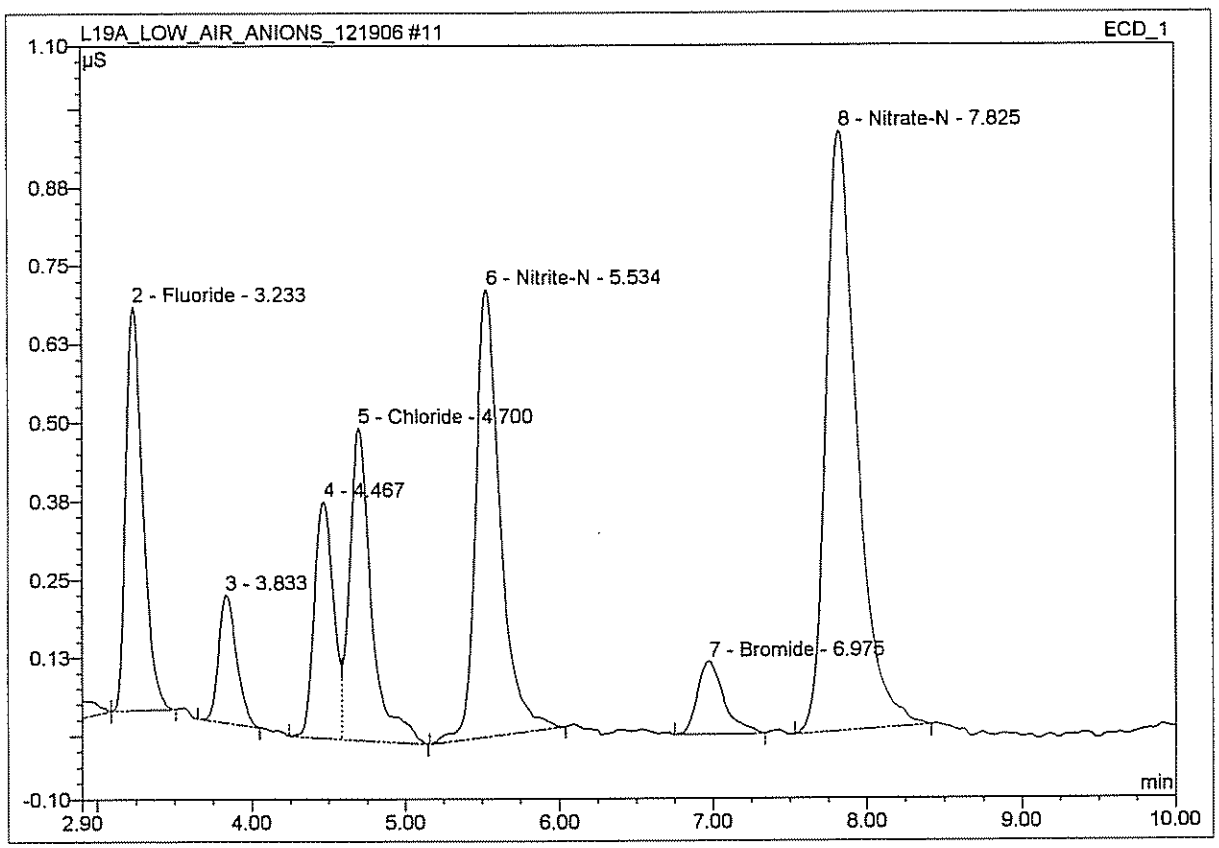


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.22	n.a.	1.67848	0.304	0.19	n.a.	BM
2	3.22	Fluoride	0.07242	0.011	0.01	0.2318	MB
3	3.83	n.a.	0.20009	0.026	0.02	n.a.	BMB
4	4.46	Chloride	0.34155	0.050	0.03	1.8175	BM
5	4.68	n.a.	0.13695	0.020	0.01	n.a.	MB
6	5.52	Nitrite-N	0.04065	0.012	0.01	0.1203	BMB
7	7.83	Nitrate-N	0.36919	0.089	0.05	1.3383	BMB
8	10.66	n.a.	19.82899	5.673	3.51	n.a.	BM
9	11.69	n.a.	#########	103.018	63.80	n.a.	MB
10	21.93	n.a.	56.70455	52.270	32.37	n.a.	BMB

original

11 H6L110106 JK7KA MS 1/10 0.2 PPM F, CL, BR

Sample Name:	**H6L110106 JK7KA MS 1/10 0.2 PPM F, CL,**	*Injection Volume:*	**50.0**
Vial Number:	**141**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 9:49**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.88**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	1.72838	0.298	0.27	n.a.	BMB
2	3.23	Fluoride	0.64330	0.083	0.08	2.0405	bMB
3	3.83	n.a.	0.20493	0.027	0.02	n.a.	BMB
4	4.47	n.a.	0.37660	0.055	0.05	n.a.	BM
5	4.70	Chloride	0.49779	0.082	0.07	2.6414	MB
6	5.53	Nitrite-N	0.71269	0.133	0.12	2.0923	BMB
7	6.98	Bromide	0.11543	0.023	0.02	2.0218	BMB
8	7.83	Nitrate-N	0.95547	0.223	0.20	3.4249	BMB
9	10.68	n.a.	19.53185	5.569	5.07	n.a.	BM
10	11.71	n.a.	#########	103.405	94.09	n.a.	MB

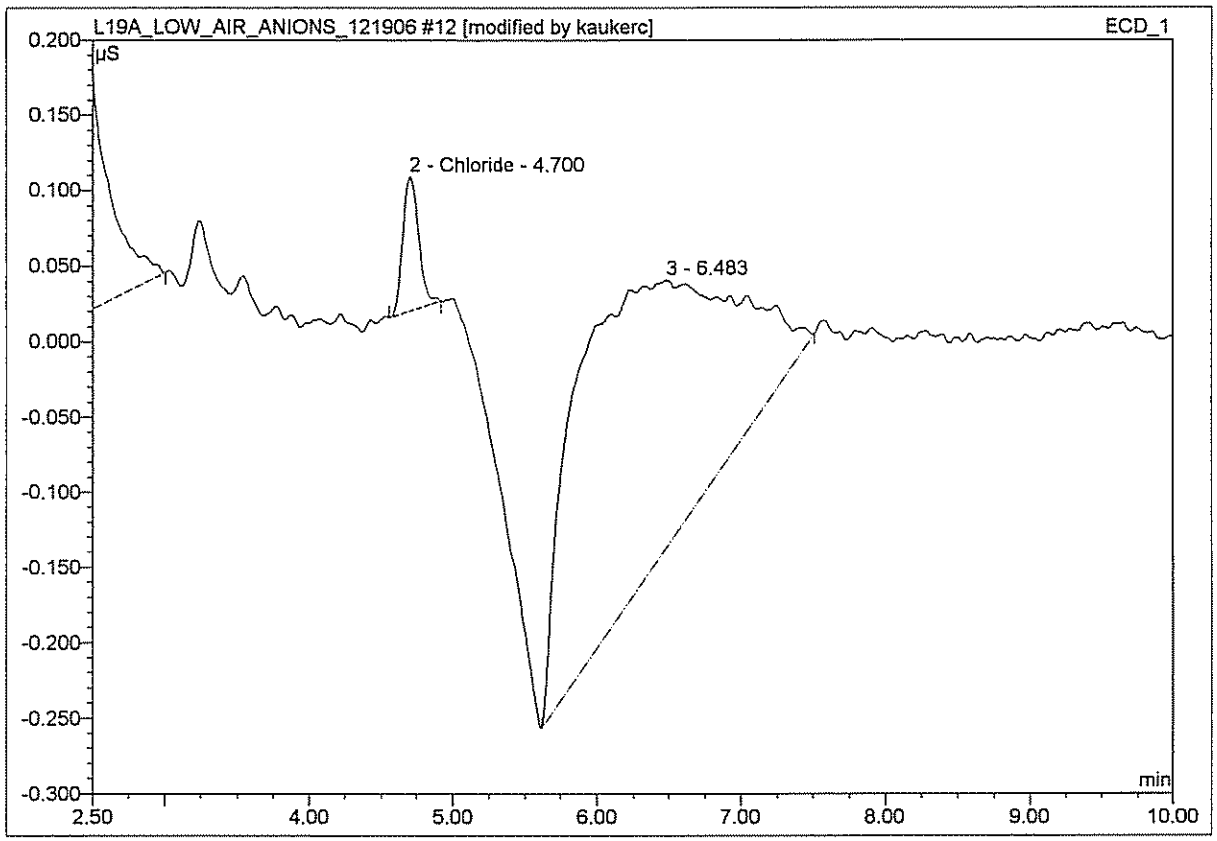
F- 2.0405 - 0.1814 = 1.8591 / 2.0 = 92.96%R

Br- 2.0218 / 2 = 101.1%R

Cl- 2.6414 - 0.7315 = 1.9099 / 2 = 95.5%R

12 H6L110106 JK7K2 1/10

Sample Name:	**H6L110106 JK7K2 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**142**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 10:21**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**

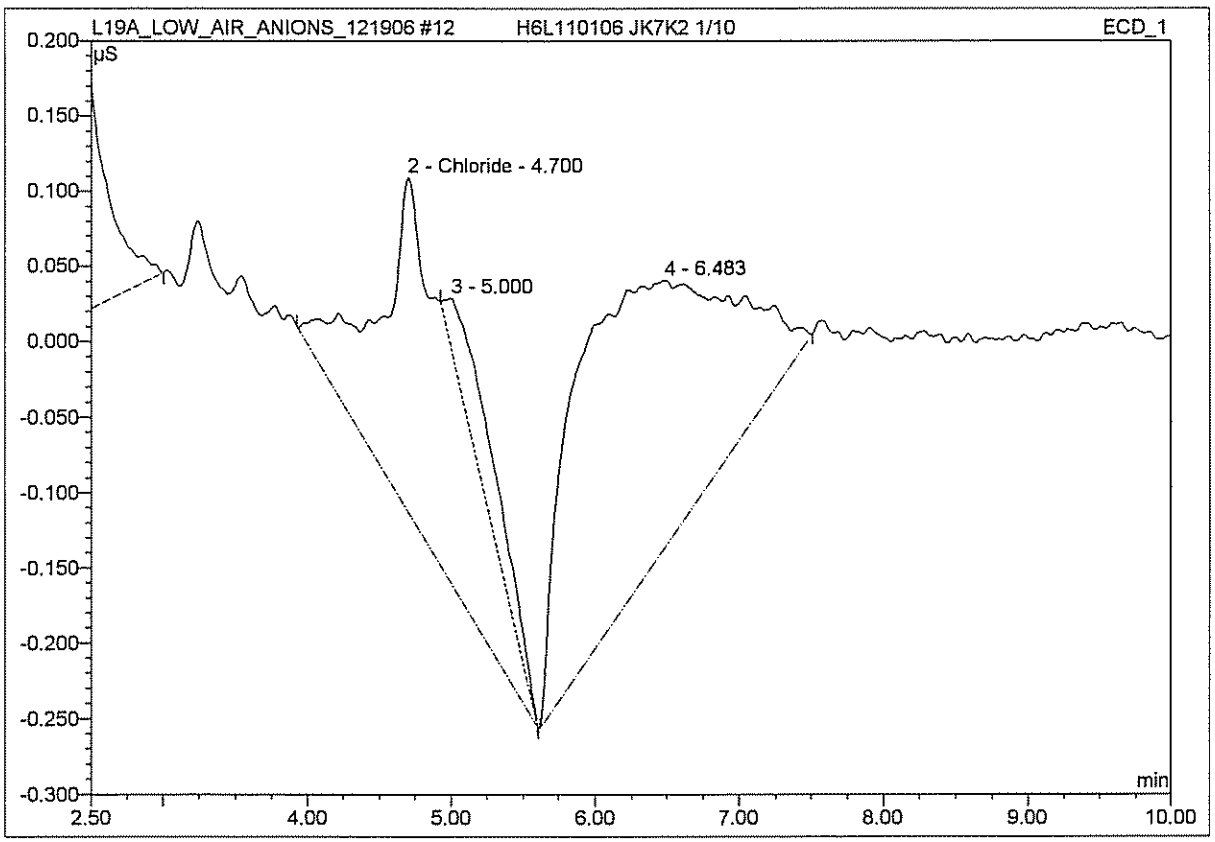


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	1.44714	0.254	0.48	n.a.	BMB
2	4.70	Chloride	0.08865	0.011	0.02	0.4740	BMB*
3	6.48	n.a.	0.17716	0.247	0.47	n.a.	BMB
4	11.98	n.a.	0.50966	0.176	0.33	n.a.	BMB
5	21.97	n.a.	56.57459	52.193	98.70	n.a.	BMB

manual integration Cl-
(B) CWK 12/19/06

12 H6L110106 JK7K2 1/10

Sample Name:	**H6L110106 JK7K2 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**142**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 10:21**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**

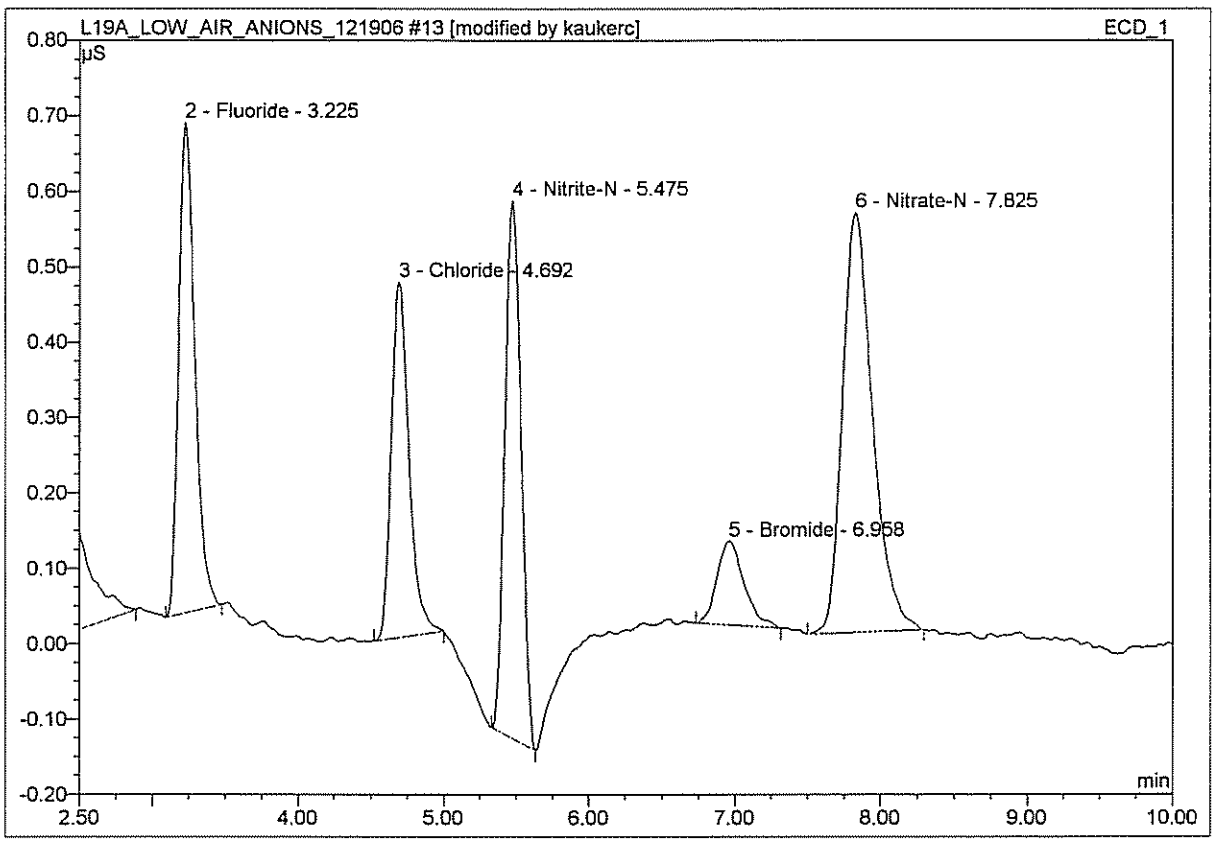


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	1.44714	0.254	0.48	n.a.	BMB
2	4.70	Chloride	0.22151	0.156	0.29	1.1814	BMB
3	5.00	n.a.	0.03334	0.024	0.04	n.a.	Rd
4	6.48	n.a.	0.17716	0.247	0.47	n.a.	BMB
5	11.98	n.a.	0.50966	0.176	0.33	n.a.	BMB
6	21.97	n.a.	56.57459	52.193	98.39	n.a.	BMB

original

13 H6L110106 JK7K2 MS 1/10 0.2 PPM F, CL, BR

Sample Name:	**H6L110106 JK7K2 MS 1/10 0.2 PPM F, CL,**	*Injection Volume:*	**50.0**
Vial Number:	**143**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 10:54**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



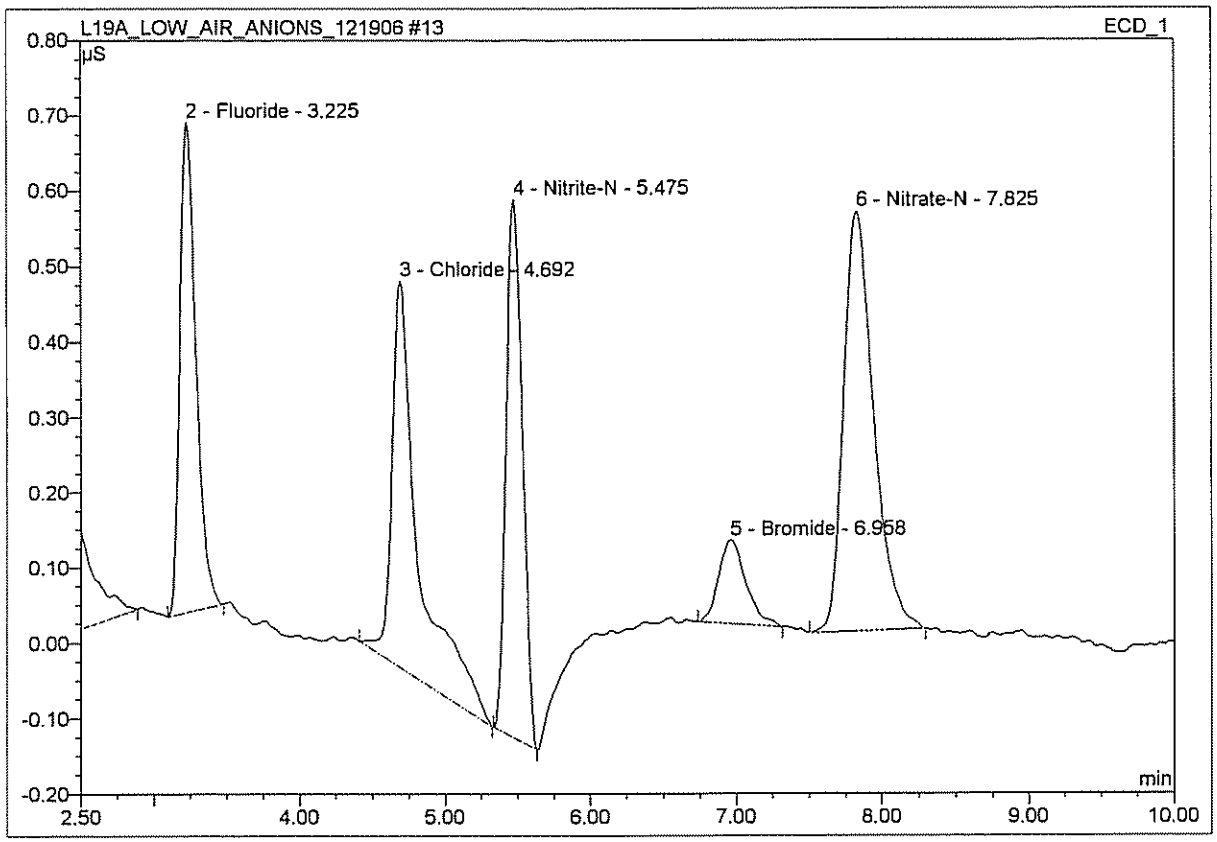
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.22	n.a.	1.45986	0.249	0.47	n.a.	BMB
2	3.23	Fluoride	0.65024	0.083	0.16	2.0623	BMB
3	4.69	Chloride	0.47198	0.066	0.13	2.5056	BMB*
4	5.48	Nitrite-N	0.71363	0.092	0.17	2.0951	BMB
5	6.96	Bromide	0.11106	0.024	0.05	1.9455	BMB
6	7.83	Nitrate-N	0.55673	0.133	0.25	2.0108	BMB
7	11.96	n.a.	0.42070	0.151	0.28	n.a.	BMB
8	21.96	n.a.	56.64823	52.175	98.49	n.a.	BMB

Cl^- 2.5056 - 0.4740 = 2.0316 / 2.0 = 101.6% R

manual integration
Ⓑ CWK 12/19/06

13 H6L110106 JK7K2 MS 1/10 0.2 PPM F, CL, BR

Sample Name:	**H6L110106 JK7K2 MS 1/10 0.2 PPM F, CL,**	*Injection Volume:*	**50.0**
Vial Number:	**143**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_Cl2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 10:54**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**

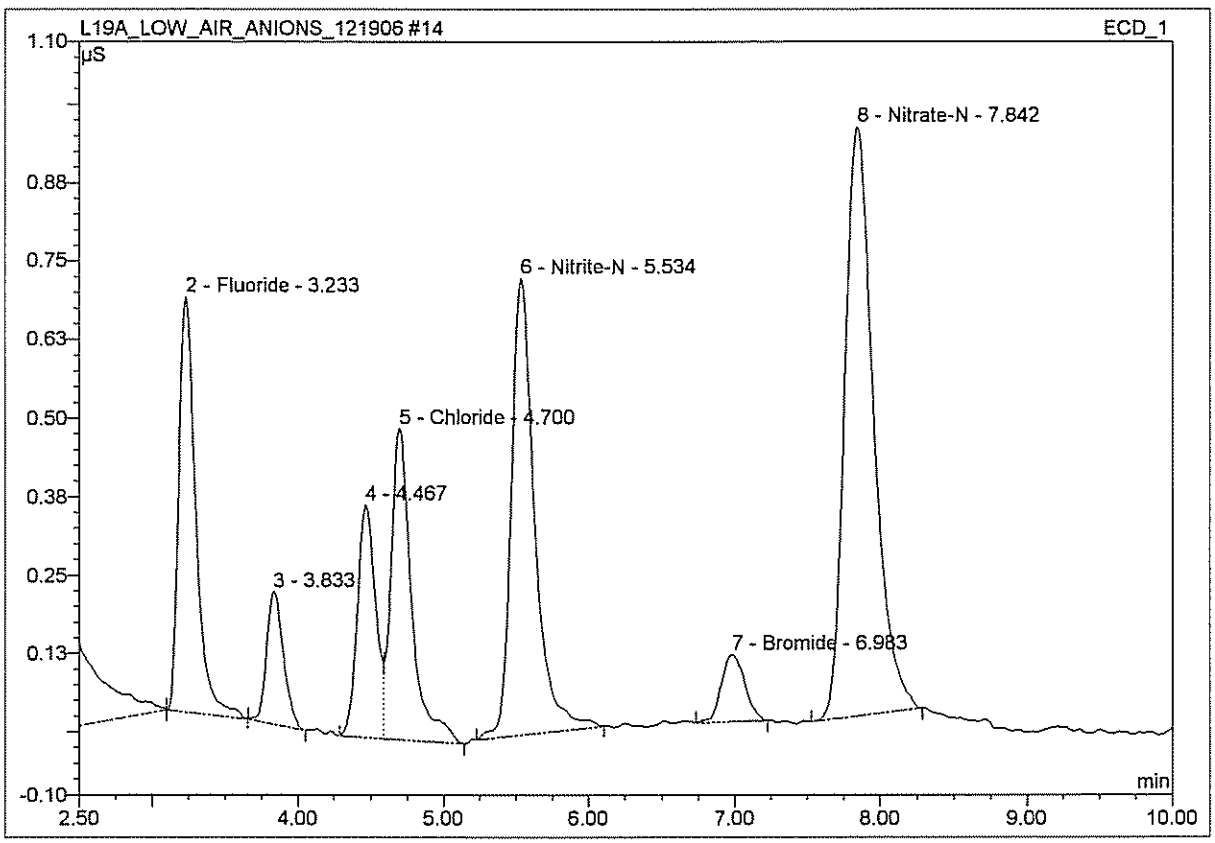


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.22	n.a.	1.45986	0.249	0.47	n.a.	BMB
2	3.23	Fluoride	0.65024	0.083	0.16	2.0623	BMB
3	4.69	Chloride	0.51228	0.107	0.20	2.7176	BMB
4	5.48	Nitrite-N	0.71363	0.092	0.17	2.0951	BMB
5	6.96	Bromide	0.11106	0.024	0.05	1.9455	BMB
6	7.83	Nitrate-N	0.55673	0.133	0.25	2.0108	BMB
7	11.96	n.a.	0.42070	0.151	0.28	n.a.	BMB
8	21.96	n.a.	56.64823	52.175	98.42	n.a.	BMB

original

14 H6L110106 JK7KA MSD 1/10 0.2 PPM F, CL, BR

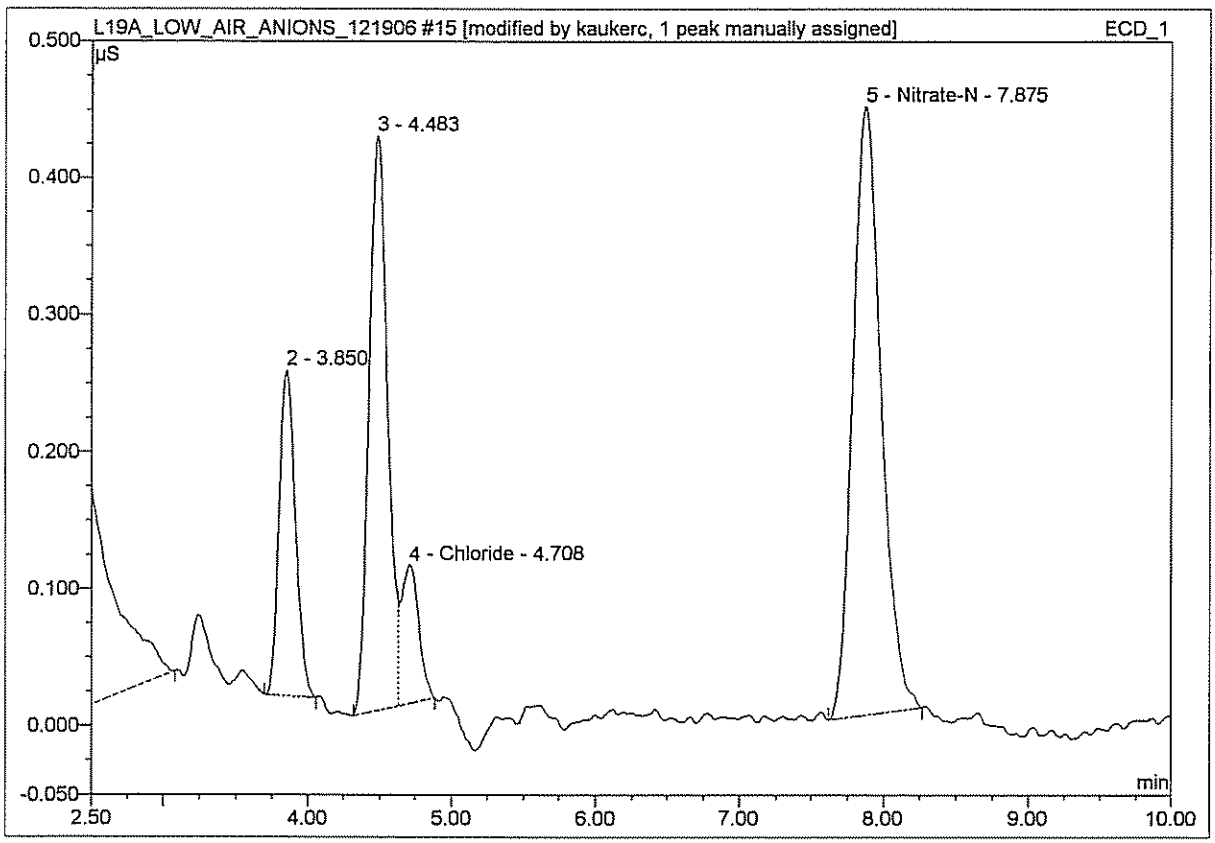
Sample Name:	**H6L110106 JK7KA MSD 1/10 0.2 PPM F, CL**	*Injection Volume:*	**50.0**
Vial Number:	**143**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 11:26**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	1.77246	0.299	0.18	n.a.	BMB
2	3.23	Fluoride	0.65994	0.089	0.05	2.0928	bMB
3	3.83	n.a.	0.21125	0.028	0.02	n.a.	BMB
4	4.47	n.a.	0.37079	0.055	0.03	n.a.	BM
5	4.70	Chloride	0.49601	0.081	0.05	2.6320	MB
6	5.53	Nitrite-N	0.72648	0.135	0.08	2.1325	BMB
7	6.98	Bromide	0.10608	0.020	0.01	1.8585	BMB
8	7.84	Nitrate-N	0.93800	0.216	0.13	3.3633	BMB
9	10.68	n.a.	18.87528	5.394	3.31	n.a.	BM
10	11.71	n.a.	##########	103.793	63.74	n.a.	MB
11	21.96	n.a.	56.91333	52.722	32.38	n.a.	BMB

15 H6L110106 JK7KN 1/10

Sample Name:	**H6L110106 JK7KN 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**144**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 11:59**	*Sample Weight:*	**1.0000**
Run Time (min):	**22.90**	*Sample Amount:*	**1.0000**

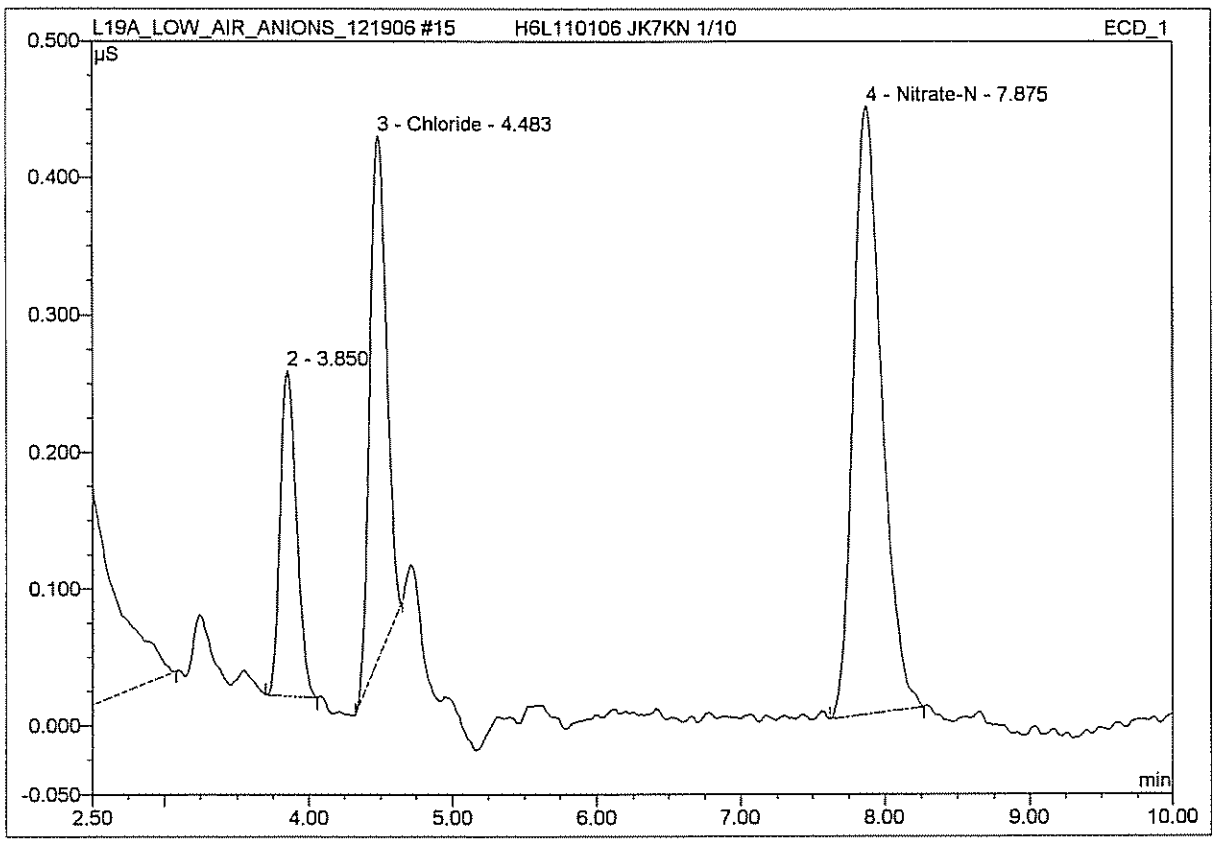


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	1.92701	0.322	0.21	n.a.	BMB
2	3.85	n.a.	0.23754	0.031	0.02	n.a.	BMB
3	4.48	n.a.	0.41921	0.063	0.04	n.a.	BM *
4	4.71	Chloride	0.10109	0.014	0.01	0.5403	MB*^
5	7.88	Nitrate-N	0.44389	0.101	0.07	1.6067	BMB
6	10.68	n.a.	34.84426	9.882	6.53	n.a.	BM
7	11.72	n.a.	##########	105.466	69.67	n.a.	MB
8	21.97	n.a.	52.22795	35.502	23.45	n.a.	BMB

Split Peak / misidentified peak
CWK 12/19/06

15 H6L110106 JK7KN 1/10

Sample Name:	**H6L110106 JK7KN 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**144**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 11:59**	*Sample Weight:*	**1.0000**
Run Time (min):	**17.88**	*Sample Amount:*	**1.0000**

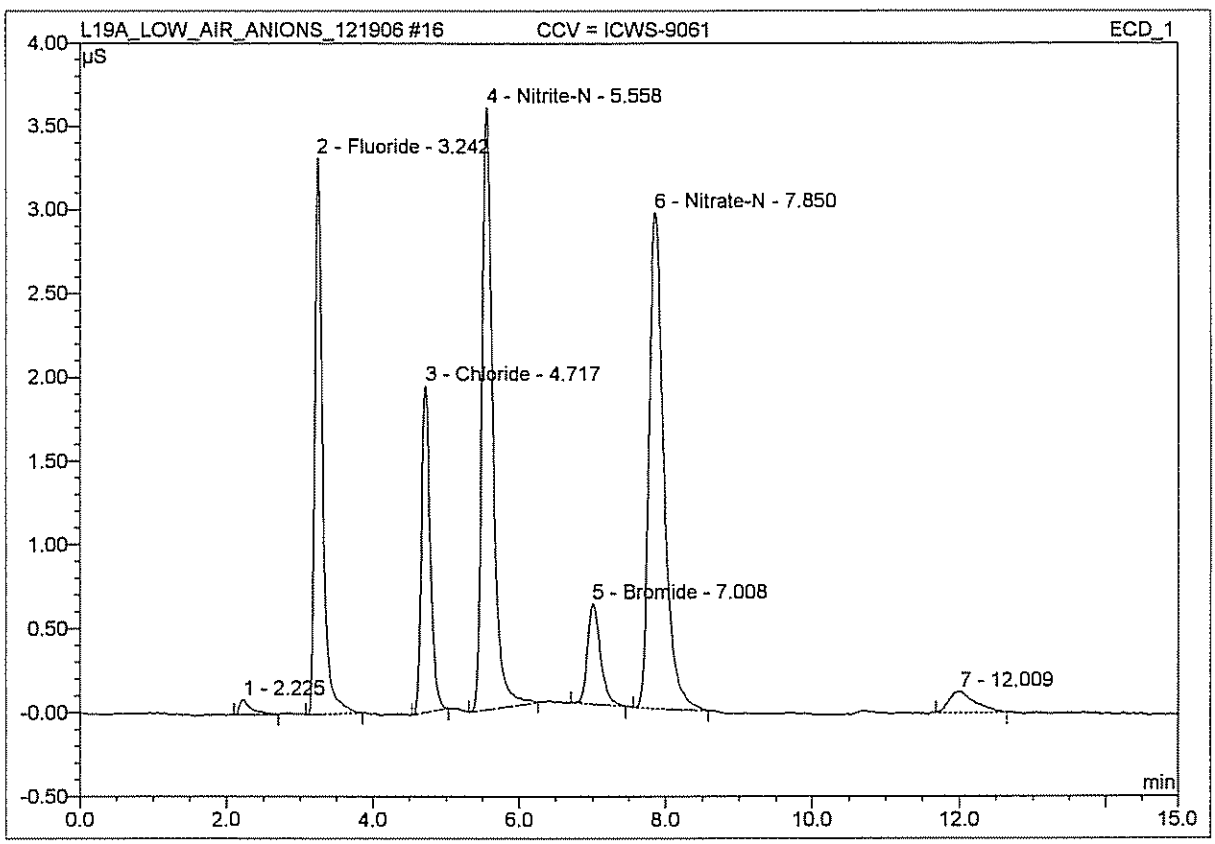


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	1.92701	0.322	0.28	n.a.	BMB
2	3.85	n.a.	0.23754	0.031	0.03	n.a.	BMB
3	4.48	Chloride	0.38160	0.051	0.04	2.0292	BMB
4	7.88	Nitrate-N	0.44389	0.101	0.09	1.6067	BMB
5	10.68	n.a.	34.84426	9.882	8.53	n.a.	BM
6	11.72	n.a.	##########	105.466	91.03	n.a.	MB

original

16 CCV = ICWS-9061

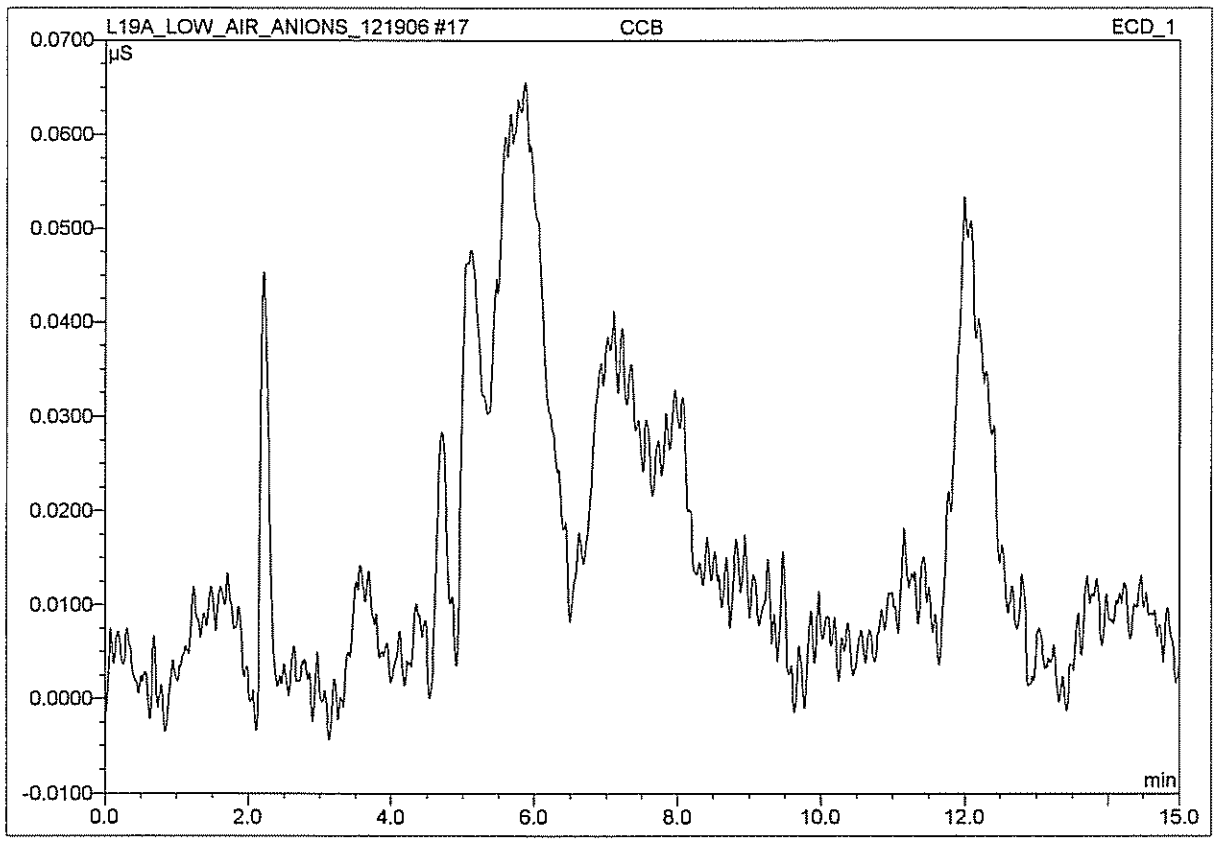
Sample Name:	**CCV = ICWS-9061**	*Injection Volume:*	**50.0**
Vial Number:	**147**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/19/2006 12:31**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	0.09026	0.017	0.76	n.a.	BMB
2	3.24	Fluoride	3.31997	0.424	19.27	1.0126	BMB
3	4.72	Chloride	1.94952	0.272	12.35	1.0083	BMB
4	5.56	Nitrite-N	3.59510	0.619	28.12	1.0213	BMB
5	7.01	Bromide	0.59911	0.122	5.55	1.0339	BMB
6	7.85	Nitrate-N	2.95797	0.696	31.63	1.0231	BMB
7	12.01	n.a.	0.12386	0.051	2.32	n.a.	BMB

17 CCB

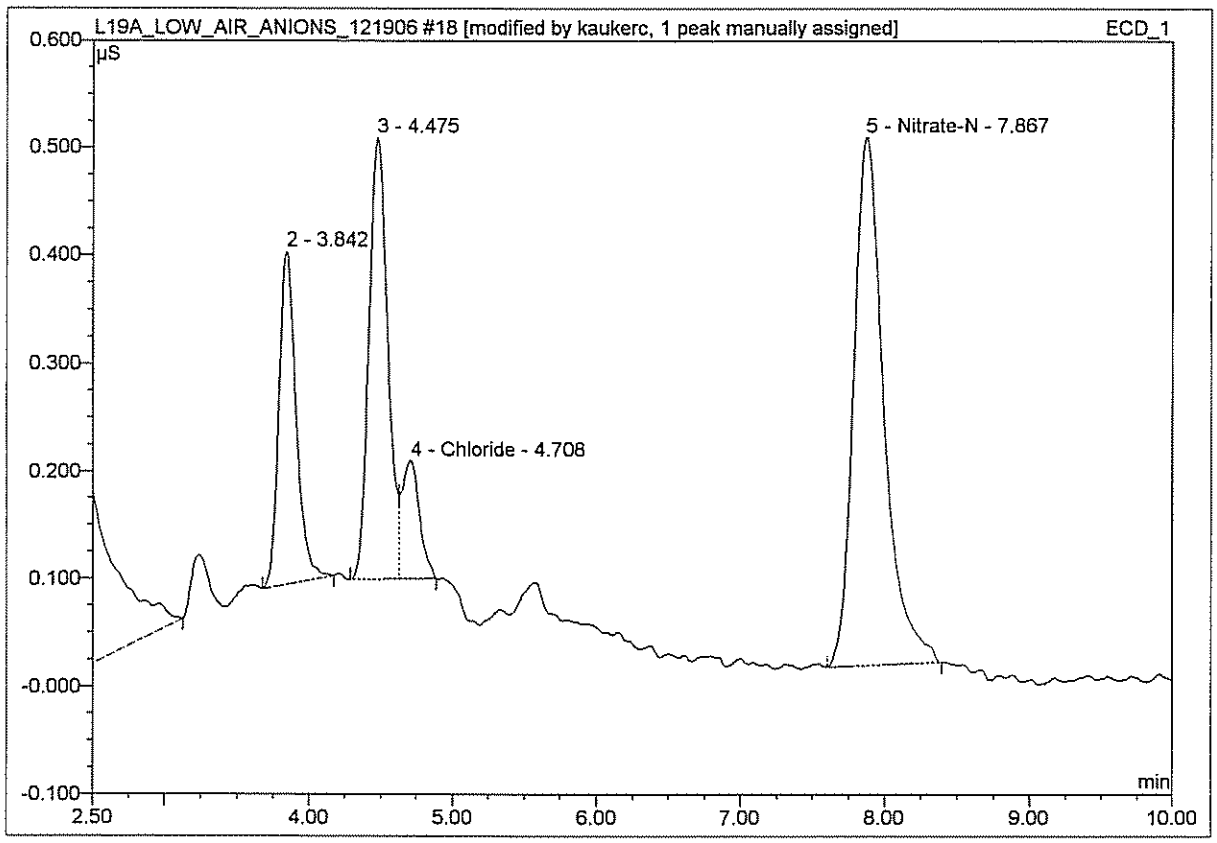
Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**148**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/19/2006 12:48**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

18 H6L110106 JK7KW 1/10

Sample Name:	**H6L110106 JK7KW 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**149**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 13:06**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



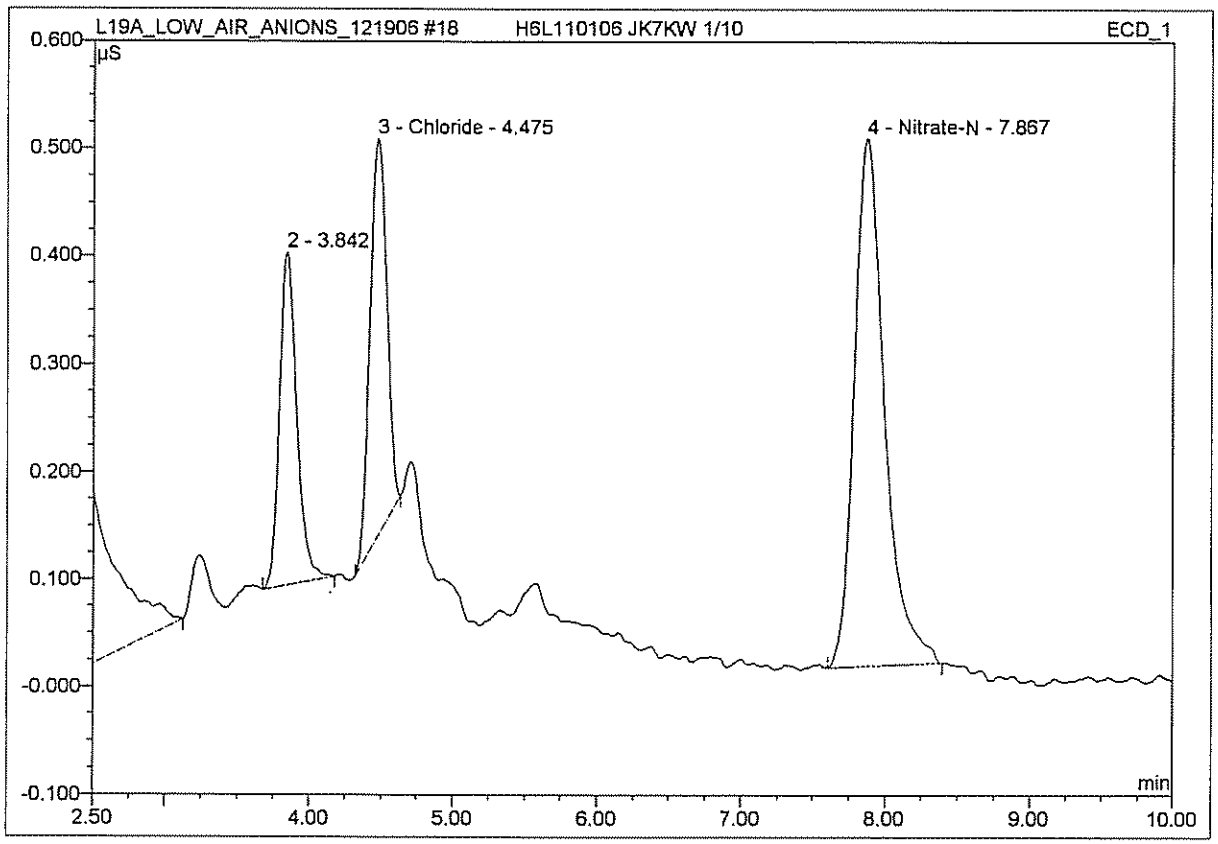
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	2.11949	0.350	0.19	n.a.	BMB
2	3.84	n.a.	0.30890	0.043	0.02	n.a.	BMB
3	4.48	n.a.	0.40994	0.062	0.03	n.a.	BM *
4	4.71	Chloride	0.10993	0.016	0.01	0.5875	MB*^
5	7.87	Nitrate-N	0.49048	0.120	0.07	1.7737	BMB
6	10.65	n.a.	39.88411	11.262	6.15	n.a.	BM
7	11.68	n.a.	##########	118.828	64.93	n.a.	MB
8	21.97	n.a.	56.72228	52.338	28.60	n.a.	BMB

(5) CWK 12/19/06

Peak misidentified

18 H6L110106 JK7KW 1/10

Sample Name:	**H6L110106 JK7KW 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**149**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/19/2006 13:06**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**

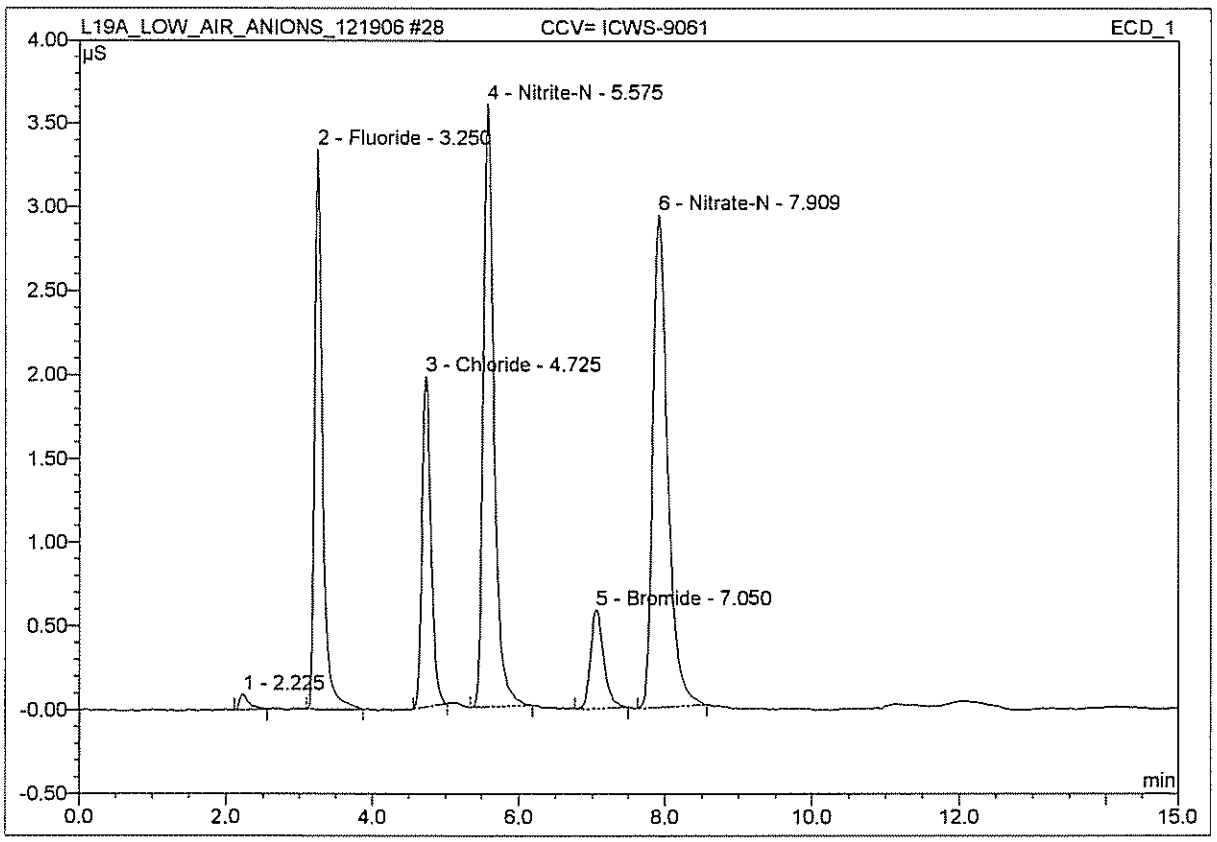


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	2.11949	0.350	0.19	n.a.	BMB
2	3.84	n.a.	0.30890	0.043	0.02	n.a.	BMB
3	4.48	Chloride	0.36885	0.050	0.03	1.9618	BMB
4	7.87	Nitrate-N	0.49048	0.120	0.07	1.7737	BMB
5	10.65	n.a.	39.88411	11.262	6.15	n.a.	BM
6	11.68	n.a.	#########	118.828	64.94	n.a.	MB
7	21.97	n.a.	56.72228	52.338	28.60	n.a.	BMB

original

28 CCV= ICWS-9061

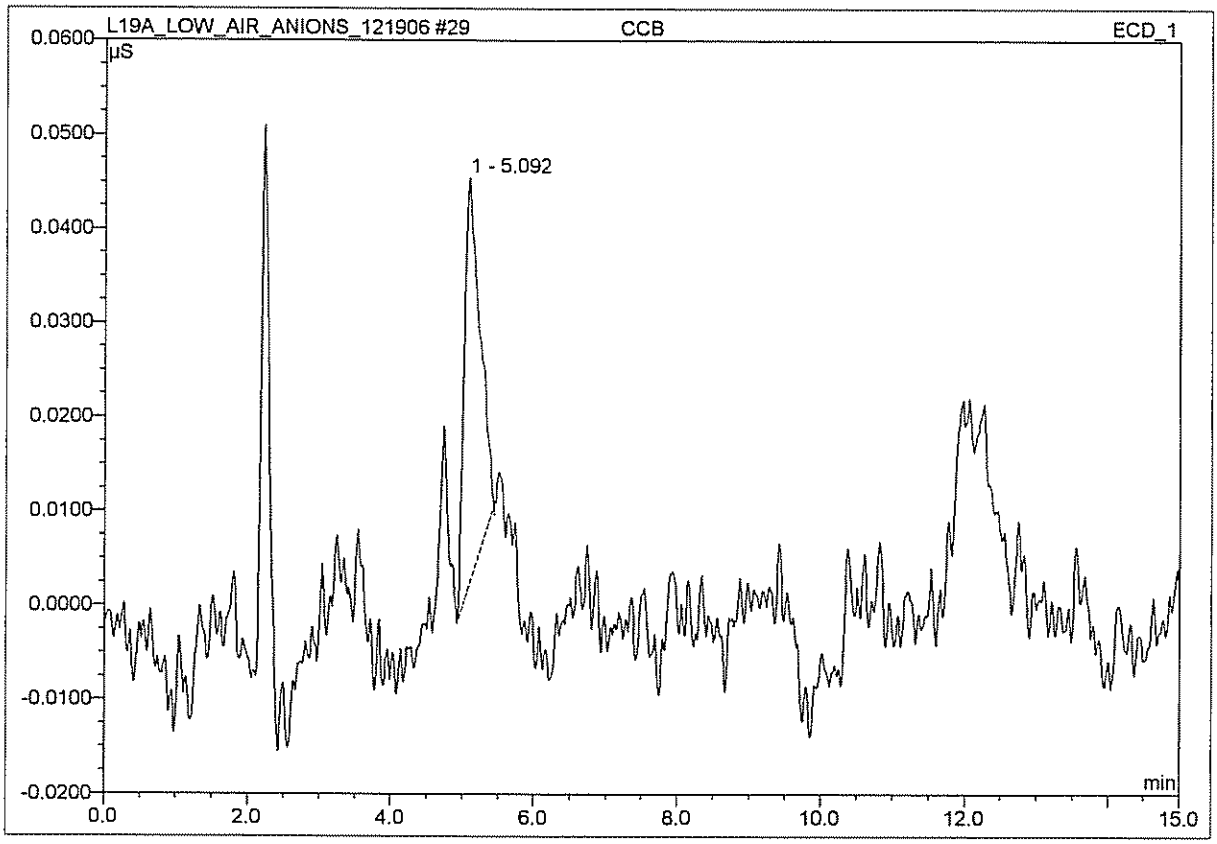
Sample Name:	**CCV= ICWS-9061**	*Injection Volume:*	**50.0**
Vial Number:	**166**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/19/2006 16:15**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	0.09051	0.013	0.63	n.a.	BMB
2	3.25	Fluoride	3.33715	0.425	19.80	1.0176	BMB
3	4.73	Chloride	1.97217	0.277	12.89	1.0196	BMB
4	5.58	Nitrite-N	3.59591	0.614	28.59	1.0215	BMB
5	7.05	Bromide	0.58861	0.122	5.66	1.0161	BMB
6	7.91	Nitrate-N	2.94017	0.697	32.44	1.0173	BMB

29 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**167**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/19/2006 16:32**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	5.09	n.a.	0.04319	0.011	100.00	n.a.	BMB

ND

STL Knoxville Anions in Air Data Review / Narrative Checklist for Methods 9056/9057/26A, SOP KNOX-WC-0005, Rev. 8

Lot #:	H6L110105 (FH), H6L110106	Analysis Date:	12/28/06	File ID:	L28_LowLevel_FClNO3BrNO3_1228/06	ICAL File ID:	J18_LowLevel_FClNO3BrNO3 ~~1018/06~~ 101806

Review Items	NA	Yes	No	If No, why is data reportable?	2nd √
1. Were PM checklists (L40), Lot Summary and any applicable QAS reviewed?		✓			✓
2. ICV within 90-110%R?		✓			✓
3. ICB/CCB < 1/2 RL?		✓		☐ **[ccb1] No analyte > MDL in associated samples.**	✓
4. CCVs/CCBs run after every 10 samples, and at end of sequence?		✓			✓
5. Is %D ≤10% for each CCV?		✓			✓
6. If CCV failed, was it rerun only once?	✓				N/A
7. LCS/LCSD analytes within 90-110%R? *If no, list LCS ID:*		✓		☐ **[lcs3] LCS recovery >upper control limit & sample results <RL.**	✓
8. Method blank < 1/2 RL? *If no, list blank ID:*		✓		☐ **[mb3] No analyte > RL in associated samples.** ☐ [mb7] Sample results > 10x higher than blank.	✓
9. Matrix spikes run at required frequency?		✓			✓
10. Matrix spikes within 75-125% recovery? *If no, list MS ID:* _____		✓		☐ [air ms1] MS %R slightly outside limits for 1 sample. ☐ [air ms2] MS %R slightly outside limits for >1 sample. ☐ Air train reagent blank – spike result not reported.	✓
11. Were MS run #'s assigned to all matrix spikes except reagent blanks?		✓			✓
12. Sample analyses done within holding time (HT)? *If no, list samples:*		✓		☐ [ht1] HT expired upon receipt. ☐ *[ht2] Analysis requested after HT expired.*	✓
13. Were results processed using correct ICAL?		✓			✓
14. Are positive results within the calibration range?		✓			✓
15. Is integration acceptable for all samples, QC samples and standards?		✓			✓
16. For manual integrated standards and QC samples, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system.	✓
17. Calculations checked for error? (Document manual calculation checks.)		✓			✓
18. Were spreadsheets checked for transcription errors?		✓			✓
19. Final report/F6 correct? (Verify results, RLs, units, qualifiers, DFs, dates, spikes.)		✓			✓
20. Are all nonconformances documented and discussed in narrative?	✓			List NCM #:	N/A
21. Appropriate air train autotext selected for narrative?		✓		☐ [air1] Cl^- reported as HCl and Cl_2. ☐ [air2] Cl^- reported as HCl only. ☐ [air3] Cl^-, F^- reported as HCl, Cl_2, HF. ☑ [air4] Cl^-, F^-, Br^- reported as HCl, Cl_2, HF, HBr, Br_2. ☐ [air5] Cl^-, F^-, NO_2^-, NO_3^- reported as HCl, Cl_2, HF, HNO_2, HNO_3. ☐ [air6] Cl^-, F^-, Br^-, I^- reported as HCl, Cl_2, HF, HBr, Br_2, I^-. ☐ [air7] Cl^-, F^-, NO_2^-, NO_3^- reported as Cl^-, F^-, NO_2^-, NO_3^-.	air 4
22. Sample pH adjustment included in narrative?	✓			☐ [air pH] Sample pH adjusted prior to analysis.	N/A
23. Audit sample results included in narrative?	✓			☐ [audit2] Audit results in mg/L.	N/A

1st Level Reviewer: [signature]	Date: 12/29/06	2nd Level Reviewer: [signature]	Date: 12/29/06
JL9AA (LCS)			
Height = 2.19733 (0.7501) + 0.033578 (0.7501)² = 1.667 ✓		JK757(ms) HCl: 7.932 µg/ml × 425 ml × (1.0079 + 35.453) / 35.453 = 3466.9 µg	

Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6363147
Prep Date: 12/28/2006 0000
Comp Date: 12/28/2006 0000

Analyte: Hydrogen Chloride
CAS #: 7647-01-0
QuantIMS #: 2702

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 1500

Reviewed by: [illegible]
Date: 12/29/06
MW Factor: 1.028429188

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	3		4L	0.1	0.042	JK7JX1AA	465	40	0.4018	ND	1,912.8783	803.4089	19,128.78	122806	1701
H6L110105	3	S	4L	0.1	0.042	JK7JX1AE	465	40	8.7252	4172.5614	1,912.8783	803.4089	19,128.78	122806	2013
H6L110105	3	D	4L	0.1	0.042	JK7JX1AF	465	40	7.8986	3777.2651	1,912.8783	803.4089	19,128.78	122806	2030
H6L110105	5		4L	0.1	0.042	JK7J11AA	600	40	0.3128	ND	2,468.2301	1,036.6566	24,682.30	122806	1736
H6L110106	2		4L	0.1	0.042	JK7J71AA	425	40	0.2973	ND	1,748.3296	734.2984	17,483.30	122806	1515
H6L110106	2	S	4L	0.1	0.042	JK7J71AJ	425	40	7.9320	3466.9376	1,748.3296	734.2984	17,483.30	122806	1534
H6L110106	2	D	4L	0.1	0.042	JK7J71AK	425	40	7.8852	3446.4822	1,748.3296	734.2984	17,483.30	122806	1552
H6L110106	6		4L	0.1	0.042	JK7KG1AA	400	40	0.2077	ND	1,645.4867	691.1044	16,454.87	122806	1811
H6L110106	10		4L	0.1	0.042	JK7KT1AA	363	40	0.6837	ND	1,493.28	627.18	14,932.79	122806	1846
H6L290000	147	B	4L	0.1	0.042	JL9AA1AA	100	1	0.0000	ND	10.28	4.32	102.84	122806	1358
H6L290000	147	C	4L	0.1	0.042	JL9AA1AC	100	1	0.7501	77.1425	10.28	4.32	102.84	122806	1324
H6L290000	147	L	4L	0.1	0.042	JL9AA1AD	100	1	0.7563	77.7801	10.28	4.32	102.84	122806	1341

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-9087	100.00	0.750	100.0	JL9AA1AC	0.75	102.84	77.13
LCSD	ICWI-9087	100.00	0.750	100.0	JL9AA1AD	0.75	102.84	77.13
MS (1)	ICWI-9087	100.00	0.020	10.0	JK7JX1AE	0.20	19,128.78	3,825.76
MSD (1)	ICWI-9087	100.00	0.020	10.0	JK7JX1AF	0.20	19,128.78	3,825.76
MS (2)	ICWI-9087	100.00	0.020	10.0	JK7J71AJ	0.20	17,483.30	3,496.66
MSD (2)	ICWI-9087	100.00	0.020	10.0	JK7J71AK	0.20	17,483.30	3,496.66
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

Comments:

STL Knoxville
Dionex IC Runlog Cover Page

Analyst:	DFW	Date:	12/28/06	Sequence ID:	L28_LowLevel_FCINO2BRNO3_122806

Instrument:		Method:	
	☐ DX-600		☐ KNOX-WC-0003, SW-846 0061/7199
	☑ ICS-1500		☐ KNOX-WC-0005, ☐ SW-846 9056 ☐ EPA 300.0 ☐ SW-846 9057-Mod ☑ EPA 26A-Mod
	☐ DX-320		☐ KNOX-WC-0014, EPA 314.0

Preventive Maintenance	Instrument Conditions		
Daily:	Flow Rate =	1.00	mL/min
☑ Check pump and gas pressure	Pressure =	1840.	psi
☑ Check all lines for crimping, leaks and discoloration	Conductance =	24.9	µS
As Needed:	Suppressor Current =	43	mA
☐ Change column and guard column	Eluent Generator =	N/A	mM KOH
☐ Change column and/or guard column bed support			
☐ Clean conductivity cell			
☐ De-gas pump head when flow is erratic			
☐ Check/replace eluant end line filter			

MS/MSD Spike Information

WO #	Compound	Spike ID	Parent Conc.	Spike Added (mL)	Final Volume (mL)	Final Conc.
DFW 12/28/06 JK7J7	Chloride	ICWI-9087	100. PPM	0.02	10.	0.2 ppm
JK7JX	"	"	"	0.02	10	"

DFW 12/28/06

Comments: HCl Batch 6363147

☐ Sodium Thiosulfate added to NaOH impinger samples.

Sequence: L28_LOWLEVEL_FCLNO2BRNO3_122806
Operator: wheelerd

Printed: 12/29/2006 8:55:10 AM

(DKW 12/29/06)

Title:
Datasource: ICS_1500_net
Location: ICS1500
Timebase: ICS1500
#Samples: 34

Created: 12/28/2006 10:49:27 AM by wheelerd
Last Update: 12/28/2006 4:28:05 PM by wheelerd

No.	Name	Sample ID	Inj. Vol.	Inj. Date/Time	Dil. Factor	*Multiplier [Liters]	Weight
1	CAL STD #1 ICWS-8915		50.0	10/18/2006 9:14:56 AM	1.0000		1.0000
2	CAL STD #2 ICWS-8916		50.0	10/18/2006 9:32:20 AM	1.0000		1.0000
3	CAL STD #3 ICWS-8917		50.0	10/18/2006 9:49:45 AM	1.0000		1.0000
4	CAL STD #4 ICWS-8918		50.0	10/18/2006 10:07:09 AM	1.0000		1.0000
5	CAL STD #5 ICWS-8919		50.0	10/18/2006 10:24:33 AM	1.0000		1.0000
6	CAL STD #6 ICWS-8920		50.0	10/18/2006 10:41:57 AM	1.0000		1.0000
7	ICV/LCS= ICWS-9088		50.0	12/28/2006 1:24:09 PM	1.0000		1.0000
8	ICV/LCSD= ICWS-9089		50.0	12/28/2006 1:41:33 PM	1.0000		1.0000
9	ICB/ METHOD BLANK		50.0	12/28/2006 1:58:57 PM	1.0000		1.0000
10	H6L110106-JK7J7-1/20		50.0	12/28/2006 2:16:22 PM	20.0000		1.0000
11	H6L110106-JK7J7-1/20-MS@0.2ppm Cl		50.0	12/28/2006 2:40:20 PM	20.0000		1.0000
12	H6L110106-JK7J7-1/20-MSD@0.2ppm Cl		50.0	12/28/2006 2:57:44 PM	20.0000		1.0000
13	H6L110106-JK7J7-1/40		50.0	12/28/2006 3:15:08 PM	40.0000		1.0000
14	H6L110106-JK7J7-1/40-MS@0.2ppm Cl		50.0	12/28/2006 3:34:42 PM	40.0000		1.0000
15	H6L110106-JK7J7-1/40-MSD@0.2ppm Cl		50.0	12/28/2006 3:52:06 PM	40.0000		1.0000
16	CCV= ICWS-9090		50.0	12/28/2006 4:09:30 PM	1.0000		1.0000
17	CCB		50.0	12/28/2006 4:26:54 PM	1.0000		1.0000
18	H6L110105-JK7JX-1/20		50.0	12/28/2006 4:44:18 PM	20.0000		1.0000
19	H6L110105-JK7JX-1/40		50.0	12/28/2006 5:01:43 PM	40.0000		1.0000
20	H6L110105-JK7J1-1/20		50.0	12/28/2006 5:19:07 PM	20.0000		1.0000
21	H6L110105-JK7J1-1/40		50.0	12/28/2006 5:36:31 PM	40.0000		1.0000
22	H6L110106-JK7KG-1/20		50.0	12/28/2006 5:53:56 PM	20.0000		1.0000
23	H6L110106-JK7KG-1/40		50.0	12/28/2006 6:11:20 PM	40.0000		1.0000
24	H6L110106-JK7KT-1/20		50.0	12/28/2006 6:28:44 PM	20.0000		1.0000
25	H6L110106-JK7KT-1/40		50.0	12/28/2006 6:46:08 PM	40.0000		1.0000
26	CCV= ICWS-9090		50.0	12/28/2006 7:03:32 PM	1.0000		1.0000
27	CCB		50.0	12/28/2006 7:20:56 PM	1.0000		1.0000
28	H6L110105-JK7JX-1/20-MS@0.2ppm Cl		50.0	12/28/2006 7:38:20 PM	20.0000		1.0000
29	H6L110105-JK7JX-1/20-MSD@0.2ppm Cl		50.0	12/28/2006 7:55:44 PM	20.0000		1.0000
30	H6L110105-JK7JX-1/40-MS@0.2ppm Cl		50.0	12/28/2006 8:13:09 PM	40.0000		1.0000
31	H6L110105-JK7JX-1/40-MSD@0.2ppm Cl		50.0	12/28/2006 8:30:33 PM	40.0000		1.0000
32	CCV= ICWS-9090		50.0	12/28/2006 8:47:58 PM	1.0000		1.0000
33	CCB		50.0	12/28/2006 9:05:22 PM	1.0000		1.0000
34	SHUTDOWN		50.0	12/28/2006 9:22:46 PM	1.0000		1.0000

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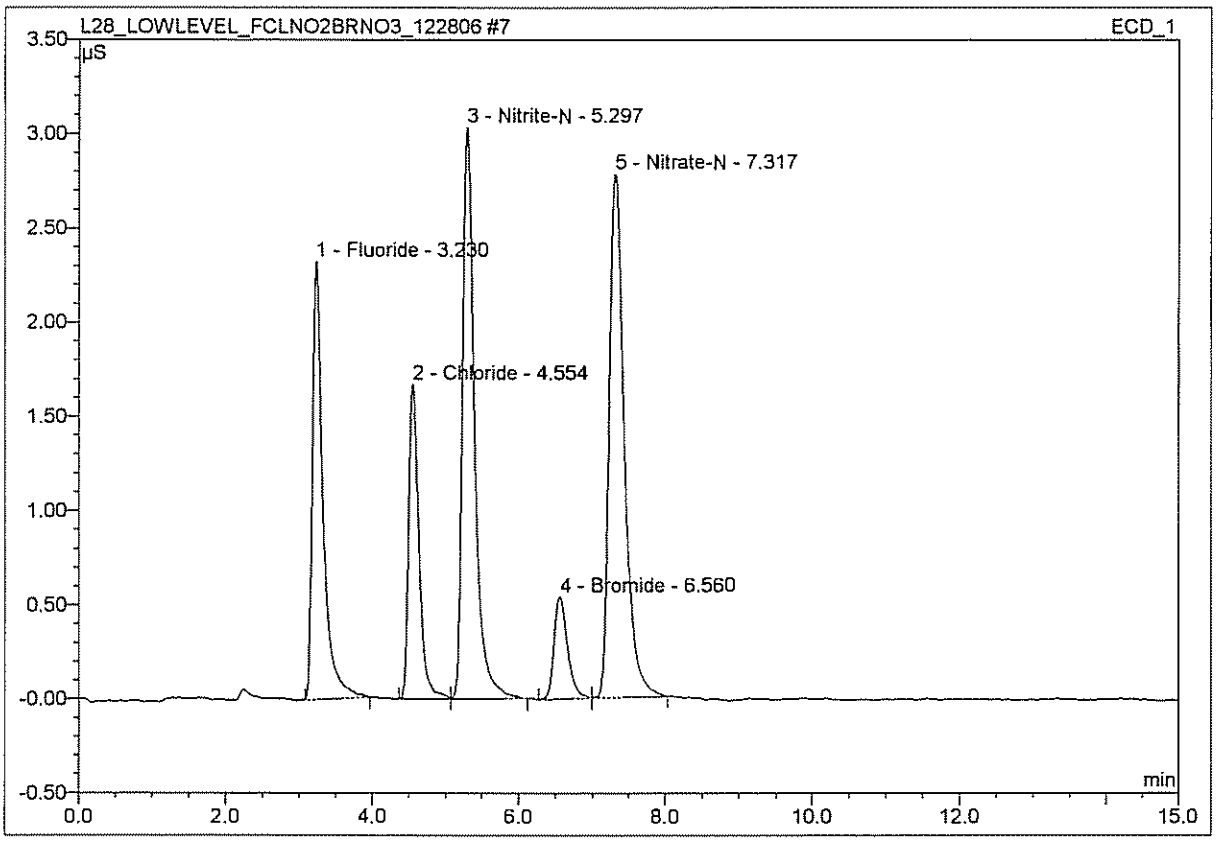
7 ICV/LCS= ICWS-9088

Sample Name:	**ICV/LCS= ICWS-9088**	*Injection Volume:*	**50.0**
Vial Number:	**1296**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 13:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

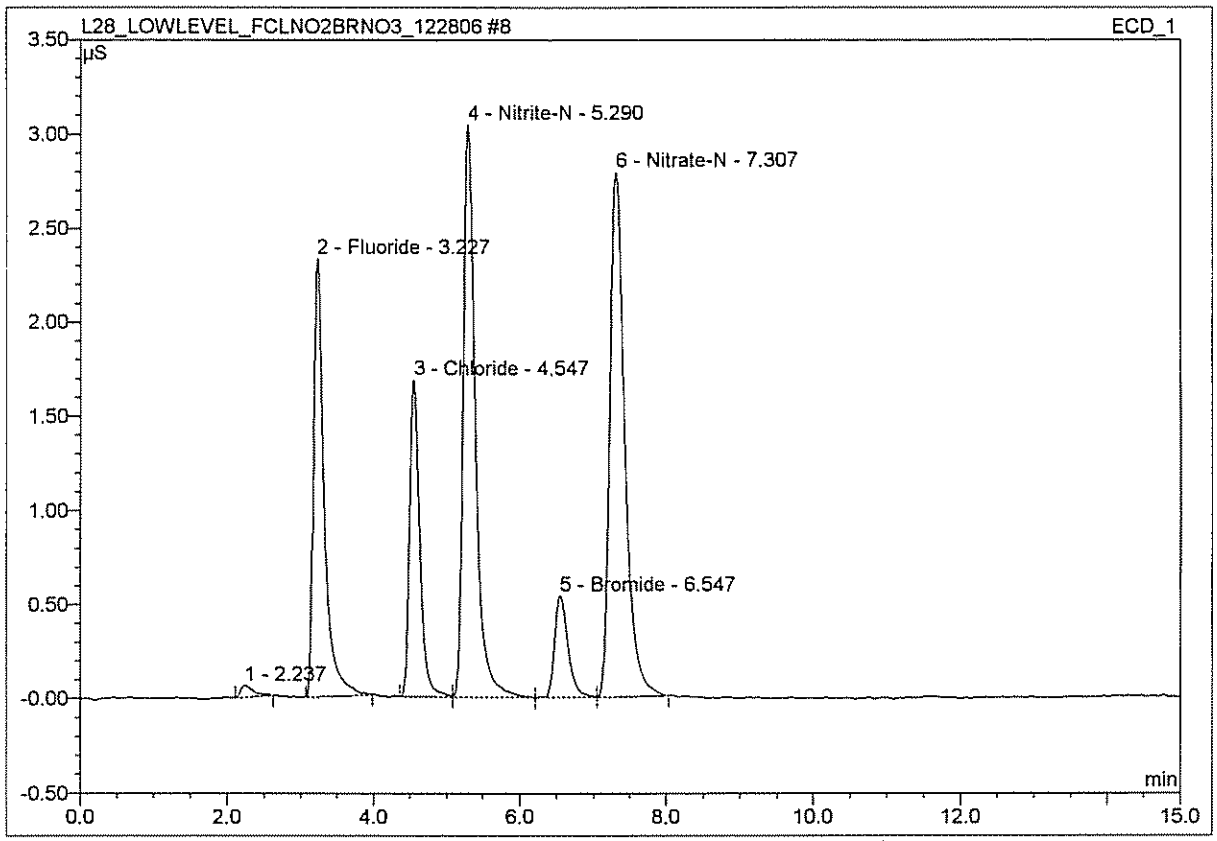


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	2.32322	0.397	19.53	0.8109	BMB
2	4.55	Chloride	1.66709	0.273	13.44	0.7501	BM
3	5.30	Nitrite-N	3.02897	0.586	28.80	0.7761	MB
4	6.56	Bromide	0.54320	0.115	5.64	0.7617	BMb
5	7.32	Nitrate-N	2.77714	0.663	32.59	0.7720	bMB

HCl JL9AA-1AC

8 ICV/LCSD= ICWS-9089

Sample Name:	**ICV/LCSD= ICWS-9089**	*Injection Volume:*	**50.0**
Vial Number:	**1297**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 13:41**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

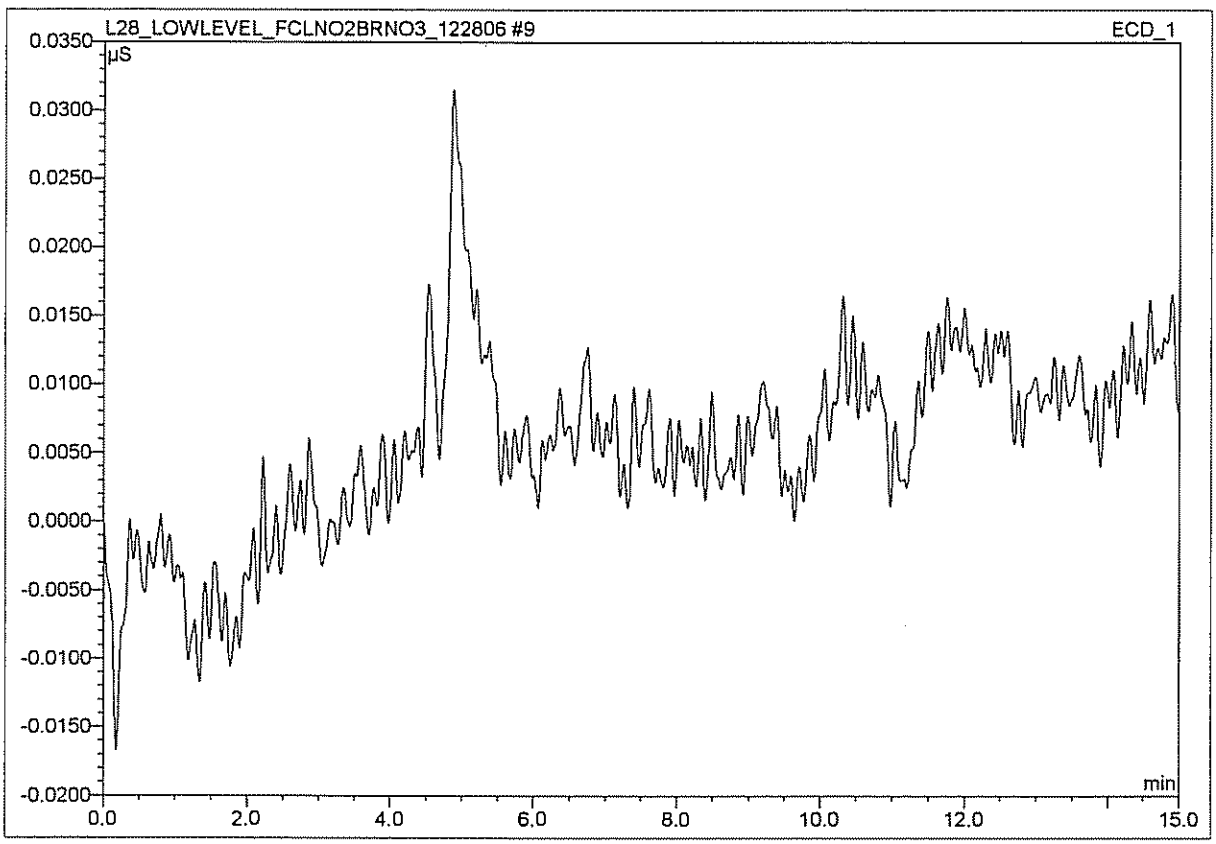


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	0.06095	0.013	0.61	n.a.	BMB
2	3.23	Fluoride	2.32775	0.399	19.45	0.8124	BMB
3	4.55	Chloride	1.68114	0.274	13.35	0.7563	BM
4	5.29	Nitrite-N	3.03772	0.587	28.59	0.7783	M
5	6.55	Bromide	0.53922	0.114	5.54	0.7561	MB
6	7.31	Nitrate-N	2.78963	0.666	32.46	0.7754	BMB

HCl JL9AA-1A/D
RW 12/29/06

9 ICB/ METHOD BLANK

Sample Name:	**ICB/ METHOD BLANK**	*Injection Volume:*	**50.0**
Vial Number:	**1298**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 13:58**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



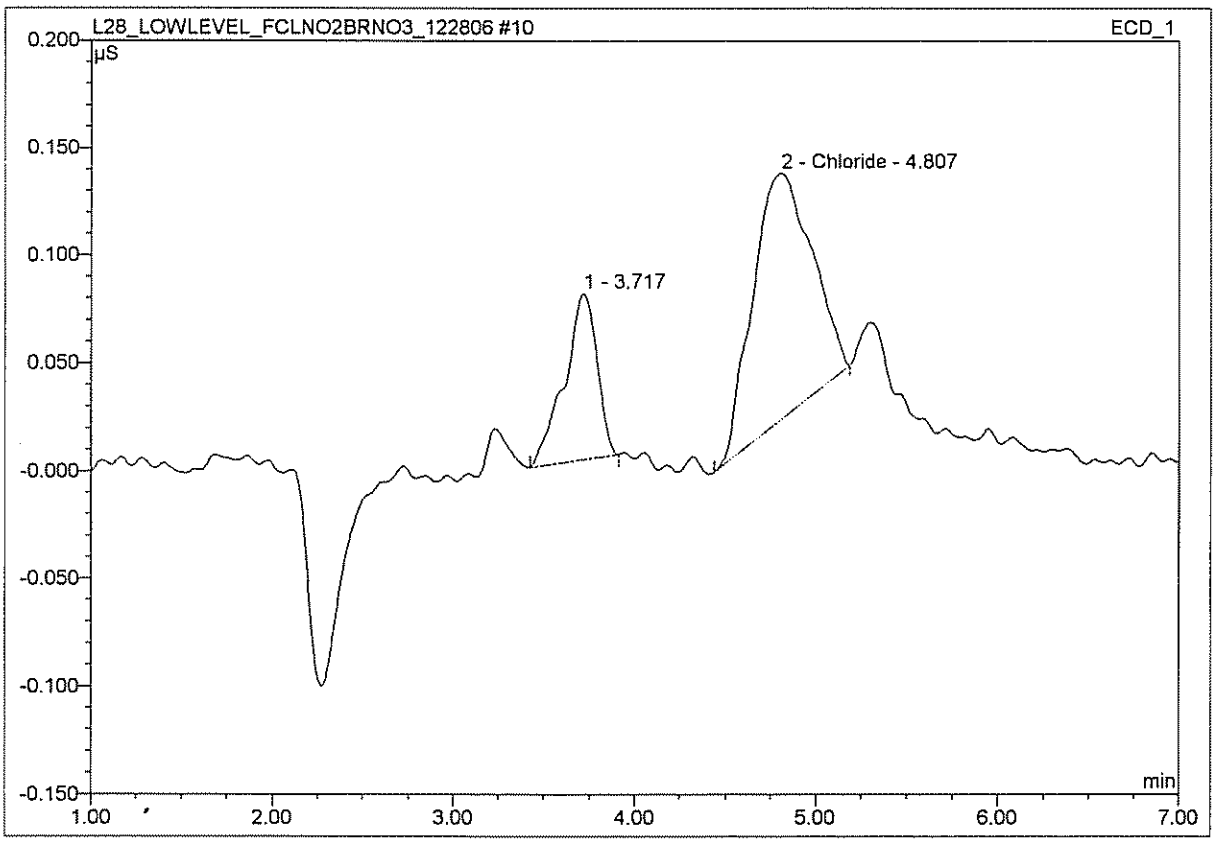
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

HCl JL9AA-1AA

10 H6L110106-JK7J7-1/20

Sample Name:	**H6L110106-JK7J7-1/20**	*Injection Volume:*	**50.0**
Vial Number:	**1294**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS_CI2 METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/28/2006 14:16**	*Sample Weight:*	**1.0000**
Run Time (min):	**20.95**	*Sample Amount:*	**1.0000**

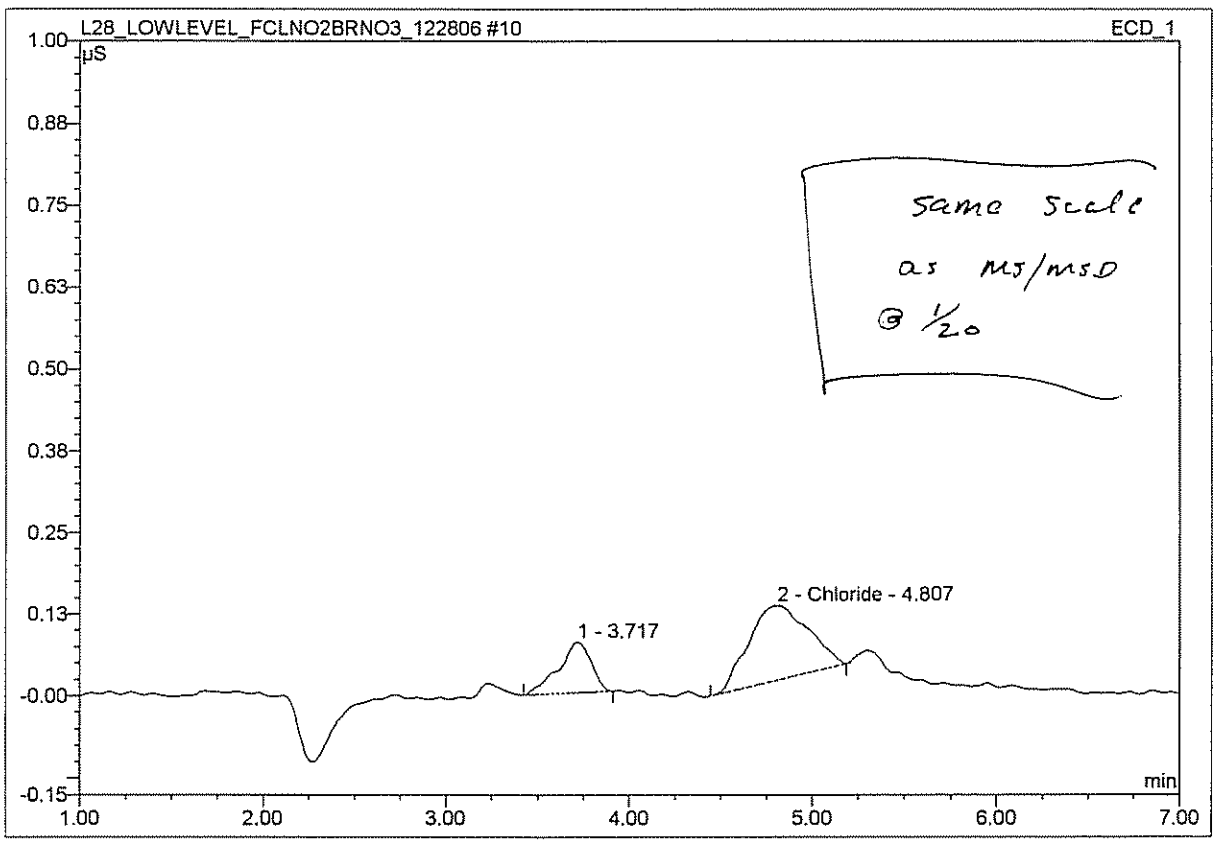


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.72	n.a.	0.07689	0.016	0.03	n.a.	BMB
2	4.81	Chloride	0.11415	0.043	0.09	1.0382	BMB
3	7.33	Nitrate-N	0.11481	0.027	0.06	0.6629	BMB
4	8.02	n.a.	0.08998	0.016	0.04	n.a.	BMB
5	11.41	n.a.	##########	45.896	99.78	n.a.	BMB

Peak not split – see 1/40.

10 H6L110106-JK7J7-1/20

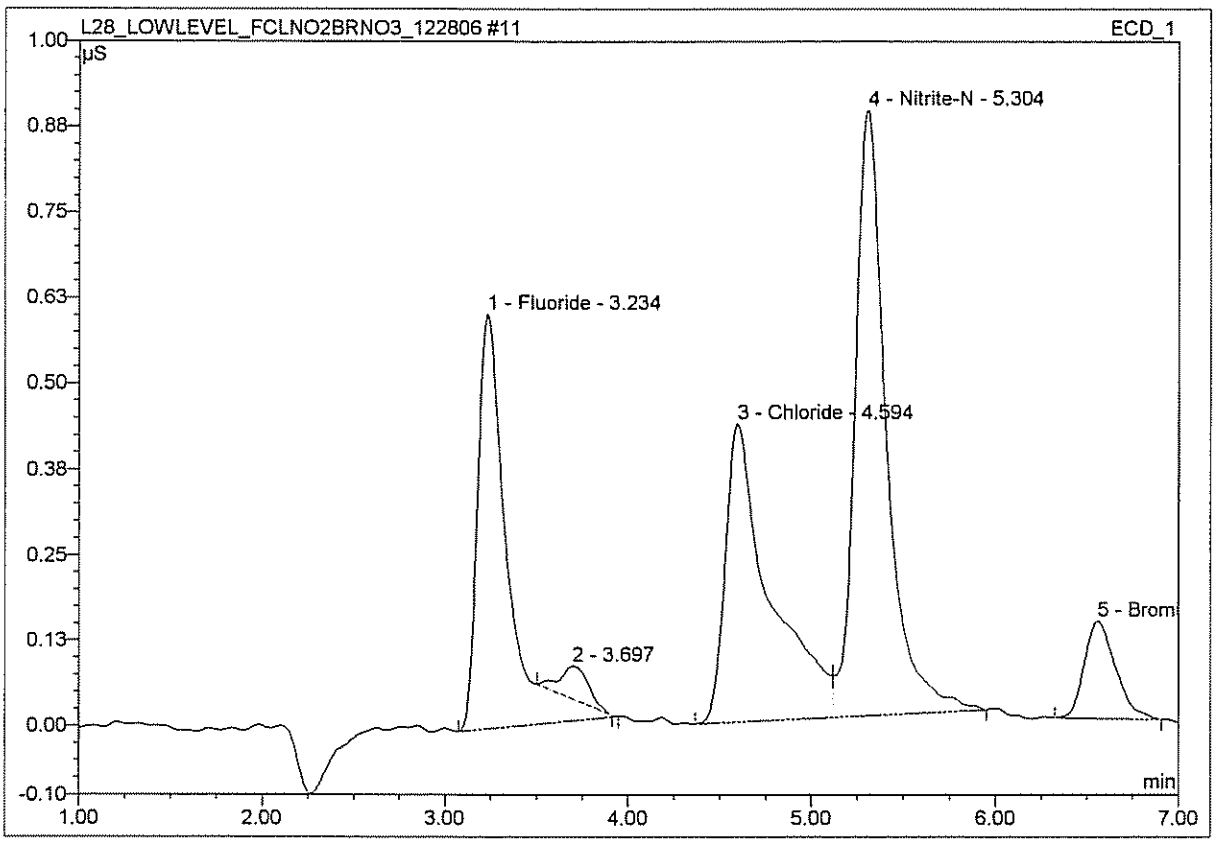
Sample Name:	**H6L110106-JK7J7-1/20**	*Injection Volume:*	**50.0**
Vial Number:	**1294**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS_CI2 METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/28/2006 14:16**	*Sample Weight:*	**1.0000**
Run Time (min):	**20.95**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.72	n.a.	0.07689	0.016	0.03	n.a.	BMB
2	4.81	Chloride	0.11415	0.043	0.09	1.0382	BMB
3	7.33	Nitrate-N	0.11481	0.027	0.06	0.6629	BMB
4	8.02	n.a.	0.08998	0.016	0.04	n.a.	BMB
5	11.41	n.a.	##########	45.896	99.78	n.a.	BMB

11 H6L110106-JK7J7-1/20-MS@0.2ppm Cl

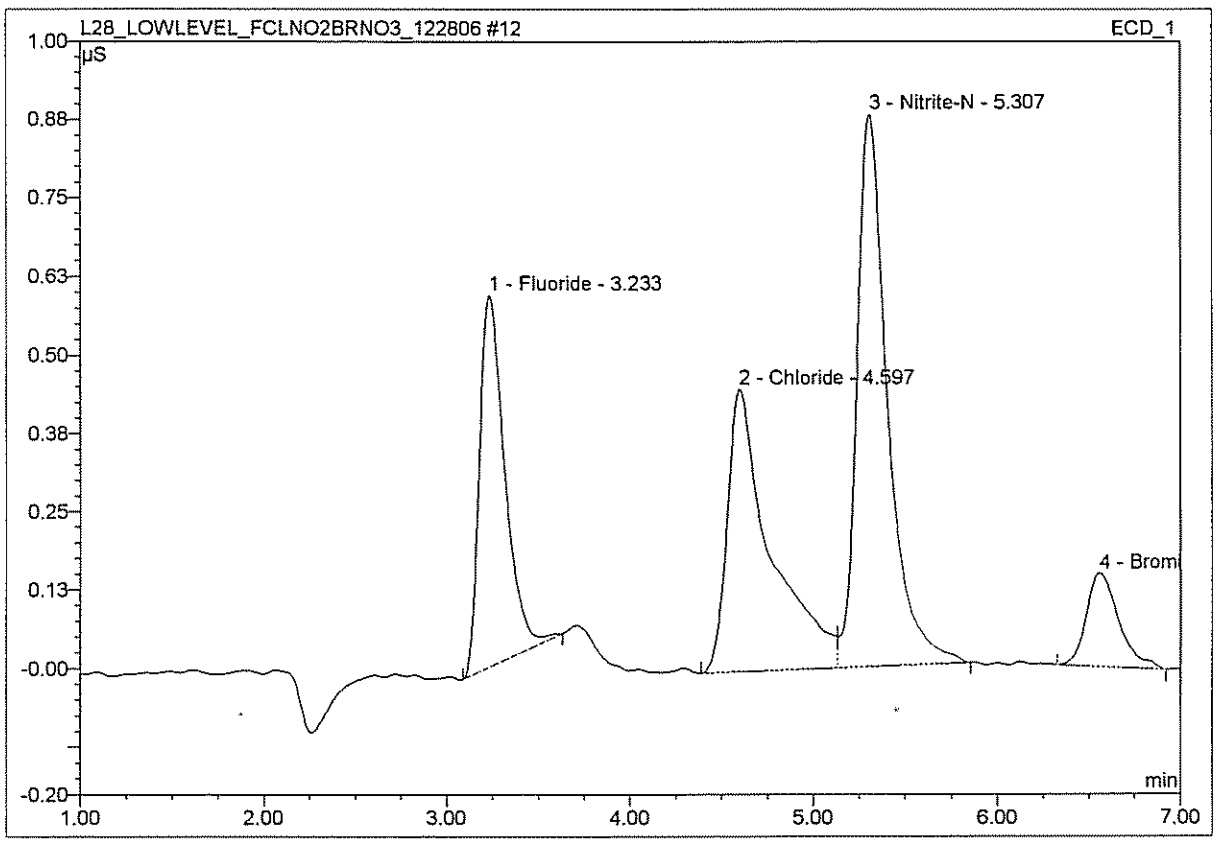
Sample Name:	**H6L110106-JK7J7-1/20-MS@0.2ppm Cl**	*Injection Volume:*	**50.0**
Vial Number:	**1294**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/28/2006 14:40**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.60402	0.115	0.25	4.4141	BMB
2	3.70	n.a.	0.04813	0.009	0.02	n.a.	Rd
3	4.59	Chloride	0.43484	0.122	0.26	3.9460	BM
4	5.30	Nitrite-N	0.88289	0.176	0.38	4.6088	MB
5	6.56	Bromide	0.14211	0.028	0.06	4.0035	BMB
6	7.32	Nitrate-N	0.83916	0.196	0.42	4.7938	BMB
7	11.41	n.a.	##########	45.573	98.60	n.a.	BMB

12 H6L110106-JK7J7-1/20-MSD@0.2ppm Cl

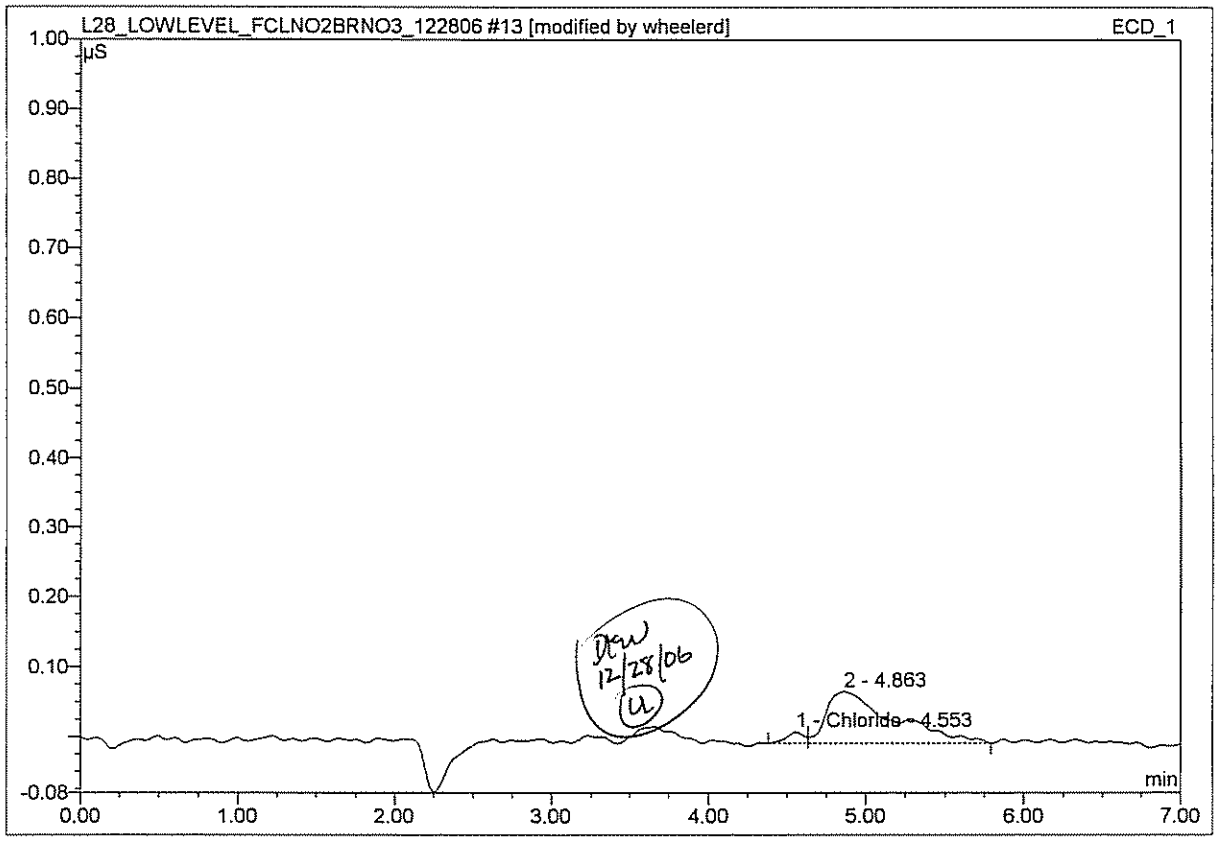
Sample Name:	**H6L110106-JK7J7-1/20-MSD@0.2ppm Cl**	*Injection Volume:*	**50.0**
Vial Number:	**1316**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/28/2006 14:57**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.90**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.59252	0.095	0.20	4.3315	BMB
2	4.60	Chloride	0.45078	0.123	0.27	4.0902	BM
3	5.31	Nitrite-N	0.88058	0.170	0.37	4.5969	MB
4	6.56	Bromide	0.14858	0.031	0.07	4.1856	BMB
5	7.33	Nitrate-N	0.85559	0.208	0.45	4.8865	BMB
6	11.41	n.a.	##########	45.813	98.65	n.a.	BMB

13 H6L110106-JK7J7-1/40

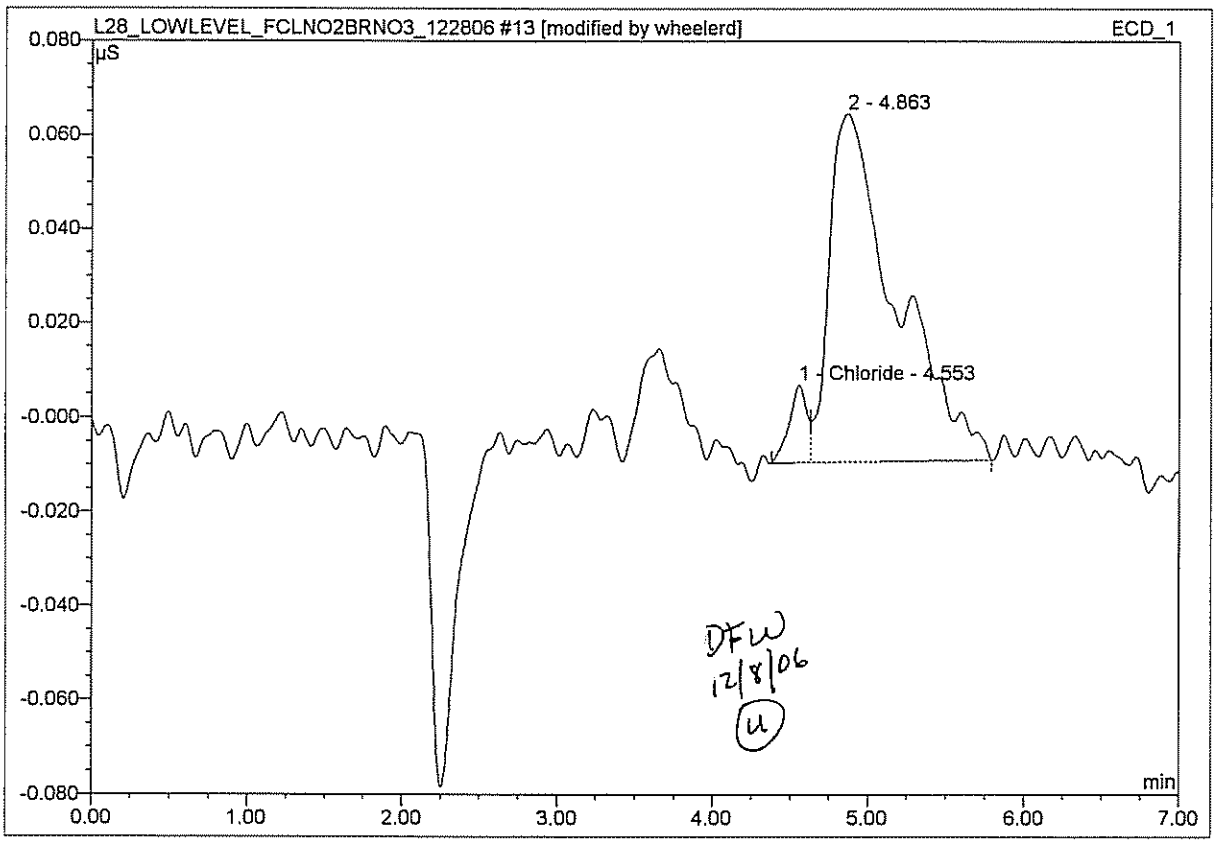
Sample Name:	**H6L110106-JK7J7-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1317**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 15:15**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.55	Chloride	0.01633	0.002	0.01	0.2973	BM *
2	4.86	n.a.	0.07384	0.036	0.17	n.a.	MB*
3	7.33	Nitrate-N	0.05437	0.012	0.06	0.6285	BMB
4	11.46	n.a.	68.39477	21.339	99.76	n.a.	BMB

13 H6L110106-JK7J7-1/40

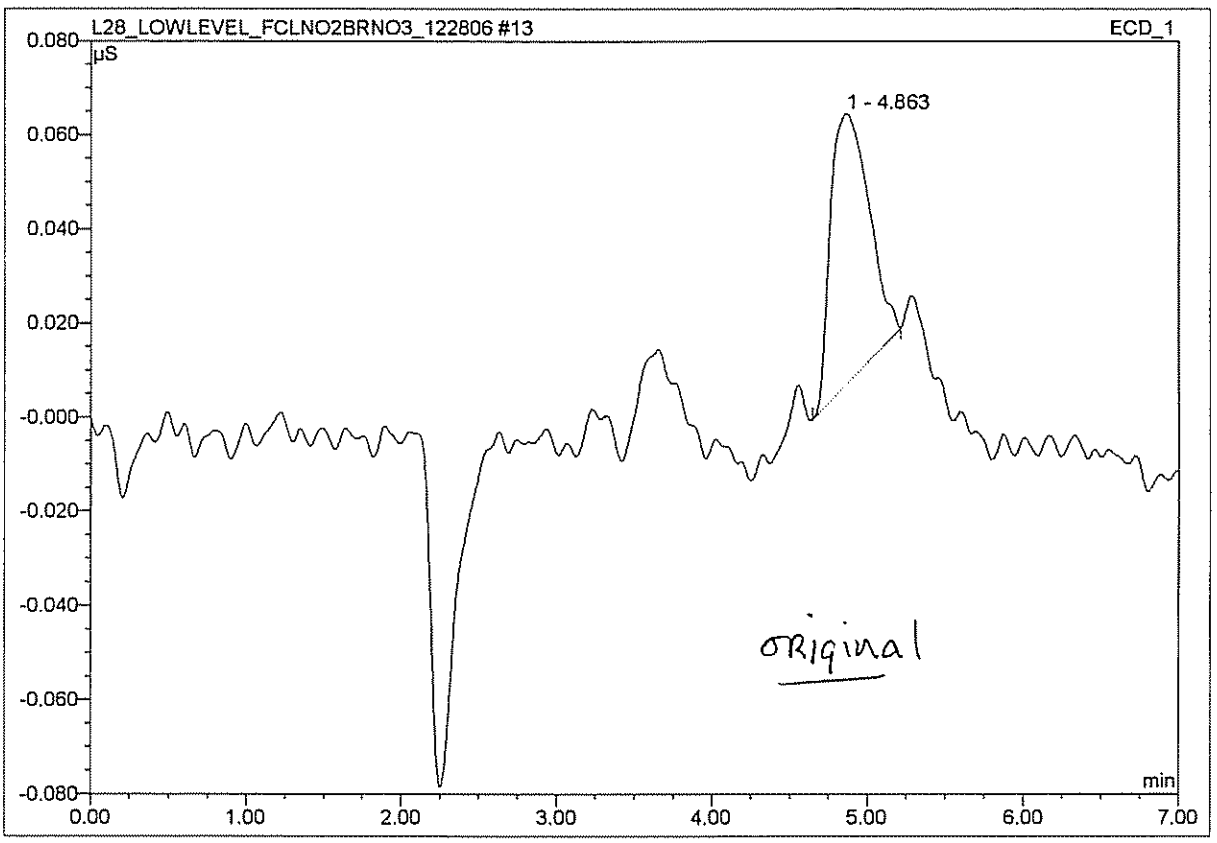
Sample Name:	**H6L110106-JK7J7-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1317**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 15:15**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.55	Chloride	0.01633	0.002	0.01	0.2973	BM *
2	4.86	n.a.	0.07384	0.036	0.17	n.a.	MB*
3	7.33	Nitrate-N	0.05437	0.012	0.06	0.6285	BMB
4	11.46	n.a.	68.39477	21.339	99.76	n.a.	BMB

13 H6L110106-JK7J7-1/40

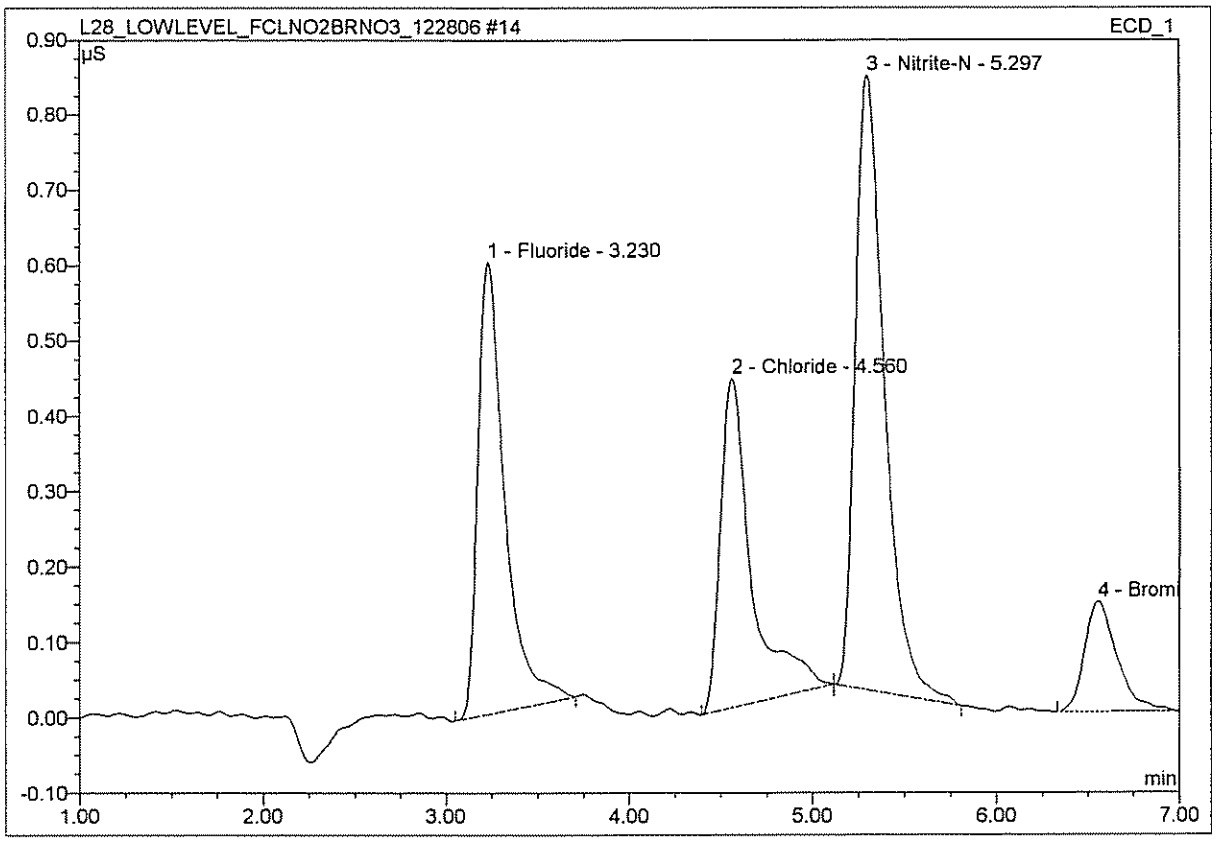
Sample Name:	**H6L110106-JK7J7-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1317**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 15:15**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.86	n.a.	0.05739	0.016	0.08	n.a.	BMB
2	7.33	Nitrate-N	0.05437	0.012	0.06	0.6285	BMB
3	11.46	n.a.	68.39477	21.339	99.87	n.a.	BMB

14 H6L110106-JK7J7-1/40-MS@0.2ppm Cl

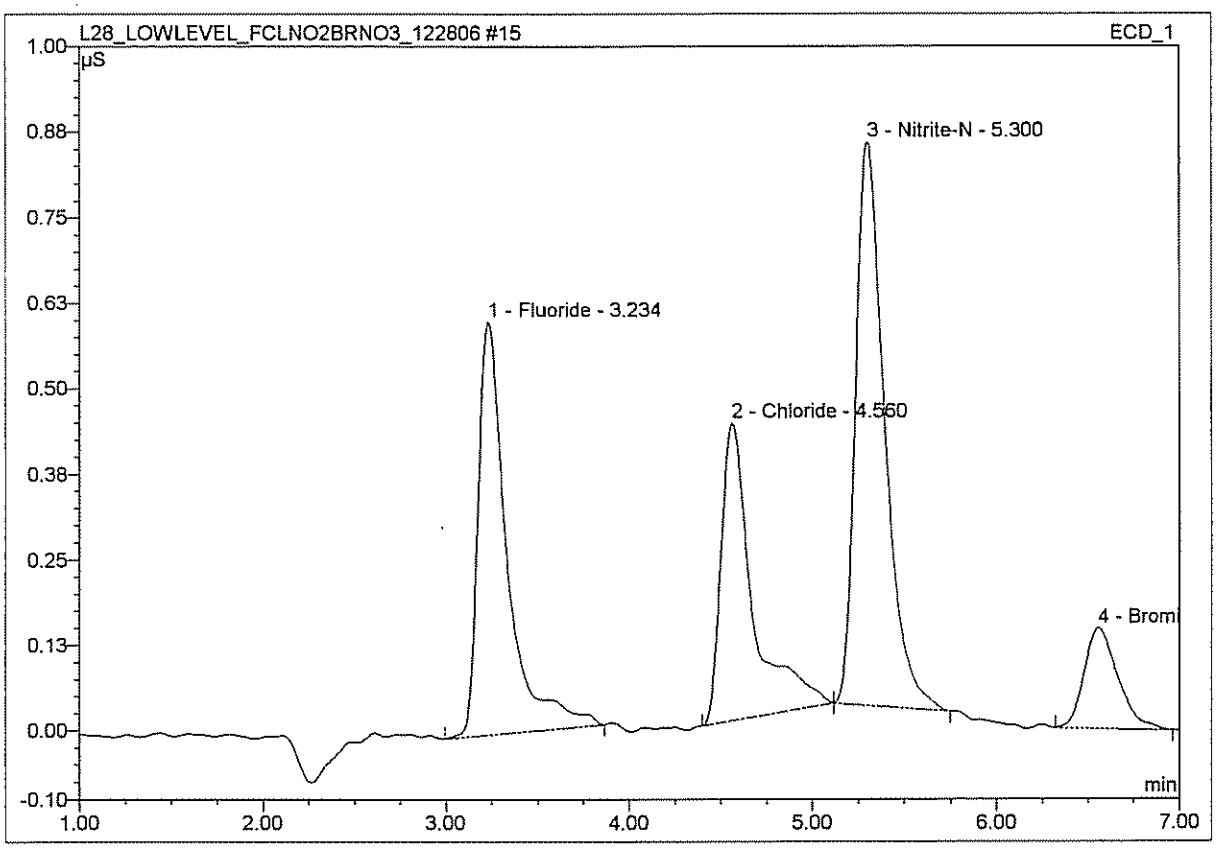
Sample Name:	**H6L110106-JK7J7-1/40-MS@0.2ppm Cl**	*Injection Volume:*	**50.0**
Vial Number:	**1317**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 15:34**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.60020	0.102	0.48	8.7734	BMB
2	4.56	Chloride	0.43705	0.086	0.40	7.9320	BMB
3	5.30	Nitrite-N	0.81527	0.150	0.70	8.5168	bMB
4	6.55	Bromide	0.14598	0.030	0.14	8.2249	BM
5	7.32	Nitrate-N	0.78173	0.187	0.87	8.9389	MB
6	11.47	n.a.	66.89217	20.869	97.41	n.a.	BMB

15 H6L110106-JK7J7-1/40-MSD@0.2ppm Cl

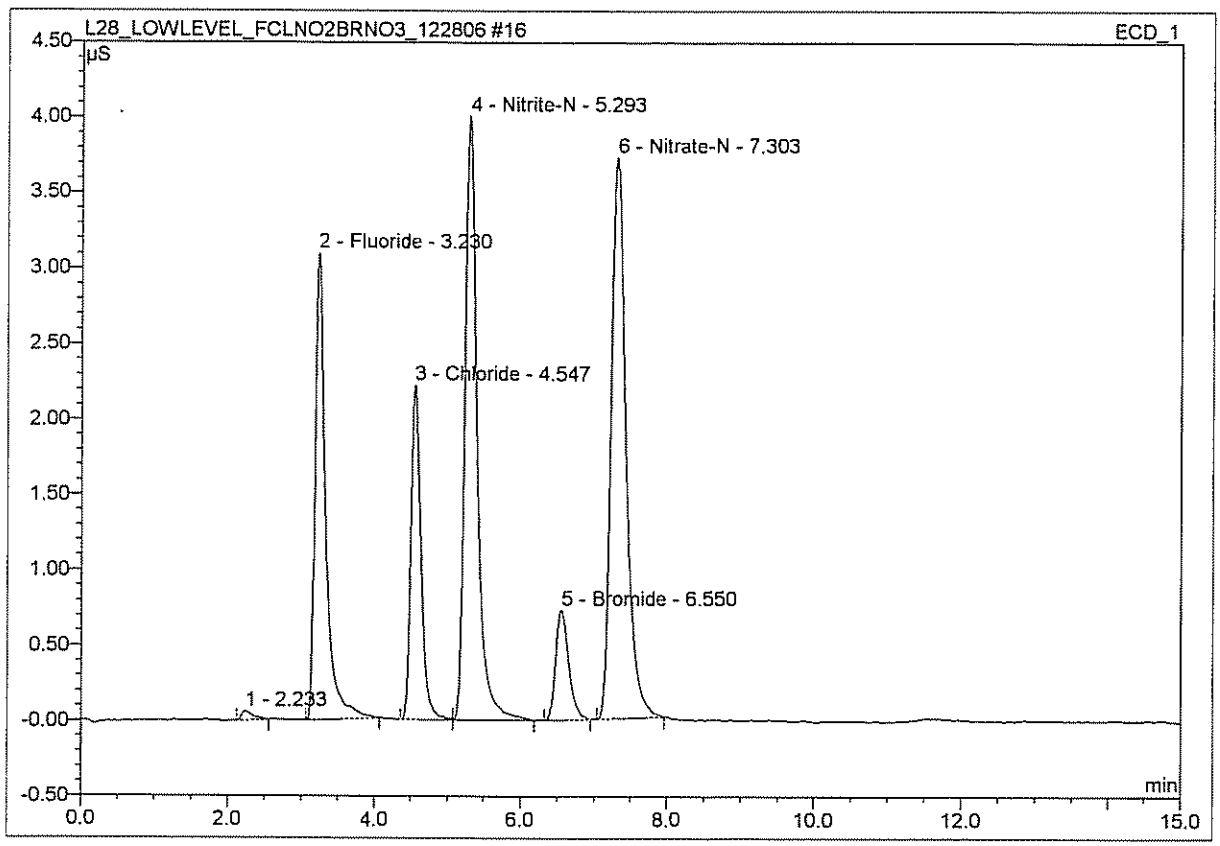
Sample Name:	**H6L110106-JK7J7-1/40-MSD@0.2ppm Cl**	*Injection Volume:*	**50.0**
Vial Number:	**1318**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 15:52**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.60384	0.111	0.51	8.8257	BMB
2	4.56	Chloride	0.43447	0.087	0.40	7.8852	BMB
3	5.30	Nitrite-N	0.82309	0.150	0.70	8.5978	bMB
4	6.55	Bromide	0.14688	0.032	0.15	8.2750	BMB
5	7.32	Nitrate-N	0.78556	0.187	0.87	8.9822	BMB
6	11.46	n.a.	67.25044	20.977	97.37	n.a.	BMB

16 CCV= ICWS-9090

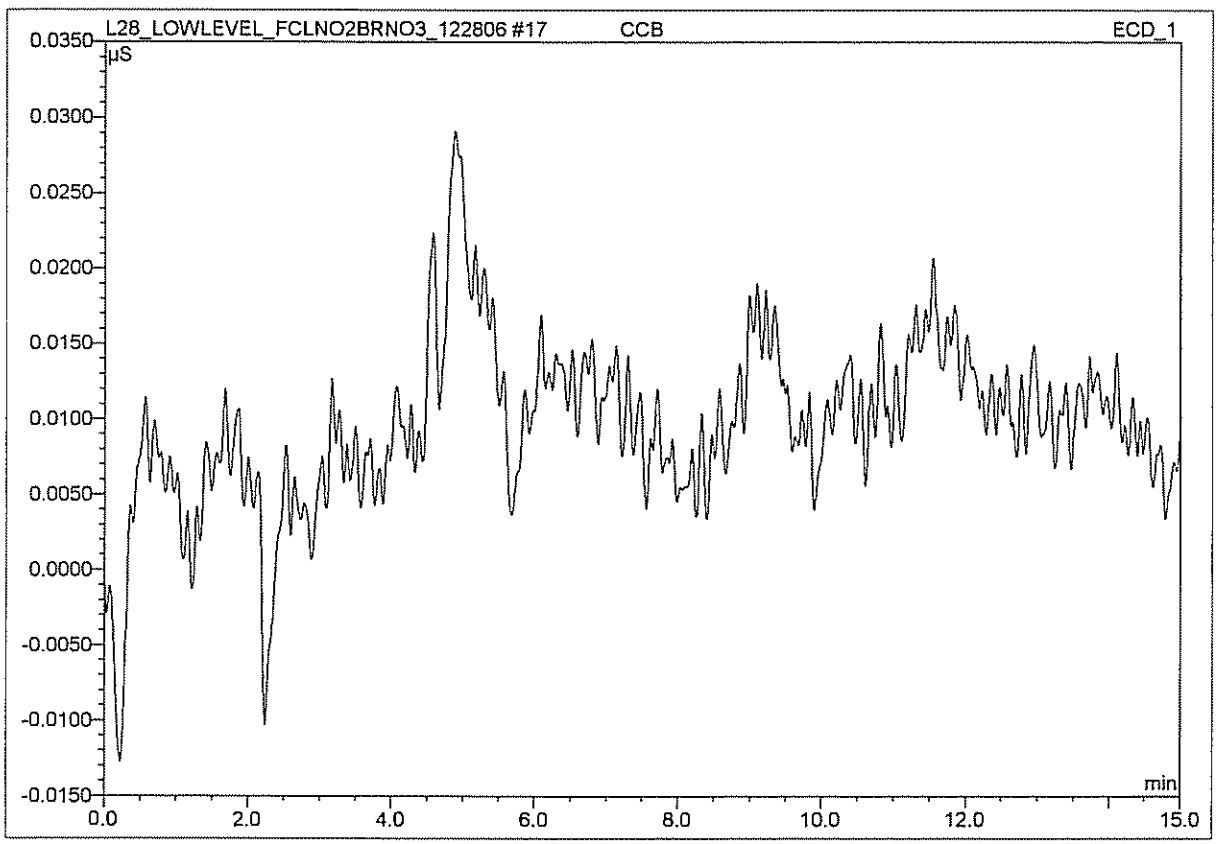
Sample Name:	**CCV= ICWS-9090**	*Injection Volume:*	**50.0**
Vial Number:	**1370**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 16:09**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	0.06059	0.011	0.42	n.a.	BMB
2	3.23	Fluoride	3.09242	0.528	19.53	1.0594	BMB
3	4.55	Chloride	2.21582	0.356	13.19	0.9933	BM
4	5.29	Nitrite-N	4.00209	0.777	28.76	1.0173	MB
5	6.55	Bromide	0.72968	0.151	5.60	1.0210	BMB
6	7.30	Nitrate-N	3.71828	0.878	32.50	1.0209	BMB

17 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**1371**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 16:26**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

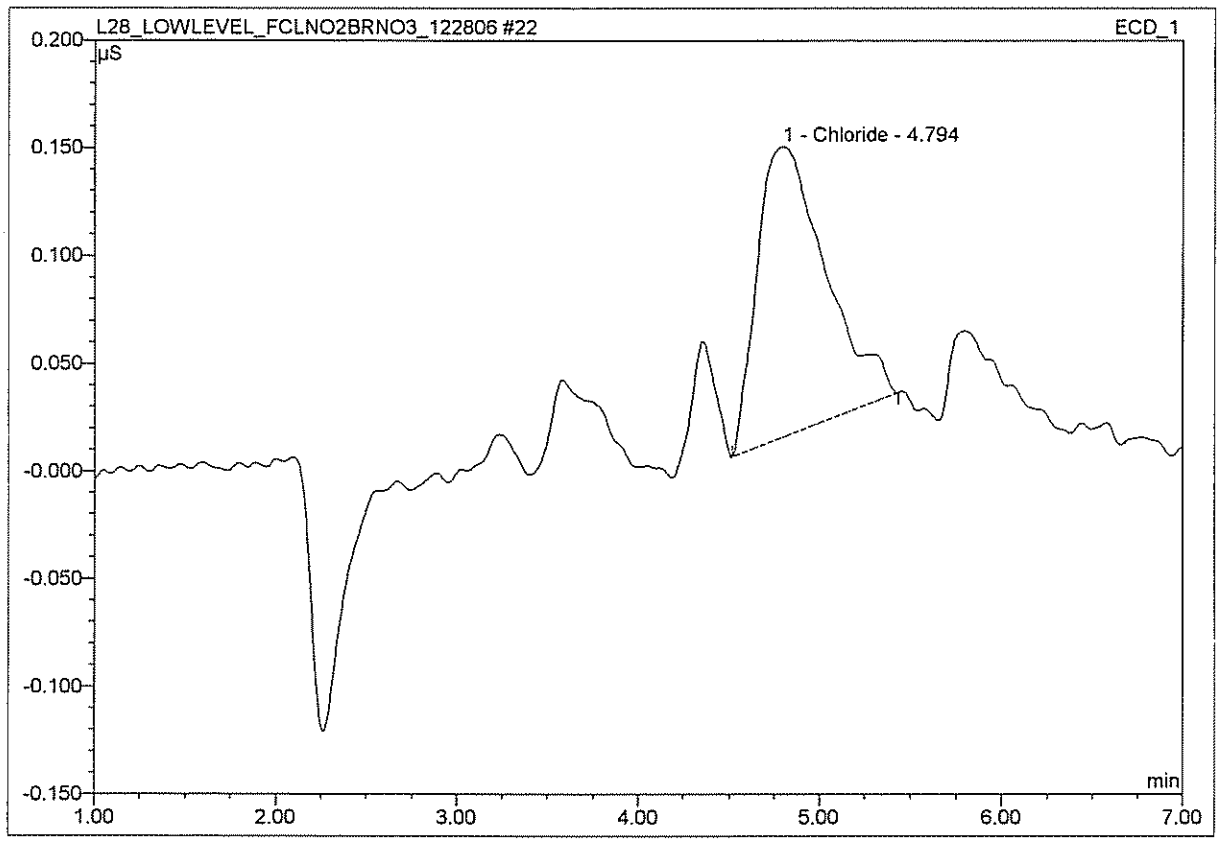


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

22 H6L110106-JK7KG-1/20

Sample Name:	**H6L110106-JK7KG-1/20**	*Injection Volume:*	**50.0**
Vial Number:	**1397**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/28/2006 17:53**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

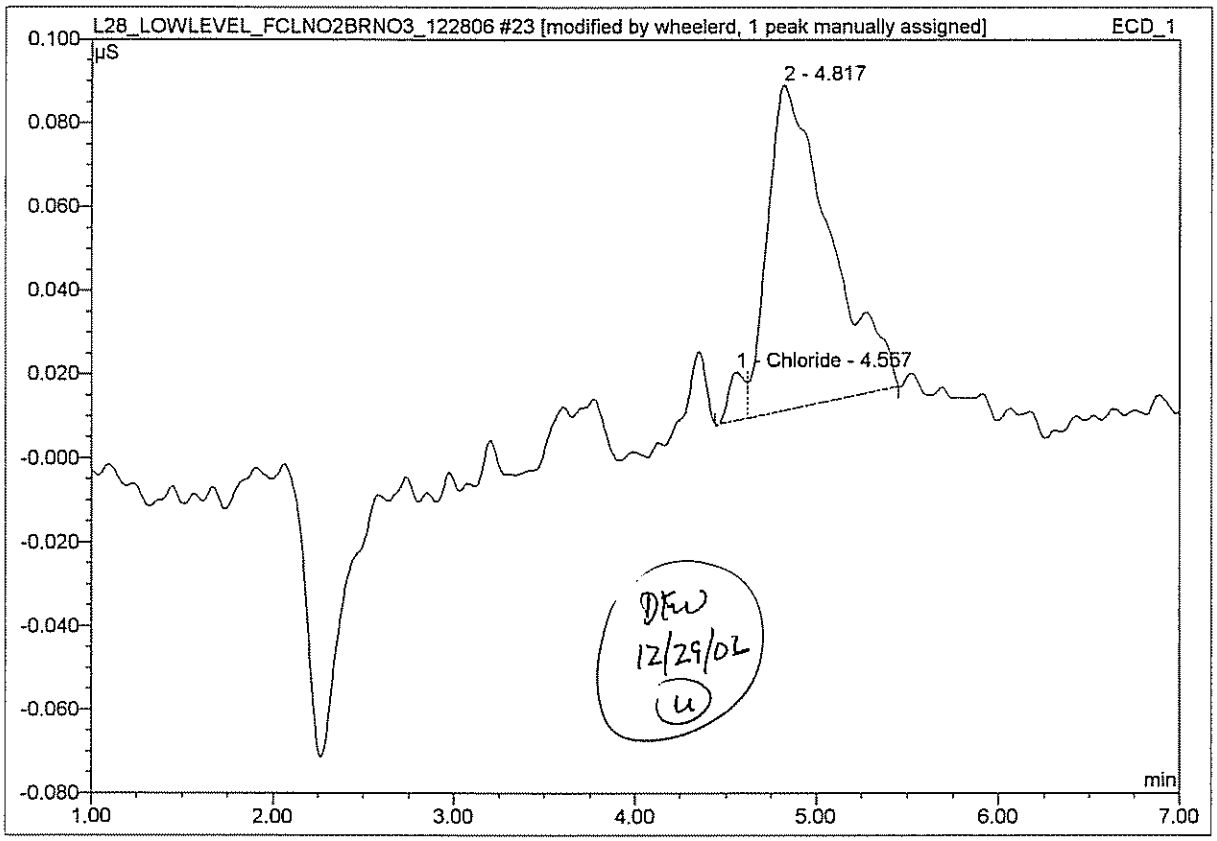


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.79	Chloride	0.13461	0.059	0.12	1.2241	BMB
2	7.33	Nitrate-N	0.09886	0.023	0.05	0.5710	BMB
3	10.32	n.a.	0.76053	0.227	0.47	n.a.	BMB
4	11.40	n.a.	##########	47.768	99.36	n.a.	BMB

Peak not split. See 1/40

23 H6L110106-JK7KG-1/40

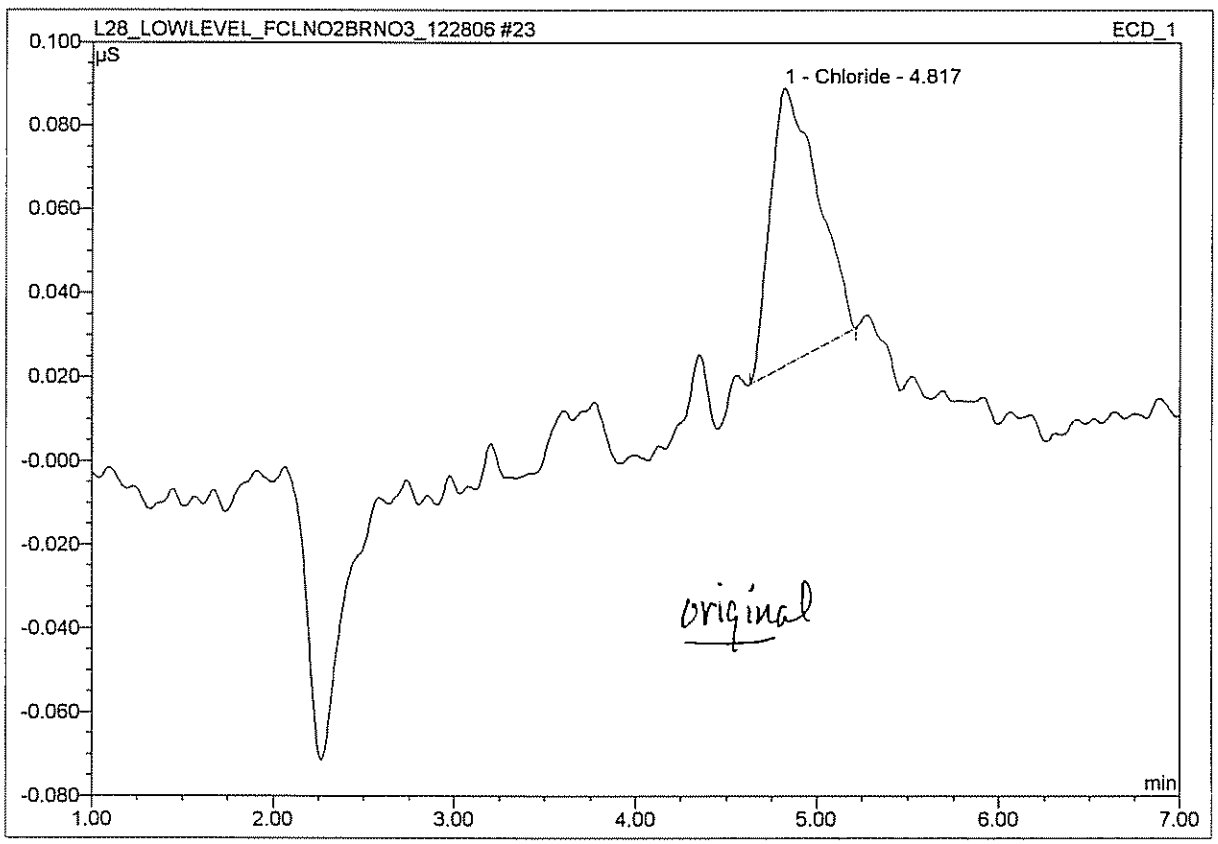
Sample Name:	**H6L110106-JK7KG-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1398**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 18:11**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.56	Chloride	0.01141	0.001	0.01	0.2077	BM *^
2	4.82	n.a.	0.07763	0.031	0.14	n.a.	MB*
3	7.32	Nitrate-N	0.05905	0.015	0.07	0.6826	BMB
4	10.32	n.a.	0.37844	0.114	0.51	n.a.	BMB
5	11.46	n.a.	70.85893	22.110	99.28	n.a.	BMB

23 H6L110106-JK7KG-1/40

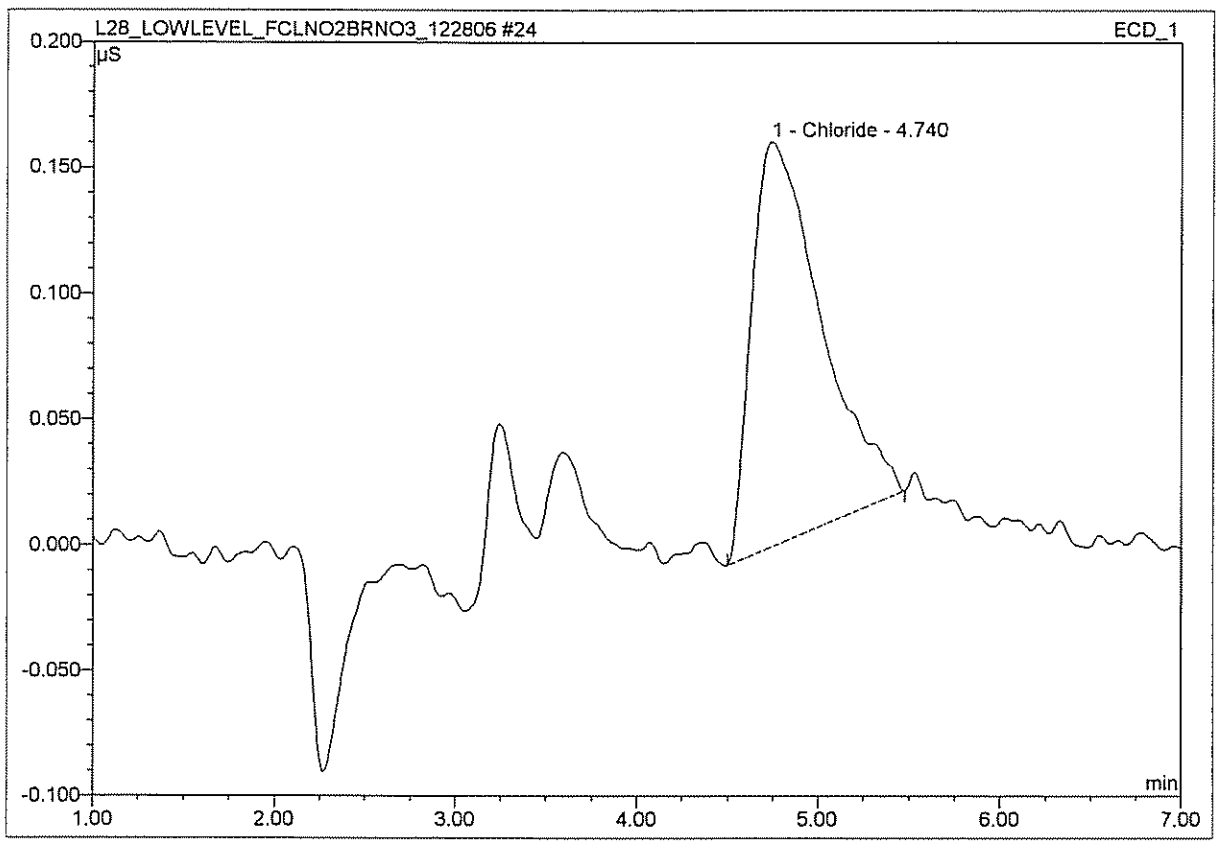
Sample Name:	**H6L110106-JK7KG-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1398**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 18:11**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.82	Chloride	0.06637	0.020	0.09	1.2076	BMB
2	7.32	Nitrate-N	0.05905	0.015	0.07	0.6826	BMB
3	10.32	n.a.	0.37844	0.114	0.51	n.a.	BMB
4	11.46	n.a.	70.85893	22.110	99.33	n.a.	BMB

24 H6L110106-JK7KT-1/20

Sample Name:	**H6L110106-JK7KT-1/20**	*Injection Volume:*	**50.0**
Vial Number:	**1399**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/28/2006 18:28**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

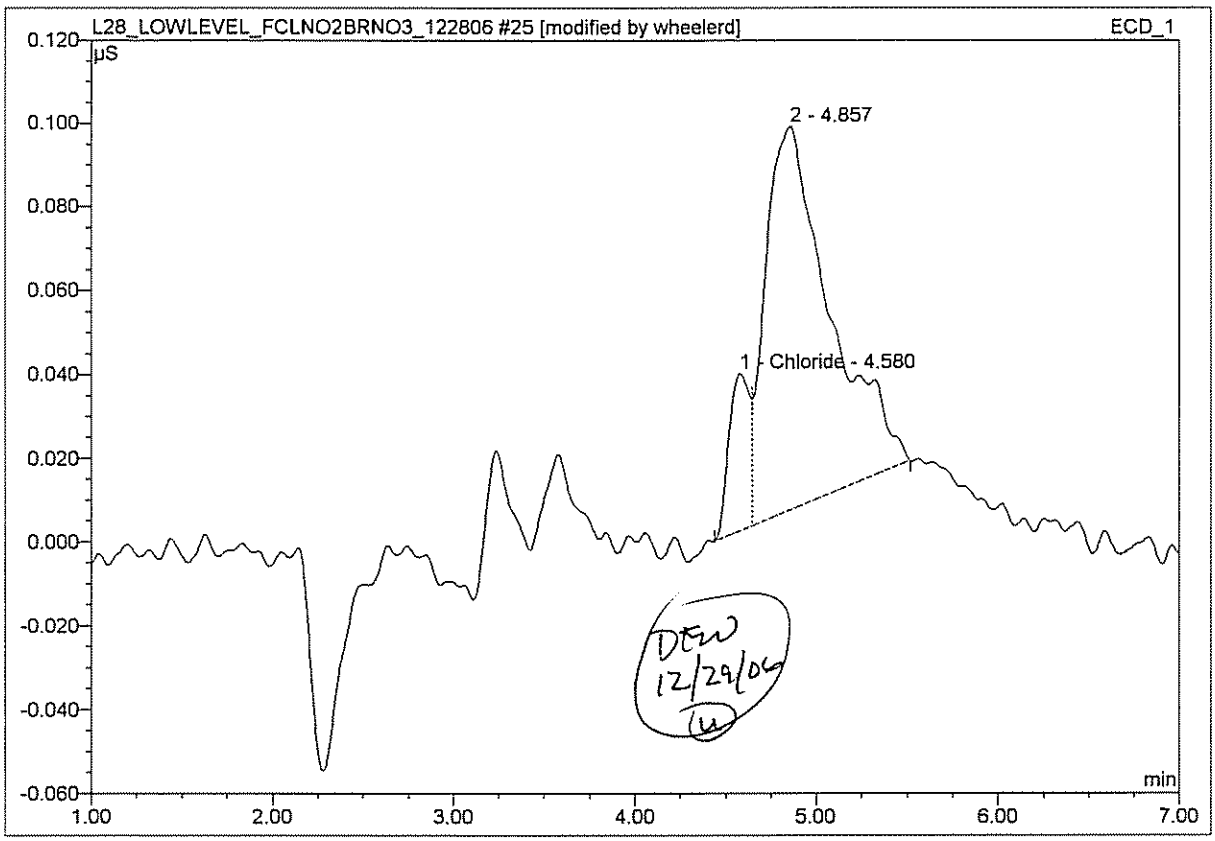


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.74	Chloride	0.16098	0.071	0.13	1.4636	BMB
2	7.33	Nitrate-N	0.12915	0.030	0.06	0.7456	BMB
3	9.67	n.a.	0.06562	0.020	0.04	n.a.	BMB
4	11.39	n.a.	#########	53.520	99.77	n.a.	BMB

Peak not split. LGC 1/40.

25 H6L110106-JK7KT-1/40

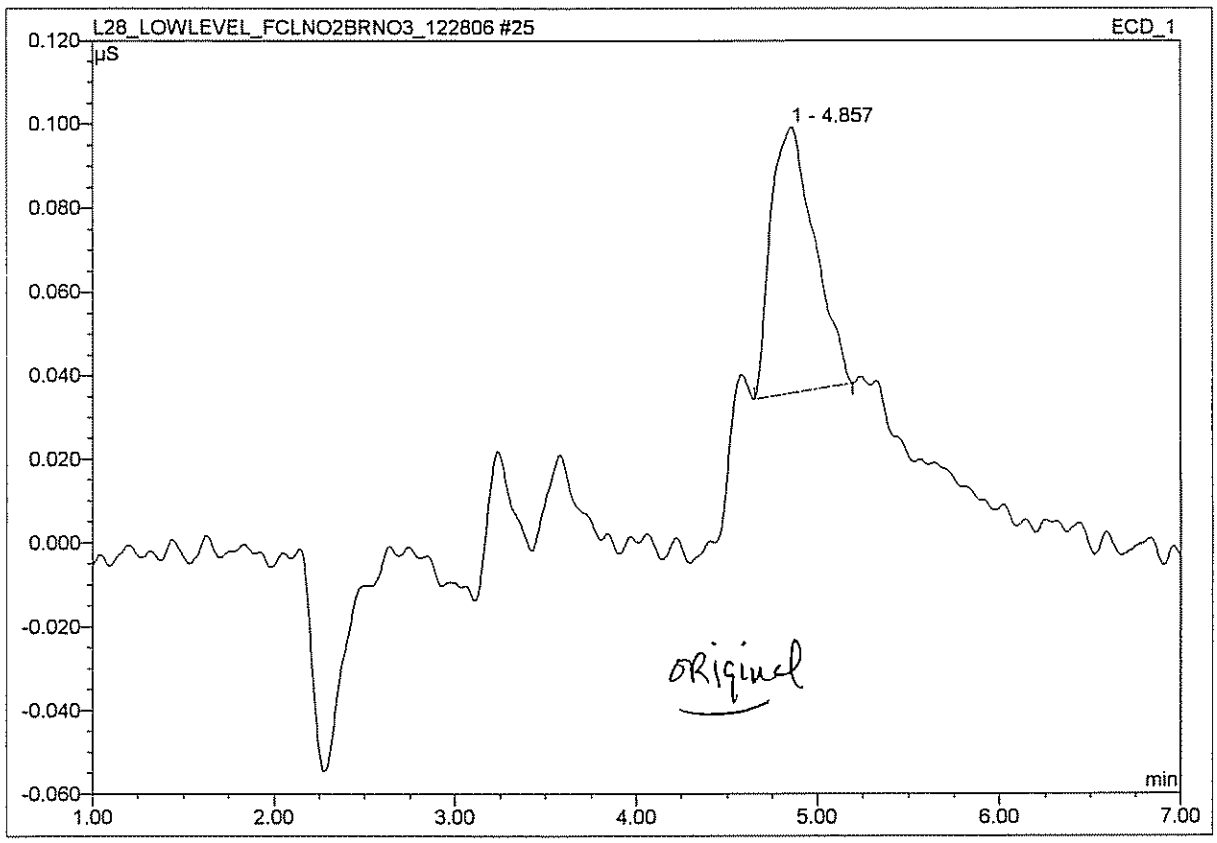
Sample Name:	**H6L110106-JK7KT-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1400**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 18:46**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.58	Chloride	0.03757	0.005	0.02	0.6837	BM *
2	4.86	n.a.	0.09163	0.038	0.15	n.a.	MB*
3	7.35	Nitrate-N	0.06197	0.014	0.06	0.7162	BMB
4	11.45	n.a.	78.97294	24.839	99.77	n.a.	BMB

25 H6L110106-JK7KT-1/40

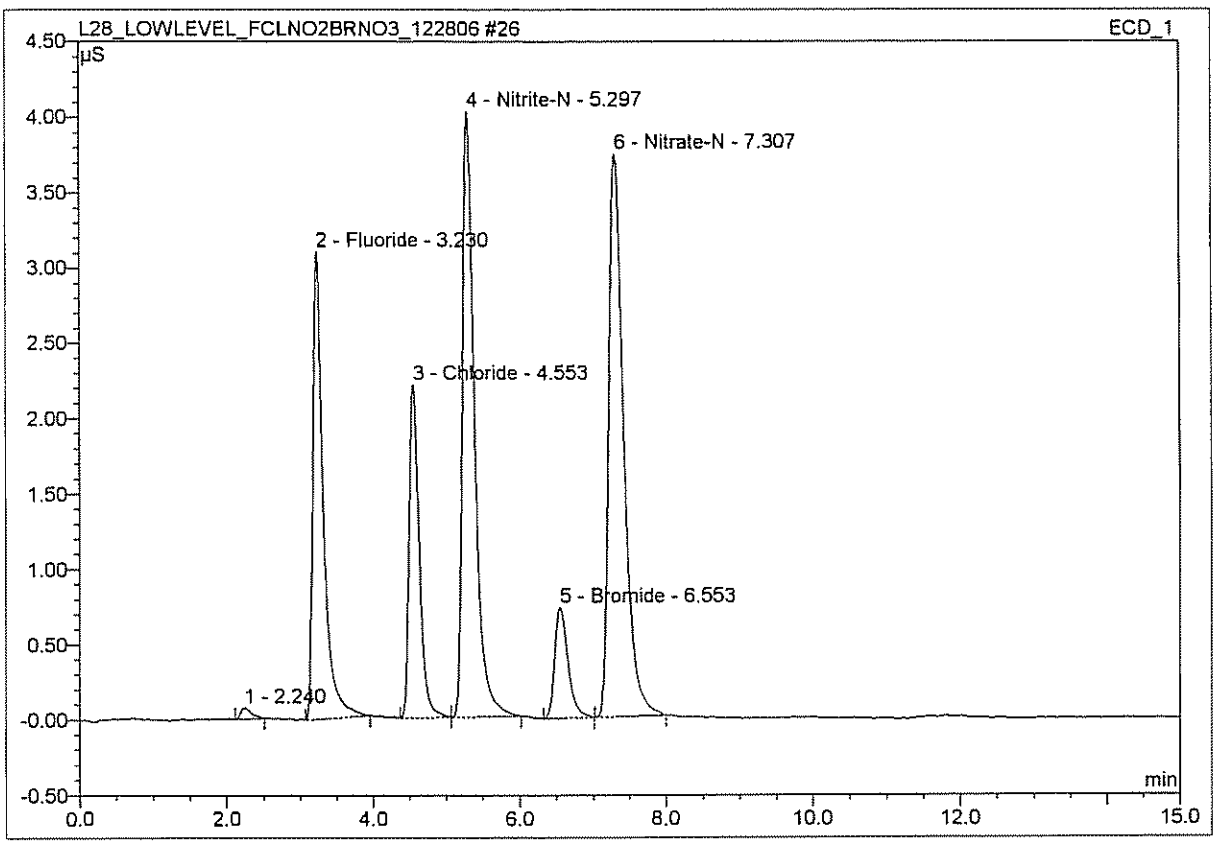
Sample Name:	**H6L110106-JK7KT-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1400**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 18:46**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.86	n.a.	0.06340	0.018	0.07	n.a.	BMB
2	7.35	Nitrate-N	0.06197	0.014	0.06	0.7162	BMB
3	11.45	n.a.	78.97294	24.839	99.87	n.a.	BMB

26 CCV= ICWS-9090

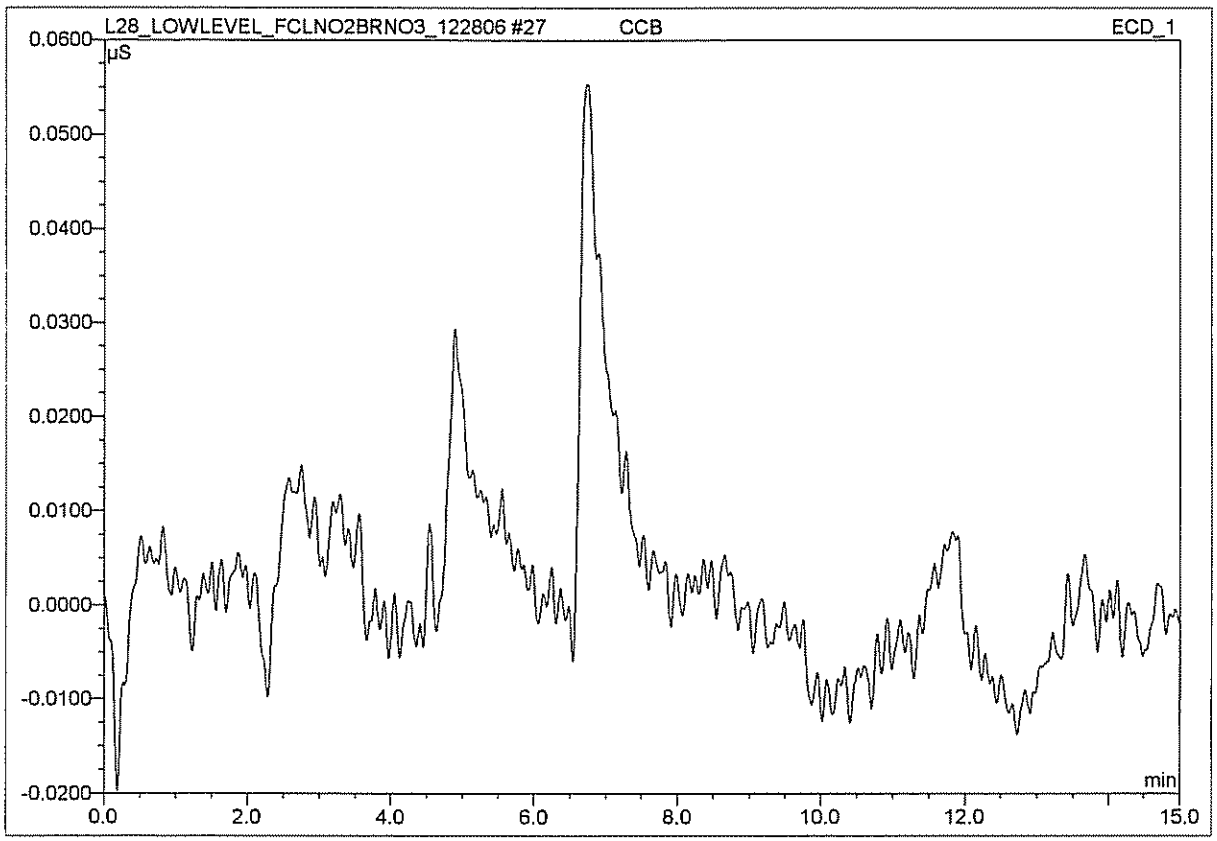
Sample Name:	**CCV= ICWS-9090**	*Injection Volume:*	**50.0**
Vial Number:	**1401**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 19:03**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	0.07266	0.013	0.48	n.a.	BMB
2	3.23	Fluoride	3.10205	0.520	19.26	1.0624	BMB
3	4.55	Chloride	2.21173	0.358	13.26	0.9915	BM
4	5.30	Nitrite-N	4.02336	0.768	28.45	1.0225	MB
5	6.55	Bromide	0.73552	0.155	5.74	1.0291	BMB
6	7.31	Nitrate-N	3.73776	0.886	32.82	1.0260	BMB

27 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**1402**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 19:20**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

STL Knoxville
Source Air Analysis Sample Information

Analyst	Date	Lot #	Work Order #	FH or BH	Impinger Volume (mL)	Impinger pH as received	Impinger pH after adjustment	Amount added to adjust pH
DFW	12/18/06	H6L110105	JK7JR	FH	480.	2	—	—
			JK7JX		465.	2		
			JK7J1		600.	2		
		H6L110106	JK7J7	FH	425.	2		
			JK7KG		400.	2		
			JK7KT		363.	2		
			JK7KØ	(RB)	(260) 100.	2		
			JK7K4	(DI H2O BLK)	100.	~5		
		H6L110105	JK7JW	BH	240.	9	—	—
			JK7JØ		250.	9	—	—
			JK7J2		270.	9	—	—
		H6L110106	JK7KA	BH	295.	2→	~9.5	Ø.825mL (80mL) (*)
			JK7KN		280.	2→	"	1.1 " (") (*)
			JK7KW		270.	2→	"	1.2 " (") (*)
			JK7K2	(RB)	(280) 100	12	—	—
			DFW	12/19/06				

Comments: (*) Adjustments made w/ ICR-NAOH-1010 (1N NaOH)

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/18/06 Chemist: DFW Expiration Date: 12/19/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9056	F-	ICWI-	8838	12/25/06	100. PPM	0.750	100.	0.75 PPM
2. (ICV/LCS)	Cl-							
3.	NO2N-							
4.	BR-							
5.	NO3N-							
6. ICWS-9057	F-							
7. (ICV/LCSD)	Cl-							
8.	NO2N-							
9.	BR-							
10.	NO3N-							
DFW 12/18/06 11. ~~ICWS~~ ~~ICWI~~- 9058	F-	ICWI-	8837			1.		1. ppm
12. (CCV)	Cl-							
13.	NO2N-							
14.	BR-							
15	NO3N-							

Reviewed By: _____

WC031R3.DOC, 8/28/03

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/19/06 Chemist: CWK Expiration Date: 12/20/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9059	F-	ICWI-	8838	12/25/06	100 ppm	0.750	100ml	0.75 ppm
2. (ICV/LCS)	Cl-							
3.	NO2-N							
4.	Br-							
5.	NO3-N							
6. ICWS-9060	F-							
7. (ICV/LCSD)	Cl-							
8.	NO2-N							
9.	Br-							
10.	NO3-N							
11. ICWS-9061	F-	ICWI	8837			1.0		1.0 ppm
12. (CCV)	Cl-							
13.	NO2-N							
14.	Br-							
	NO3-N							

Reviewed By: _____

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/28/06 Chemist: DKW Expiration Date: 3/28/07

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-9086	F-	17125	ERA	12/31/07	1000. PPM	5.	50.	100. mg/L (ppm)
2. (Intermediate	Cl-	36065		6/30/07				
3. Calib Source)	NO2N-	17075		7/31/07				
4.	BR-	27025		2/28/07				
5.	NO3N-	17026		2/28/08				
6. ICWI-9087	F-	1-38F-2	SPEX	8/15/07		5.	50.	100. mg/L (ppm)
7. Intermediate	Cl-	1-5CL-2		3/15/07				
8. 2nd Source)	NO2N-	1-13NO2N-2		9/15/07				
9.	Br-	1-1BR-2		4/30/07				
10.	NO3N-	1-27NO3N-2		5/15/07				
11.								
12.			DKW	12/28/07				
13.								
14.								

Reviewed By: _____

WC031R3.DOC, 8/28/03

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/28/06 Chemist: DKW Expiration Date: 12/29/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9088	F-	ICWI-	9087	3/28/07	100. PPM	0.750	100.	0.75 ppm
2. (ICV/LCS)	Cl-							
3.	NO2N-							
4.	Br-							
5.	NO3N-							
6. ICWS-9089	F-							
7. (ICV/LCSD)	Cl-							
8.	NO2N-							
9.	Br-							
10.	NO3N-							
11. ICWS-9090	F-	ICWI-	9086			1.		1. ppm
12. (CCV)	Cl-							
13.	NO2N							
14.	Br.							
15.	NO3N-							

Reviewed By: _____

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 9/25/06 Chemist: DKW Expiration Date: 12/25/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-8837	F-	17125	ERA	12/31/07	1000 ppm	5.	50	100. mg/L (ppm)
2. (Intermed. calib. source)	Cl-	36065		6/30/07				
3.	NO2N	17075		7/31/07				
4.	BR-	27025		2/28/07				
5.	NO3N-	17026		2/28/08				
6. ICWI-8838	F-	1-38F-2	SPEX	8/15/07	1000 ppm	5.	50	100. ppm (mg/L)
7. (Intermed 2nd Source)	Cl-	1-5CL-2		3/15/07				
8.	NO2N-	1-13NO2N-2		9/15/07				
9.	BR-	1-1BR-2		4/30/07				
10.	NO3N-	1-27NO3N-2		5/15/07				
11.								
12.								
13.								
14.								

Reviewed By: _____

Total Particulates

STL Knoxville Particulate Matter Determination Data Review/Narrative Checklist
Method: SW-846 Method 0050 by SOP KNOX-WC-0006, Rev. 2
Page 1 of 1

Batch Number:	6349313
Lot Number(s):	H6L110106

Review Items **A. Calibration**	N/A	Y	N	If No, why is data reportable?	2nd √
1. Was the balance calibration checked with 5, 50 & 100 gram weights prior to use?		✓			✓
2. Was the balance checked with 100 gram weight after every 10 samples?		✓			✓
3. Was the balance tared before each weighing?		✓			✓
4. Was the balance ID documented?		✓			✓
B. Client Sample and QC Sample Results					
1. Were all special project requirements met? **(Were PM Checklists, Lot Summary, and any applicable QAS reviewed?)**		✓			✓
2. Were sample IDs verified?		✓			✓
3. Were all transcriptions checked?		✓			✓
4. Calculations checked for error?		✓			✓
5. Final report acceptable? (Results correct, units correct, **deviations noted in narrative**, and analysis dates correct.)		✓			✓
C. Preparation/Matrix QC					
1. Were all sample weighings performed in duplicate (at least)?		✓			✓
2. Was the average of the last two weighings used?		✓			✓
D. Other					
1. Are all nonconformances documented appropriately?	✓			**NCM No.:**	NA

Analyst: J M Humphrey	**Date:** 12/18/06	**2nd Level Reviewer:** [signature]	**Date:** 12/19/06
Comments:		**Comments:**	

STL Knoxville
SOP KNOX-WC-0006
Particulate Data Worksheet

Batch Number: 6349313
Prep Date: 12/15/2006 0000
Comp Date: 12/18/2006 0000

Analyst: jmh

Reviewed by: [signature]

Date: 12/19/06

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	1	2	3	*Tare Weight Average (g)*	1	2	3	*Final Weight Average (g)*	*Particulate Weight (mg)*
H6L110106	1		88AG	HARDIN SDA INLET DUCT RUN 1 A	JK7J51AA	64.9126			***64.91260***	66.3618	66.3622		***66.36200***	1449.4
H6L110106	5		88AG	HARDIN SDA INLET DUCT RUN 2 A	JK7KE1AA	84.3155			***84.31550***	86.4869	86.4869		***86.48690***	2171.4
H6L110106	9		88AG	HARDIN SDA INLET DUCT RUN 3 A	JK7KQ1AA	65.1228			***65.12280***	67.1836	67.1839		***67.18375***	2061.0

Comments:

STL Knoxville
Sample Data Log
Particulate Matter by KNOX-WC-0006

Batch Number: 6349313

	Sample Number	Work Order Number	Matrix	Filter or Beaker No.	Probe Rinse Volume (mL)	Tare Weight (g)	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials
1	H6L110106-001	JK7J5-1AA	AC E	1	135	64.9126	1	H-47372	100.0001	✓	66.3618	12/18/06	1153	JMH
							2	↓	99.9999	✓	66.3622	12/18/06	1412	JMH
							3					JMH		
							4					12/18/06		
2	-005	JK7KE-1AA	AC E	2	121	84.3155	1	H-47372	100.0001	✓	86.4869	12/18/06	1154	JMH
							2	↓	99.9999	✓	86.4869	12/18/06	1413	JMH
							3					JMH		
							4					12/18/06		
3	-009	JK7KQ-1AA	AC E	3	104	65.1228	1	H-47372	100.0001	✓	67.1836	12/18/06	1155	JMH
							2	↓	99.9999	✓	67.1839	12/18/06	1414	JMH
							3					JMH		
							4					12/18/06		
4					JMH		1							
							2							
							3							
							4							
5					12/18/06		1							
							2							
							3							
							4							

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

STL Knoxville

Tare Weight Log
Particulate Matter by KNOX-WC-0006

	Filter or Beaker No.	Matrix	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials	Tare Weight (g)
1	JK7J5 1	A_{C_E}	1	H-47372	100.0000	✓	64.9126	12/15/06	1354	JMH	64.9126
			2								
			3					JMH			
			4					12/15/06			
2	JK7KE 2	A_{C_E}	1	H-47372	100.0000	✓	84.3155	12/15/06	1355	JMH	84.3155
			2								
			3					JMH			
			4					12/15/06			
3	JK7KQ 3	A_{C_E}	1	H-47372	100.0000	✓	65.1228	12/15/06	1356	JMH	65.1228
			2								
			3					JMH			
			4					12/15/06			
4			1								
			2								
			3								
			4								
5			1								
			2								
			3								
			4								
6			1								
			2								
			3								
			4								
7			1								
			2								
			3								
			4								
8			1								
			2								
			3								
			4								
9			1								
			2								
			3								
			4								
10			1								
			2								
			3								
			4								

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

Subcontract

SEVERN TRENT STL

GENERAL CHEMISTRY DATA

SEVERN TRENT STL

SAMPLE DATA

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 ACE FW

General Chemistry

Lot-Sample #...: H6L110106-001 **Work Order #...:** JK7J5 **Matrix.....:** AIR
Date Sampled...: 11/30/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**1450**	**0.50**	**mg**	**CFR60A 5**	**12/15-12/18/06**	**6349313**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110106-003 **Work Order #...:** JK7J8 **Matrix.....:** WATER
Date Sampled...: 11/30/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrogen, as Ammonia	**4.8**	**0.20**	**mg/L**	**MCAWW 350.3**	**12/14/06**	**6348460**

Dilution Factor: 1 MDL.....: 0.057

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 ACE FW

General Chemistry

Lot-Sample #...: H6L110106-005 **Work Order #...:** JK7KE **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**2170**	**0.50**	**mg**	**CFR60A 5**	**12/15-12/18/06**	**6349313**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110106-007 **Work Order #...:** JK7KK **Matrix.....:** WATER
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrogen, as Ammonia	**1.6**	**0.20**	**mg/L**	**MCAWW 350.3**	**12/14/06**	**6348460**

Dilution Factor: 1 MDL.....: 0.057

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 ACE FW

General Chemistry

Lot-Sample #...: H6L110106-009 **Work Order #...:** JK7KQ **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**2060**	**0.50**	**mg**	**CFR60A 5**	**12/15-12/18/06**	**6349313**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110106-011 **Work Order #...:** JK7KV **Matrix.....:** WATER
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrogen, as Ammonia	**3.3**	**0.20**	**mg/L**	**MCAWW 350.3**	**12/14/06**	**6348460**

Dilution Factor: 1 MDL.....: 0.057

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK & SDA INLET RB 0.1N H2SO4 BLANK

General Chemistry

Lot-Sample #...: H6L110106-014 **Work Order #...:** JK7K1 **Matrix.....:** WATER
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrogen, as Ammonia	**0.060 B**	**0.20**	**mg/L**	**MCAWW 350.3**	**12/14/06**	**6348460**

Dilution Factor: 1 MDL.....: 0.057

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less than RL.

METHOD BLANK REPORT

General Chemistry

Client Lot #...: H6L110106 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrogen, as Ammonia		Work Order #: JLG661AA		MB Lot-Sample #:	A6L140000-460	
	ND	0.20	mg/L	MCAWW 350.3	12/14/06	6348460
		Dilution Factor: 1				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H6L110106 **Matrix.....:** WATER

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrogen, as Ammonia		Work Order #: JLG661AC	LCS Lot-Sample#: A6L140000-460		
	101	(85 - 114)	MCAWW 350.3	12/14/06	6348460
		Dilution Factor: 1			

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H6L110106 **Matrix.....:** WATER

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrogen, as Ammonia			Work Order #: JLG661AC		LCS Lot-Sample#: A6L140000-460		
	16.3	16.5	mg/L	101	MCAWW 350.3	12/14/06	6348460
			Dilution Factor: 1				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H6L110106 **Matrix.....:** WATER
Date Sampled...: 12/13/06 **Date Received..:** 12/13/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrogen, as Ammonia		WO#: JLDNQ1AG-MS/JLDNQ1AH-MSD				MS Lot-Sample #: A6L130196-001	
	106	(75 - 125)			MCAWW 350.3	12/14/06	6348460
	104	(75 - 125)	1.8	(0-20)	MCAWW 350.3	12/14/06	6348460

Dilution Factor: 1

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H6L110106 **Matrix.....:** WATER
Date Sampled...: 12/13/06 **Date Received..:** 12/13/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Nitrogen, as Ammonia			WO#: JLDNQ1AG-MS/JLDNQ1AH-MSD				MS Lot-Sample #: A6L130196-001		
	0.21	2.50	2.87	mg/L	106		MCAWW 350.3	12/14/06	6348460
	0.21	2.50	2.82	mg/L	104	1.8	MCAWW 350.3	12/14/06	6348460

Dilution Factor: 1

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

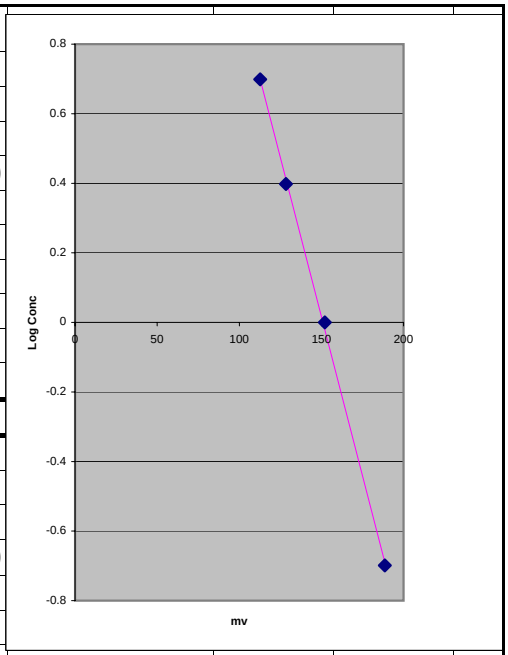
SEVERN TRENT STL

SUPPORTIVE RAW DATA

STL, North Canton

Ammonia ISE Logsheet

Analysis	NH3	LCS lot #:	P132505		Batch
					6348460
Prep Date	12/14/2006	LCS TV mg/L=	16.30		
Anal Date	12/14/2006				
		Ionic strength adj buffer		Reagent #:	WR61374
Analyst	SS				
RL	0.2 MG/L				



Std No.	Conc mg/L	log conc	mv		
NH6375	0.2	-0.69897	188.6	Slope	-54.6012
NH6376	1	0	152.1	**Intercept**	150.8820
NH6377	2.5	0.39794001	128.4	r	-0.9997
NH6378	5	0.69897	112.7		

CURVE 12-8-06

CCV NH 6387

Sample No	MV	**Sample Vol** ml or g	Final Vol ml	Dilution	Final Conc MG/L or MG/KG	
ICV	131.5	50	50	1	2.2645	91%
ICB	222.4	50	50	1	0.0490	
LCS	122.6	50	50	5	16.4795	101%
JLDNQ	187.9	50	50	1	0.2099	
JLDNQ MS	125.9	50	50	1	2.8677	
JLDNQ MSD	126.3	50	50	1	2.8197	
JLDNX	195.0	50	50	1	0.1556	
JLDN1	191.5	50	50	1	0.1803	
JLDN6	121.4	50	50	20	69.3396	
JLDPK	202.1	50	50	1	0.1152	
JLDPP	202.7	50	50	1	0.1125	
JLE38	220.2	50	50	1	0.0538	
CCV	129.0	50	50	1	2.5163	101%
CCB	208.8	50	50	1	0.0869	
JLD08	210.4	50	50	1	0.0813	
JLDIJ	219	50	50	1	0.0566	
JLDIM	218.1	50	50	1	0.0587	
JLDIN	181.8	50	50	1	0.2715	
JLD32	222.7	50	50	1	0.0484	
JK7J8	113.9	50	50	1	4.7568	
JK7KK	139.7	50	50	1	1.6025	
JK7KV	122.5	50	50	1	3.3098	
JK7K1	217.5	50	50	1	0.0602	
JKWQD	107.5	50	50	2	12.4610	
CCV	128.9	50	50	1	2.5269	101%
CCB	229.1	50	50	1	0.0369	
		50	50	1	579.8875	
		50	50	1	579.8875	
		50	50	1	579.8875	
		50	50	1	579.8875	
		50	50	1	579.8875	
		50	50	1	579.8875	
		50	50	1	579.8875	
		50	50	1	579.8875	

		50	50	1	579.8875				
		50	50	1	579.8875				
CCV		50	50	1	579.8875	23196%			
CCB		50	50	1	579.8875				
		50	50	1	579.8875				
		50	50	1	579.8875				
		50	50	1	579.8875				
		50	50	1	579.8875				
		50	50	1	579.8875				
		50	50	1	579.8875				
		50	50	1	579.8875				
		50	50	1	579.8875				
		50	50	1	579.8875				
		50	50	1	579.8875				
CCV		50	50	1	579.8875	23196%			
CCB		50	50	1	579.8875				

STL North Canton

Sample Control Chain of Custody for General Chemistry

Lot Number	Sample	Suffix	Lab ID	Test	Prep Date	Prepared by	Analysis Date	Analyzed by
H6L110106	3		JK7J81AA	Nitrogen, Ammonia (ISE - 350.3)	12/14/06	Samantha Scott	12/14/06	Samantha Scott
H6L110106	7		JK7KK1AA	Nitrogen, Ammonia (ISE - 350.3)	12/14/06	Samantha Scott	12/14/06	Samantha Scott
H6L110106	11		JK7KV1AA	Nitrogen, Ammonia (ISE - 350.3)	12/14/06	Samantha Scott	12/14/06	Samantha Scott
H6L110106	14		JK7K11AA	Nitrogen, Ammonia (ISE - 350.3)	12/14/06	Samantha Scott	12/14/06	Samantha Scott

Sample Receipt Documentation

HBL110106

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 4
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Waomund
Run No.: 1	Test Method: EPA 17 / 26A / CTM027	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Hydrogen Halides	Halogens	
Cont. No. 1	11-30-06	1715	—	1	Thimble No. 59	X				
Cont. No. 2	11-30-06	1718	—	1	ACE F.W.	X				
Cont. No. 3	11-30-06	1640	0.1N H_2SO_4	1	Imps 1 & 2 + Rinse		X	X		
Cont. No. 4	11-30-06	1646	0.1N NaOH	1	Imps 3 & 4 + Rinse				X	
Rec'd temp. Ambient, No custody seals										
MFH 12-6-06, 9 containers Fedex#		696769459203 9199 9214 9133 9177 9166 9188 9225								

Special Instructions: Cont No. 1 & No. 2 retained by ASAI. Split Container No. 3 for IC analysis to determine NH_3. HF and HBr are primary analytes for the 26A analysis.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For ~~30~~ 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	11-30-06	1718	1. Relinquished By: Bill Mullins	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Raybance	12/3/06	1330	3. Relinquished By: Alan D. Raybance	12/4/06	0820
Comments: [illegible]	12/4/06	0800	[illegible]	12/5/06	1400

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

Rec'd BY: Matthew T. Howard, 12-6-06, 09:15

200

AIR SAMPLING ASSOCIATES, INC.

HGL110106

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 2 of 4	Analysis
Address: 8100 Southpark Way	Unit No.: Hardis SDA Inlet Duct	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: EPA 17/26A/CTM027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Halogen/halids	Halogens
Cont. No. 1	12-1-06	1556	—	1	Thimble No. 60	X			
Cont. No. 2	12-1-06	1558	—	1	ACE F.W.	X			
Cont. No. 3	12-1-06	1540	0.1N H_2SO_4	1	Imps 1 & 2 + Rinse		X	X	
Cont. No. 4	12-1-06	1542	0.1N NaOH	1	Imps 3 & 4 + Rinse			X	

Special Instructions: Cont. Nos. 1 and 2 retained by ASAI. Split Cont. No. 3 for IC analysis to determine NH_3. HF and HBr are primary analytes for the EPA 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1558	1. Relinquished By: Bill Mullins	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [signature]	12/4/06	0820	[signature]	12/5/06	1400

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Rec'd By: Matthew F. Howard, 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

H6L 110106

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 3 of 4	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 3	Test Method: EPA 17 / 26A / CTM027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Hydrogen Halide	Halogens	
Cont. 1	12-2-06	0801	—	1	Thimble No. 61	X				
Cont. 2 /	12-2-06	0807	—	1	ACE FW.	X				
Cont. 3 //	12-2-06	0832	0.1N H_2SO_4	1	Imps 1 & 2 + Rinse		X	X		
Cont. 4 /	12-2-06	0836	0.1N NaOH	1	Imps 3 & 4 + Rinse				X	

Special Instructions: Container No. 1 and 2 retained by ASAI. Split Cont. No. 3 for IC analysis to determine NH_3. HF and HBr are primary analytes for the 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyby	12-2-06	0836	1. Relinquished By: Bill Hyby	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [signature]	12/4/06	0820	[signature]	12/5/06	1400

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Rec'd By: Matthew J. Howard 12-6-06, 09:15

H6L110106

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 4 of 4	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin Stack & SDA Inlet	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: Reagent Blanks	Test Method: EPA 17/26A/CTM027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Hydrogen Halides	Halogens	
Cont. No. 6	12-1-06	1553	—	1	0.1 N H_2SO_4 Blank		X	X		
Cont. No. 7	12-1-06	1551	—	1	0.1 N NaOH Blank				X	
Cont. No. 8	12-1-06	1549	—	1	D.I. Water Blank			X	X	
Cont. No. 9	12-1-06	1547	—	1	ACE Blank	X				

Special Instructions: Split Cont. No. 6 for IC analysis to determine NH_3. HF and HBR ~~and~~ are the primary analytes for EPA 26A. Cont. No. 9 retained by ASAI.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1553	1. Relinquished By: Bill Mullins	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

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Rec'd By: Matthew Howard, 12-6-06, 09:15

STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: Air Sampling Associates **Project:** _____ **Lot Number:** 1-6L110106

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times) MPH 12-6-06	✓	✓		☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☑ 1g Other:	4a 1g Cont. No. 2 was mcid. The CoC says that Cont. 1 and 2 were retained by ASAI.
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?	✓			☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?			✓	If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: _____ PM Instructions: _____

Sample Receiving Associate: Matthew J Howard Date: 12-6-06

QA026R18.doc, 1/30/06

Severn Trent Laboratories, Inc
SAMPLE ANALYSIS REQUISITION

LABORATORY: STL N Canton
4101 Shuffel Drive NW
North Canton OH 44720,

NEED ANALYTICAL REPORT BY
12/25/06

C3 12-12-06

ATTN:

LAB PURCHASE ORDER: SR087884

CLIENT CODE: 1353236 PROJECT MANAGER: Terry Wasmund

NUMBER OF SAMPLES IN LOT: 0000

✓ QM 12/19

SAMPLE I.D.	SAMPLING DATE	ANALYSIS REQUIRED
H6L110106-003 JK7J8-1-AA	11/30/06	Nitrogen, Ammonia (ISE - 350.3) (NH3) METHOD: 350.3
H6L110106-007 JK7KK-1-AA	12/01/06	Nitrogen, Ammonia (ISE - 350.3) (NH3) METHOD: 350.3
H6L110106-011 JK7KV-1-AA	12/02/06	Nitrogen, Ammonia (ISE - 350.3) (NH3) METHOD: 350.3
H6L110106-014 JK7K1-1-AA	12/01/06	Nitrogen, Ammonia (ISE - 350.3) (NH3) METHOD: 350.3

1F250

NEED DETECTION LIMIT AND ANALYSIS DATE INCLUDED IN REPORT.

SHIPPING METHOD: FEDX DATE: 12/11/06

SEND REPORT TO: TERRY WASMUND

SAMPLE RECEIVED BY: _____ DATE: _____

PLEASE SEND A SIGNED COPY OF THIS FORM WITH REPORT AT COMPLETION OF ANALYSIS.

THANK YOU.

STL Knoxville
INT: _____ 12/11/06 9:22:52
STL N Canton
4101 Shuffel Drive NW
North Canton OH 44720,

RELINQUISHED BY: [signature] DATE/TIME: 12-11-06 14:00

RELINQUISHED BY: _____ DATE/TIME: _____

RECEIVED FOR LAB BY: [signature] DATE/TIME: 12-12-06 10:15

PLEASE RETURN ORIGINAL SAMPLE ANALYSIS REQUISITION

STL Cooler Receipt Form/Narrative **Lot Number:** H6L110506

North Canton Facility

Client: STL Knoxville Project: _____ Quote#: _____

Cooler Received on: 12-12-06 Opened on: 12-12-06 by: _____ (Signature)

Fedx ☑ Client Drop Off ☐ UPS ☐ DHL ☐ FAS ☐ STL Courier ☐

Stetson ☐ US Cargo ☐ Other: _____

STL Cooler No# _____ Foam Box ☐ Client Cooler ☑ Other _____

1. Were custody seals on the outside of the cooler? Yes ☑ No ☐ Intact? Yes ☑ No ☐ NA ☐
   If YES, Quantity 2
   Were the custody seals signed and dated? Yes ☑ No ☐ NA ☐
2. Shipper's packing slip attached to this form? Yes ☑ No ☐ NA ☐
3. Did custody papers accompany the samples? Yes ☑ No ☐ Relinquished by client? Yes ☑ No ☐
4. Did you sign the custody papers in the appropriate place? Yes ☑ No ☐
5. Packing material used: Bubble Wrap ☑ Foam ☐ None ☐ Other: _____
6. Cooler temperature upon receipt 18.1 °C (see back of form for multiple coolers/temp)

METHOD: Temp Vial ☐ Coolant & Sample ☐ Against Bottles ☐ IR ☑ ICE/H_2O Slurry ☐

COOLANT: ~~Wet Ice~~ ☑ Blue Ice ☐ Dry Ice ☐ Water ☐ None ☑

7. Did all bottles arrive in good condition (Unbroken)? Yes ☑ No ☐
8. Could all bottle labels and/or tags be reconciled with the COC? Yes ☑ No ☐
9. Were samples at the correct pH upon receipt? Yes ☐ No ☐ NA ☑
10. Were correct bottles used for the tests indicated? Yes ☑ No ☐
11. Were air bubbles >6 mm in any VOA vials? Yes ☐ No ☐ NA ☑
12. Sufficient quantity received to perform indicated analyses? Yes ☑ No ☐
13. Was a Trip Blank present in the cooler? Yes ☐ No ☑ Were VOAs on the COC? Yes ☐ No ☑

Contacted PM LDE Date: 12-12-06 by: LH via Voice Mail ☐ Verbal ☒ Other ☐

Concerning: #1

√	
	1. CHAIN OF CUSTODY
	The following discrepancies occurred: High temp no Ice in cooler
	2. SAMPLE CONDITION
	Sample(s) _____ were received after the recommended holding time had expired.
	Sample(s) _____ were received in a broken container.
	3. SAMPLE PRESERVATION
	Sample(s) _____ were further preserved in sample receiving to meet recommended pH level(s). *Nitric Acid Lot #* 092006 *- Sulfuric Acid Lot #* 071805*-H2SO4; Sodium Hydroxide Lot #* -122805 *-NaOH; Hydrochloric Acid Lot #* 100504*-HCl; Sodium Hydroxide and Zinc Acetate Lot #* 071604*-CH3COO2ZN/NaOH*
	Sample(s) _____ were received with bubble > 6 mm in diameter (cc: PM)
	4. Other (see below or back)

Client ID	pH	Date	Initials

AIR SAMPLING ASSOCIATES, INC.

Appendix G:

EPA Conditional Test Methods 5 and 26A (Particulate Matter and Hydrogen Halides & Halogens) Analytical Data – Stack

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 06-057

Date Analysis Completed: 12/12/06

Project Name: ADA-ES

Unit Tested: Stack

Project Location: Hardin, MT

EPA Method 26A

Run Number:	1	2	3
Particulate Matter on Filter (mg):	10.6	15.4	14.0
Particulate Matter in Front Wash (mg):	13.2	9.7	9.7
Total Particulate Matter in "Front-Half" – MF (mg):	23.8	25.1	23.7
Particulate Matter in "Back-Half" (mg):	—	—	—
Total Particulate Matter in Sample – MT (mg):	—	—	—

Billy J. Mullins, Jr.
Analyst

Bill Hyg **Date:** 1-17-07
Data Checked By

Version No. 1 5/30/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 26A

Stack Filters

Project No. 06-057
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	12/05/06 1530	12/07/06 0855			
Desiccator Time Out	12/07/06 0855	12/07/06 1505			

Run No.	1	Filter No. A092		Sample I.D.	
Filter & Particulate (g)	0.3573	0.3573 ✓			

Filter & Particulate Average (g) 0.3573
Initial Filter Weight (g) 0.3467
Total Particulate (mg) 10.6

Run No.	2	Filter No. A112		Sample I.D.	
Filter & Particulate (g)	0.3989	0.3986 ✓			

Filter & Particulate Average (g) 0.3986
Initial Filter Weight (g) 0.3832
Total Particulate (mg) 15.4

Run No.	3	Filter No. A113		Sample I.D.	
Filter & Particulate (g)	0.3917	0.3918 ✓			

Filter & Particulate Average (g) 0.3918
Initial Filter Weight (g) 0.3778
Total Particulate (mg) 14.0

Billy J. Mullins, Jr.
Analyst

AIR SAMPLING ASSOCIATES, INC.

Filter Weight Log
EPA Method 5

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
A091		0.3484	0.3484				0.3484
	8/25/06	9/20/06	9/21/06				
	0900	1400	1410				
A092		0.3467	0.3467				0.3467
	8/25/06	9/20/06	9/21/06				
	0900	1400	1410				
AØ93	10	0.3457	0.3455				0.3455
	~~09~~/2/06	~~09~~/3/06	10/3/06				
	0800	0830	1615				
AØ94		0.3514	0.3514				0.3514
		10/3/06	10/3/06				
		0831	1617				
AØ95		0.3522	0.3519				0.3519
		10/3/06	10/3/06				
		0832	1619				
AØ96		0.3653	0.3652				0.3652
		10/3/06	10/3/06				
		0833	1620				
AØ97		0.3622	0.3619				0.3619
		10/3/06	10/3/06				
		0834	1620				
AØ98		0.3637	0.3636				0.3636
		10/3/06	10/3/06				
		0835	1621				
AØ99		0.3695	0.3694				0.3694
		10/3/06	10/3/06				
		0836	1622				
A 100		0.3691	0.3691				0.3691
		10/3/06	10/3/06				
		0837	1623				
A101		0.3745	0.3745				0.3745
		10/3/06	10/3/06				
		0838	1624				
A102		0.3789	0.3789				0.3789
		10/3/06	10/3/06				
		0839	1625				
A103		0.3801	0.3802				0.3802
		10/3/06	10/3/06				
		0840	1626				
BHT &A104		0.3836	0.3837				0.3837
		10/3/06	10/3/06				
		0841	1626				

AIR SAMPLING ASSOCIATES, INC.

Filter Weight Log
EPA Method 5

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
A105		0.3801	0.3801				0.3801
	10/2/06	10/12/06	10/13/06				
	0800	1000	0826				
A106	10/2/06	0.3827	0.3825				0.3825
	0800	10/12/06	10/13/06				
		1001	0827				
A107		0.3808	0.3810				0.3810
	10/2/06	10/12/06	10/13/06				
	0800	1002	0828				
A108		0.3843	0.3845				0.3845
	10/2/06	10/12/06	10/13/06				
	0800	1003	0829				
A109		0.3872	0.3873				0.3873
	10/2/06	10/12/06	10/13/06				
	0800	1004	0830				
A110		0.3885	0.3886				0.3886
	10/2/06	10/12/06	10/13/06				
	0800	1005	0831				
A112		0.3833	0.3832				0.3832
	10/2/06	10/12/06	10/13/06				
	0800	1006	0832				
A113		0.3781	0.3778				0.3778
	10/2/06	10/12/06	10/13/06				
	0800	1007	0833				
A114		0.3814	0.3812				0.3812
	10/2/06	10/12/06	10/13/06				
	0800	1008	0834				
A115		0.3701	0.3700				0.3700
	10/2/06	10/12/06	10/13/06				
	0800	1009	0835				
A116		0.3678	0.3679				0.3679
	10/2/06	10/12/06	10/13/06				
	0800	1010	0836				
A117		0.3644	0.3644				0.3644
	10/2/06	10/12/06	10/13/06				
	0800	1011	0837				
A118		0.3636	0.3635				0.3635
	10/2/06	11/20/06	11/21/06				
	0800	1245	0807				
A119		0.3655	0.3655				0.3655
	10/2/06	11/20/06	11/21/06				
	0800	1246	0808				
A120		0.3616	0.3615				0.3615
	10/2/06	11/20/06	11/21/06				
	0800	1247	0809				

AIR SAMPLING ASSOCIATES, INC.

Page____of___

Particulate Analysis EPA Method 26A

Front Wash

Project No. 06-057 Location Hardin, MT
Project Name ADA-ES Unit Tested Stack

Desiccator Time In	12/08/06 1650	12/11/06 0820	12/12/06 820		
Desiccator Time Out	12/11/06 0817	12/12/06 0815	12/12/06 1530		

Run No.	1	Volume (ml)	140	Sample I.D.	
Final Weight (g)	106.6097	106.6048	106.6046 ✓		
Initial Weight (g)	106.5904	106.5904	106.5904		
Particulate Weight (g)					

Particulate Average (mg) 14.2
Less Acetone Blank (mg) 1.0
Total Particulate (mg) 13.2

Run No.	2	Volume (ml)	150	Sample I.D.	
Final Weight (g)	104.0611	104.0568	104.0563 ✓		
Initial Weight (g)	104.0455	104.0455	104.0455		
Particulate Weight (g)					

Particulate Average (mg) 10.8
Less Acetone Blank (mg) 1.1
Total Particulate (mg) 9.7

Run No.	3	Volume (ml)	105	Sample I.D.	
Final Weight (g)	91.1131	91.1093	91.1097 ✓		
Initial Weight (g)	91.0992	91.0992	91.0992		
Particulate Weight (g)					

Particulate Average (mg) 10.5
Less Acetone Blank (mg) 0.8
Total Particulate (mg) 9.7

Acetone Blank		Volume (ml)	200	Sample I.D.	
Final Weight (g)	104.8397	104.8349	104.8349 ✓		
Initial Weight (g)	104.8334	104.8334	104.8334		
Particulate Weight (g)					

Average (mg) 1.5
* mg/l 7.5

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

Billy J. Mullins Jr. Date: 12/12/06
Analyst

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 26A

Front Half Tare Weights

Project No. 06-057 Location Hardin, MT
Project Name ADA-ES Unit Tested Stack

Desiccator Time In	12/05/06 1530	12/06/06 1645	12/07/06 0840	12/07/06 1515	
Desiccator Time Out	12/06/06 1640	12/07/06 0840	12/07/06 1515	12/08/06 0815	

Run No.	1			Sample I.D.	
Weight (g)	106.5926	106.5913	106.5900	106.5904 ✓	

Run No.	2			Sample I.D.	
Weight (g)	104.0453	104.0455 ✓			

Run No.	3			Sample I.D.	
Weight (g)	91.0995	91.0992 ✓			

Acetone Blank				Sample I.D.	
Weight (g)	104.8332	104.8334 ✓			

Billy J. Mullins, Jr
Analyst

Return to Navigator

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SEVERN TRENT STL

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ANALYTICAL REPORT

PROJECT NO. 06-057

Hardin, Montana Hardin Stack

Lot #: H6L110105

Bill Hefley

Air Sampling Associates, Inc.
407-2B Holford's Prairie Road
Lewisville, TX 75056

SEVERN TRENT LABORATORIES, INC.

Terry Wasmund
Project Manager

January 2, 2007

ANALYTICAL METHODS SUMMARY

H6L110105

PARAMETER	ANALYTICAL METHOD
Bromine Emissions	KNOX 0050/26A Mod
Chlorine Emissions	KNOX 0050/26A Mod
Hydrogen Bromide Emissions	KNOX 0050/26A Mod
Hydrogen Chloride Emissions	KNOX 0050/26A Mod
Hydrogen Fluoride Emissions	KNOX 0050/26A Mod

References:

KNOX Severn Trent Laboratories Knoxville, Facility Standard Operating Procedure.

QC DATA ASSOCIATION SUMMARY

H6L110105

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	AIR	KNOX 0050/26A Mod		6361375	6362028
	AIR	KNOX 0050/26A Mod		6363098	6363067
	AIR	KNOX 0050/26A Mod		6361376	6362030
002	AIR	KNOX 0050/26A Mod		6354402	6354235
	AIR	KNOX 0050/26A Mod		6354401	6354234
	AIR	KNOX 0050/26A Mod		6354400	6354230
003	AIR	KNOX 0050/26A Mod		6361375	
	AIR	KNOX 0050/26A Mod		6363147	6363101
	AIR	KNOX 0050/26A Mod		6361376	
004	AIR	KNOX 0050/26A Mod		6354402	
	AIR	KNOX 0050/26A Mod		6354401	
	AIR	KNOX 0050/26A Mod		6354400	
005	AIR	KNOX 0050/26A Mod		6361375	
	AIR	KNOX 0050/26A Mod		6363147	
	AIR	KNOX 0050/26A Mod		6361376	
006	AIR	KNOX 0050/26A Mod		6354402	
	AIR	KNOX 0050/26A Mod		6354401	
	AIR	KNOX 0050/26A Mod		6354400	

SAMPLE SUMMARY

H6L110105

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
JK7JR	001	HARDIN STACK RUN 1 0.1N H2SO4	11/30/06	19:28
JK7JW	002	HARDIN STACK RUN 1 0.1N NAOH	11/30/06	19:24
JK7JX	003	HARDIN STACK RUN 2 0.1N H2SO4	12/01/06	18:23
JK7J0	004	HARDIN STACK RUN 2 0.1N NAOH	12/01/06	18:19
JK7J1	005	HARDIN STACK RUN 3 0.1N H2SO4	12/02/06	22:35
JK7J2	006	HARDIN STACK RUN 3 0.1N NAOH	12/02/06	22:26

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

PROJECT NARRATIVE
H6L110105

The results reported herein are applicable to the samples submitted for analysis only.

This report shall not be reproduced except in full, without the written approval of the laboratory.

The original chain of custody documentation is included with this report.

Sample Receipt

Custody seals were not present upon sample receipt at STL Knoxville.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Samples were analyzed for chloride (Cl^-), fluoride (F^-) and bromide (Br^-) by ion chromatography using SOP number KNOX-WC-005 (based on EPA methods 9056, 9057 and 26A). Results for the H_2SO_4 impinger samples were reported as total µg hydrogen chloride (HCl), total µg hydrogen fluoride (HF) and total µg hydrogen bromide (HBr). Results for the NaOH impinger samples were reported as total µg chlorine (Cl_2), total µg hydrogen fluoride (HF) and total µg hydrogen bromine (Br_2).

Please note that the halogen fluorine (F) is not expected to be present in stack gas as diatomic fluorine (F_2). Fluorine reacts with water vapor in a favored reaction that forms HF: $2F_2 + 2H_2O \rightarrow 4HF + O_2$. Therefore, the results from the H_2SO_4 impingers and the NaOH impingers are reported as HF, and no F_2 is expected in the samples.

Results were calculated using the following equations:

$$\text{HX, ug} = \left(X^-, \text{ug/mL}\right) * \left(\text{Sample Volume, mL}\right) * \left(\frac{\text{Molecular Weight HX}}{\text{Molecular Weight } X^-}\right) * \left(\text{Bench Dilution}\right)$$

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. #05-043-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. #000687, Indiana DOH Cert. #C-TN-02, Iowa DNR Cert. #375, Kansas DHE Cert. #E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Ohio EPA VAP Cert. #CL0059, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. #68-00576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. # QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, West Virginia DEP Cert. #345, Wisconsin DNR Lab ID #998044300, Naval Facilities Engineering Service Center and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

PROJECT NARRATIVE
H6L110105

$$Cl_2, Br_2\ ug = (X^-, ug/mL) * (\text{Sample Volume}, mL) * (\text{Bench Dilution})$$

NaOH impinger samples were treated with sodium thiosulfate ($Na_2S_2O_3$) prior to the final analysis in order to convert residual hypochlorite (OCl^-) to chloride ion. The presence of hypobromite is also assumed to be converted to bromide under these conditions.

Note: A sample volume of 100 mL was used to convert the results to total µg for the method blanks, laboratory control samples, and client reagent blanks.

For demonstration of analytical method performance on these samples, STL Knoxville analyzed matrix spikes (MS) and matrix spike duplicates (MSD). Acceptable recoveries of these spikes demonstrate that quantitation from this particular stack gas matrix is accurate and acceptable. Impinger samples containing 0.1N H_2SO4 and 0.1N NaOH display matrix interference effects causing poor method performance and possibly giving unreliable data unless the interference is removed. Therefore, the samples were diluted in the lab to remove the interference for a more accurate chloride response. The samples may be analyzed at increasing dilutions along with matrix spikes until matrix spikes recover from the sample within laboratory control limits. The ion chromatograph calibration range used to quantitate the sample results permits a standard ten-fold sample dilution while supporting the reporting limit with the low calibration standard.

The dilution factor reported on the sample result form does not represent the bench dilution factor. It is actually the combination of factors required by the method to convert the anion reporting limit and method detection limit from µg/mL to total µg. It may appear to be elevated because it includes the total sample volume in mL.

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Sample Data Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110105-001 **Work Order #...:** JK7JR **Matrix.....:** AIR
Date Sampled...: 11/30/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	486	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4860.55		MDL.....: 243		
Hydrogen chloride	ND	987	ug	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 9872.92		MDL.....: 415		
Hydrogen fluoride	ND	505	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 5054.65		MDL.....: 253		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110105-002 Work Order #...: JK7JW Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	240	ug	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 2400		MDL.....: 57.6		
Chlorine	**440**	**240**	**ug**	**KNOX 0050/26A Mod**	**12/18/06**	**6354401**
		Dilution Factor: 2400		MDL.....: 101		
Hydrogen fluoride	ND	253	ug	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 2527.32		MDL.....: 126		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110105-003 Work Order #...: JK7JX Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	471	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4708.65		MDL.....: 235		
Hydrogen chloride	ND	1910	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 19128.78		MDL.....: 803		
Hydrogen fluoride	ND	490	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 4896.69		MDL.....: 245		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110105-004 Work Order #...: JK7J0 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	250	ug	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 2500		MDL.....: 60.0		
Chlorine	**480**	**250**	**ug**	**KNOX 0050/26A Mod**	**12/18/06**	**6354401**
		Dilution Factor: 2500		MDL.....: 105		
Hydrogen fluoride	ND	263	ug	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 2632.63		MDL.....: 132		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110105-005 Work Order #...: JK7J1 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	608	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 6075.68		MDL.....: 304		
Hydrogen chloride	ND	2470	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 24682.3		MDL.....: 1040		
Hydrogen fluoride	ND	632	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 6318.31		MDL.....: 316		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110105-006 **Work Order #...:** JK7J2 **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	270	ug	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 2700		MDL.....: 64.8		
Chlorine	**483**	**270**	**ug**	**KNOX 0050/26A Mod**	**12/18/06**	**6354401**
		Dilution Factor: 2700		MDL.....: 113		
Hydrogen fluoride	ND	284	ug	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 2843.24		MDL.....: 142		

METHOD BLANK REPORT

General Chemistry

Client Lot #...: H6L110105 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		Work Order #: JLWCC1AA		MB Lot-Sample #:	H6L200000-402	
	ND	10.0	ug	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 100				
Chlorine		Work Order #: JLWAA1AA		MB Lot-Sample #:	H6L200000-401	
	ND	10.0	ug	KNOX 0050/26A Mod	12/18/06	6354401
		Dilution Factor: 100				
Hydrogen bromide		Work Order #: JL69F1AA		MB Lot-Sample #:	H6L270000-375	
	ND	10.1	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 101.2				
Hydrogen chloride		Work Order #: JL8TM1AA		MB Lot-Sample #:	H6L290000-098	
	ND	10.3	ug	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 102.8				
Hydrogen chloride		Work Order #: JL9AA1AA		MB Lot-Sample #:	H6L290000-147	
	ND	10.3	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 102.8				
Hydrogen fluoride		Work Order #: JLV9M1AA		MB Lot-Sample #:	H6L200000-400	
	ND	10.5	ug	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 105.3				
Hydrogen fluoride		Work Order #: JL69G1AA		MB Lot-Sample #:	H6L270000-376	
	ND	10.5	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 105.3				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: H6L110105 Matrix.....: AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#:JLWCC1AC-LCS/JLWCC1AD-LCSD			LCS Lot-Sample#: H6L200000-402		
	101	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6354402
	101	(90 - 110)	0.63	(0-20)	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 100					
Chlorine		WO#:JLWAA1AC-LCS/JLWAA1AD-LCSD			LCS Lot-Sample#: H6L200000-401		
	101	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6354401
	101	(90 - 110)	0.22	(0-20)	KNOX 0050/26A Mod	12/18/06	6354401
		Dilution Factor: 100					
Hydrogen bromide		WO#:JL69F1AC-LCS/JL69F1AD-LCSD			LCS Lot-Sample#: H6L270000-375		
	96	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6361375
	99	(90 - 110)	2.6	(0-20)	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 101.2					
Hydrogen chloride		WO#:JL8TM1AC-LCS/JL8TM1AD-LCSD			LCS Lot-Sample#: H6L290000-098		
	100	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6363098
	101	(90 - 110)	1.2	(0-20)	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 102.8					
Hydrogen chloride		WO#:JL9AA1AC-LCS/JL9AA1AD-LCSD			LCS Lot-Sample#: H6L290000-147		
	100	(90 - 110)			KNOX 0050/26A Mod	12/28/06	6363147
	101	(90 - 110)	0.82	(0-20)	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 102.8					
Hydrogen fluoride		WO#:JLV9M1AC-LCS/JLV9M1AD-LCSD			LCS Lot-Sample#: H6L200000-400		
	101	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6354400
	101	(90 - 110)	0.06	(0-20)	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 105.3					
Hydrogen fluoride		WO#:JL69G1AC-LCS/JL69G1AD-LCSD			LCS Lot-Sample#: H6L270000-376		
	100	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6361376
	100	(90 - 110)	0.51	(0-20)	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Lot-Sample #...: H6L110105 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#:JLWCC1AC-LCS/JLWCC1AD-LCSD LCS Lot-Sample#: H6L200000-402					
	75.0	75.6	ug	101		KNOX 0050/26A Mod	12/18/06	6354402
	75.0	76.0	ug	101	0.63	KNOX 0050/26A Mod	12/18/06	6354402
			Dilution Factor: 100					
Chlorine			WO#:JLWAA1AC-LCS/JLWAA1AD-LCSD LCS Lot-Sample#: H6L200000-401					
	75.0	75.8	ug	101		KNOX 0050/26A Mod	12/18/06	6354401
	75.0	76.0	ug	101	0.22	KNOX 0050/26A Mod	12/18/06	6354401
			Dilution Factor: 100					
Hydrogen bromide			WO#:JL69F1AC-LCS/JL69F1AD-LCSD LCS Lot-Sample#: H6L270000-375					
	76.0	73.1	ug	96		KNOX 0050/26A Mod	12/18/06	6361375
	76.0	75.0	ug	99	2.6	KNOX 0050/26A Mod	12/18/06	6361375
			Dilution Factor: 101.2					
Hydrogen chloride			WO#:JL8TM1AC-LCS/JL8TM1AD-LCSD LCS Lot-Sample#: H6L290000-098					
	77.1	77.2	ug	100		KNOX 0050/26A Mod	12/18/06	6363098
	77.1	78.1	ug	101	1.2	KNOX 0050/26A Mod	12/18/06	6363098
			Dilution Factor: 102.8					
Hydrogen chloride			WO#:JL9AA1AC-LCS/JL9AA1AD-LCSD LCS Lot-Sample#: H6L290000-147					
	77.1	77.1	ug	100		KNOX 0050/26A Mod	12/28/06	6363147
	77.1	77.8	ug	101	0.82	KNOX 0050/26A Mod	12/28/06	6363147
			Dilution Factor: 102.8					
Hydrogen fluoride			WO#:JLV9M1AC-LCS/JLV9M1AD-LCSD LCS Lot-Sample#: H6L200000-400					
	79.0	79.4	ug	101		KNOX 0050/26A Mod	12/18/06	6354400
	79.0	79.5	ug	101	0.06	KNOX 0050/26A Mod	12/18/06	6354400
			Dilution Factor: 105.3					
Hydrogen fluoride			WO#:JL69G1AC-LCS/JL69G1AD-LCSD LCS Lot-Sample#: H6L270000-376					
	79.0	78.8	ug	100		KNOX 0050/26A Mod	12/18/06	6361376
	79.0	79.2	ug	100	0.51	KNOX 0050/26A Mod	12/18/06	6361376
			Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H6L110105 **Matrix.....:** AIR
Date Sampled...: 11/30/06 **Date Received..:** 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen chloride		Work Order #...: JK7JR1AJ		MS Lot-Sample #: H6L110105-001	
	105	(75 - 125)	KNOX 0050/26A Mod	12/18/06	6363098

Dilution Factor: 9872.

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H6L110105 Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen chloride			Work Order #...:		JK7JR1AJ	MS Lot-Sample #:		H6L110105-001
	ND	1970	2070	ug	105	KNOX 0050/26A	12/18/06	6363098
			Dilution Factor: 9872.					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H6L110105 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#: JK7JW1AJ-MS/JK7JW1AK-MSD MS Lot-Sample #: H6L110105-002					
	106	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6354402
	103	(75 - 125)	3.2	(0-20)	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 2400					
Chlorine		WO#: JK7JW1AG-MS/JK7JW1AH-MSD MS Lot-Sample #: H6L110105-002					
	114	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6354401
	118	(75 - 125)	1.8	(0-20)	KNOX 0050/26A Mod	12/18/06	6354401
		Dilution Factor: 2400					
Hydrogen bromide		WO#: JK7JR1AE-MS/JK7JR1AF-MSD MS Lot-Sample #: H6L110105-001					
	94	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6361375
	94	(75 - 125)	0.25	(0-20)	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4860.					
Hydrogen chloride		WO#: JK7JX1AE-MS/JK7JX1AF-MSD MS Lot-Sample #: H6L110105-003					
	109	(75 - 125)			KNOX 0050/26A Mod	12/28/06	6363147
	99	(75 - 125)	9.9	(0-20)	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 19128					
Hydrogen fluoride		WO#: JK7JR1AG-MS/JK7JR1AH-MSD MS Lot-Sample #: H6L110105-001					
	103	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6361376
	104	(75 - 125)	0.94	(0-20)	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 5054.					
Hydrogen fluoride		WO#: JK7JW1AE-MS/JK7JW1AF-MSD MS Lot-Sample #: H6L110105-002					
	99	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6354400
	98	(75 - 125)	0.59	(0-20)	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 2527.					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H6L110105 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#: JK7JW1AJ-MS/JK7JW1AK-MSD				MS Lot-Sample #: H6L110105-002		
	ND	480	510	ug	106		KNOX 0050/26A	12/18/06	6354402
	ND	480	494	ug	103	3.2	KNOX 0050/26A	12/18/06	6354402
			Dilution Factor: 2400						
Chlorine			WO#: JK7JW1AG-MS/JK7JW1AH-MSD				MS Lot-Sample #: H6L110105-002		
	440	480	987	ug	114		KNOX 0050/26A	12/18/06	6354401
	440	480	1000	ug	118	1.8	KNOX 0050/26A	12/18/06	6354401
			Dilution Factor: 2400						
Hydrogen bromide			WO#: JK7JR1AE-MS/JK7JR1AF-MSD				MS Lot-Sample #: H6L110105-001		
	ND	972	913	ug	94		KNOX 0050/26A	12/18/06	6361375
	ND	972	910	ug	94	0.25	KNOX 0050/26A	12/18/06	6361375
			Dilution Factor: 4860.						
Hydrogen chloride			WO#: JK7JX1AE-MS/JK7JX1AF-MSD				MS Lot-Sample #: H6L110105-003		
	ND	3830	4170	ug	109		KNOX 0050/26A	12/28/06	6363147
	ND	3830	3780	ug	99	9.9	KNOX 0050/26A	12/28/06	6363147
			Dilution Factor: 19128						
Hydrogen fluoride			WO#: JK7JR1AG-MS/JK7JR1AH-MSD				MS Lot-Sample #: H6L110105-001		
	ND	1010	1040	ug	103		KNOX 0050/26A	12/18/06	6361376
	ND	1010	1050	ug	104	0.94	KNOX 0050/26A	12/18/06	6361376
			Dilution Factor: 5054.						
Hydrogen fluoride			WO#: JK7JW1AE-MS/JK7JW1AF-MSD				MS Lot-Sample #: H6L110105-002		
	ND	505	499	ug	99		KNOX 0050/26A	12/18/06	6354400
	ND	505	496	ug	98	0.59	KNOX 0050/26A	12/18/06	6354400
			Dilution Factor: 2527.						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Sample Receipt Documentation

AIR SAMPLING ASSOCIATES, INC.

HGL110105

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 3	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Tony Waomund	
Run No.: 1	Test Method: 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Hydrogen Halide	Halogens		
Cont. 1	11-30-06	1924	—	1	Filter No. A092	X				
Cont. 2	11-30-06	1926	—	1	ACE F.W.	X				
Cont. 3	11-30-06	1928	0.1N H_2SO_4	1	Imp. 1, 2 + Hot Line		X			
Cont. 4	11-30-06	1924	0.1N NaOH	1	Imp. 3, 4			X		
Rec'd temp. Ambient		MFH 12/6/06								
9 coolers Rec'd Fedex# 696769459203		696769459188 9225								
No custody seals.		9199 9214								
MFH 12-6-06		9144 9133								
		9177 9166								

Special Instructions: Cont. Nos. 1 & 2 retained by ASAI. HF & HBr are primary analytes for the 26A analysis.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	11-30-06	1928	1. Relinquished By: Bill Mullins	12/3/06	0900
2. Received By: Billy J. Mullins, Jr	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

Rec'd By: Matthew F. Howard 12-6-06, 09:15

HGL 110105

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 2 of 3	
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Hydrogen Halide	Halogens		
Cont. 1	12-1-06	1812	—	1	Filter No. A112	X				
Cont. 2	12-1-06	1815	—	1	ACE F.W.	X				
Cont. 3	12-1-06	1823	0.1N H_2SO_4	1	Imps 1 & 2 + Hot Line		X			
Cont. 4	12-1-06	1819	0.1N NaOH	1	Imps 3 & 4			X		

Special Instructions: Cont. Nos 1 & 2 retained by ASAI. HF & HBr are primary analytes for the 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI, ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1823	1. Relinquished By: Bill Mullins	12/3/06	0900
2. Received By: Billy J. Mullins, Jr.	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roybance	12/3/06	1330	3. Relinquished By: Alan D. Roybance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

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Rec'd By: Matthew J. Howard, 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

HGL110105

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 3 of 3
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund
Run No.: 3	Test Method: 26A	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Hydrogen Halid	Halogens		
Cont. 1	12-2-06	2219	—	1	Filter No. A113	X				
Cont. 2	12-2-06	2232	—	1	ACE FW	X				
Cont. 3	12-2-06	2235	0.1N H_2SO_4	1	Imps 1, 2 + Hot Line		X			
Cont. 4	12-2-06	2226	0.1N NaOH	1	Imps 3, 4			X		

Special Instructions: Cont. Nos. 1 & 2 retained by ASAI. HF & HBr are primary analytes for the 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-2-06	2235	1. Relinquished By: Bill Mullins	12/3/06	0900
2. Received By: Billy J. Mullins, Jr.	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

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Rec'd BY: Matthew F. Howard 12/6/06, 09:15

STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: Air Sampling Associates **Project:** _____ **Lot Number:** HLLN1D1D5

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	NA.
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?	✓			☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?			✓	If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: _____ PM Instructions: _____

Sample Receiving Associate: Matthew T Howard Date: 12-6-06

QA026R18.doc, 1/30/06

Wet Chemistry

Sample Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110105-001 Work Order #...: JK7JR Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	486	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4860.55		MDL.....: 243		
Hydrogen chloride	ND	987	ug	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 9872.92		MDL.....: 415		
Hydrogen fluoride	ND	505	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 5054.65		MDL.....: 253		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110105-002 Work Order #...: JK7JW Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	240	ug	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 2400		MDL.....: 57.6		
Chlorine	**440**	**240**	**ug**	**KNOX 0050/26A Mod**	**12/18/06**	**6354401**
		Dilution Factor: 2400		MDL.....: 101		
Hydrogen fluoride	ND	253	ug	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 2527.32		MDL.....: 126		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110105-003 Work Order #...: JK7JX Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	471	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4708.65		MDL.....: 235		
Hydrogen chloride	ND	1910	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 19128.78		MDL.....: 803		
Hydrogen fluoride	ND	490	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 4896.69		MDL.....: 245		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110105-004 Work Order #...: JK7J0 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	250	ug	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 2500		MDL.....: 60.0		
Chlorine	**480**	**250**	**ug**	**KNOX 0050/26A Mod**	**12/18/06**	**6354401**
		Dilution Factor: 2500		MDL.....: 105		
Hydrogen fluoride	ND	263	ug	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 2632.63		MDL.....: 132		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 0.1N H2SO4

General Chemistry

Lot-Sample #...: H6L110105-005 Work Order #...: JK7J1 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	608	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 6075.68		MDL.....: 304		
Hydrogen chloride	ND	2470	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 24682.3		MDL.....: 1040		
Hydrogen fluoride	ND	632	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 6318.31		MDL.....: 316		

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 0.1N NAOH

General Chemistry

Lot-Sample #...: H6L110105-006 Work Order #...: JK7J2 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	270	ug	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 2700		MDL.....: 64.8		
Chlorine	483	270	ug	KNOX 0050/26A Mod	12/18/06	6354401
		Dilution Factor: 2700		MDL.....: 113		
Hydrogen fluoride	ND	284	ug	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 2843.24		MDL.....: 142		

QC Summary

METHOD BLANK REPORT

General Chemistry

Client Lot #...: H6L110105 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		Work Order #: JLWCC1AA		MB Lot-Sample #:	H6L200000-402	
	ND	10.0	ug	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 100				
Chlorine		Work Order #: JLWAA1AA		MB Lot-Sample #:	H6L200000-401	
	ND	10.0	ug	KNOX 0050/26A Mod	12/18/06	6354401
		Dilution Factor: 100				
Hydrogen bromide		Work Order #: JL69F1AA		MB Lot-Sample #:	H6L270000-375	
	ND	10.1	ug	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 101.2				
Hydrogen chloride		Work Order #: JL8TM1AA		MB Lot-Sample #:	H6L290000-098	
	ND	10.3	ug	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 102.8				
Hydrogen chloride		Work Order #: JL9AA1AA		MB Lot-Sample #:	H6L290000-147	
	ND	10.3	ug	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 102.8				
Hydrogen fluoride		Work Order #: JLV9M1AA		MB Lot-Sample #:	H6L200000-400	
	ND	10.5	ug	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 105.3				
Hydrogen fluoride		Work Order #: JL69G1AA		MB Lot-Sample #:	H6L270000-376	
	ND	10.5	ug	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 105.3				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: H6L110105 Matrix.....: AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#:JLWCC1AC-LCS/JLWCC1AD-LCSD LCS Lot-Sample#: H6L200000-402					
	101	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6354402
	101	(90 - 110)	0.63	(0-20)	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 100					
Chlorine		WO#:JLWAA1AC-LCS/JLWAA1AD-LCSD LCS Lot-Sample#: H6L200000-401					
	101	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6354401
	101	(90 - 110)	0.22	(0-20)	KNOX 0050/26A Mod	12/18/06	6354401
		Dilution Factor: 100					
Hydrogen bromide		WO#:JL69F1AC-LCS/JL69F1AD-LCSD LCS Lot-Sample#: H6L270000-375					
	96	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6361375
	99	(90 - 110)	2.6	(0-20)	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 101.2					
Hydrogen chloride		WO#:JL8TM1AC-LCS/JL8TM1AD-LCSD LCS Lot-Sample#: H6L290000-098					
	100	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6363098
	101	(90 - 110)	1.2	(0-20)	KNOX 0050/26A Mod	12/18/06	6363098
		Dilution Factor: 102.8					
Hydrogen chloride		WO#:JL9AA1AC-LCS/JL9AA1AD-LCSD LCS Lot-Sample#: H6L290000-147					
	100	(90 - 110)			KNOX 0050/26A Mod	12/28/06	6363147
	101	(90 - 110)	0.82	(0-20)	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 102.8					
Hydrogen fluoride		WO#:JLV9M1AC-LCS/JLV9M1AD-LCSD LCS Lot-Sample#: H6L200000-400					
	101	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6354400
	101	(90 - 110)	0.06	(0-20)	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 105.3					
Hydrogen fluoride		WO#:JL69G1AC-LCS/JL69G1AD-LCSD LCS Lot-Sample#: H6L270000-376					
	100	(90 - 110)			KNOX 0050/26A Mod	12/18/06	6361376
	100	(90 - 110)	0.51	(0-20)	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Lot-Sample #...: H6L110105 Matrix.....: AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#:JLWCC1AC-LCS/JLWCC1AD-LCSD LCS Lot-Sample#: H6L200000-402					
	75.0	75.6	ug	101		KNOX 0050/26A Mod	12/18/06	6354402
	75.0	76.0	ug	101	0.63	KNOX 0050/26A Mod	12/18/06	6354402
			Dilution Factor: 100					
Chlorine			WO#:JLWAA1AC-LCS/JLWAA1AD-LCSD LCS Lot-Sample#: H6L200000-401					
	75.0	75.8	ug	101		KNOX 0050/26A Mod	12/18/06	6354401
	75.0	76.0	ug	101	0.22	KNOX 0050/26A Mod	12/18/06	6354401
			Dilution Factor: 100					
Hydrogen bromide			WO#:JL69F1AC-LCS/JL69F1AD-LCSD LCS Lot-Sample#: H6L270000-375					
	76.0	73.1	ug	96		KNOX 0050/26A Mod	12/18/06	6361375
	76.0	75.0	ug	99	2.6	KNOX 0050/26A Mod	12/18/06	6361375
			Dilution Factor: 101.2					
Hydrogen chloride			WO#:JL8TM1AC-LCS/JL8TM1AD-LCSD LCS Lot-Sample#: H6L290000-098					
	77.1	77.2	ug	100		KNOX 0050/26A Mod	12/18/06	6363098
	77.1	78.1	ug	101	1.2	KNOX 0050/26A Mod	12/18/06	6363098
			Dilution Factor: 102.8					
Hydrogen chloride			WO#:JL9AA1AC-LCS/JL9AA1AD-LCSD LCS Lot-Sample#: H6L290000-147					
	77.1	77.1	ug	100		KNOX 0050/26A Mod	12/28/06	6363147
	77.1	77.8	ug	101	0.82	KNOX 0050/26A Mod	12/28/06	6363147
			Dilution Factor: 102.8					
Hydrogen fluoride			WO#:JLV9M1AC-LCS/JLV9M1AD-LCSD LCS Lot-Sample#: H6L200000-400					
	79.0	79.4	ug	101		KNOX 0050/26A Mod	12/18/06	6354400
	79.0	79.5	ug	101	0.06	KNOX 0050/26A Mod	12/18/06	6354400
			Dilution Factor: 105.3					
Hydrogen fluoride			WO#:JL69G1AC-LCS/JL69G1AD-LCSD LCS Lot-Sample#: H6L270000-376					
	79.0	78.8	ug	100		KNOX 0050/26A Mod	12/18/06	6361376
	79.0	79.2	ug	100	0.51	KNOX 0050/26A Mod	12/18/06	6361376
			Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H6L110105 Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen chloride		Work Order #...: JK7JR1AJ		MS Lot-Sample #: H6L110105-001	
	105	(75 - 125)	KNOX 0050/26A Mod	12/18/06	6363098

Dilution Factor: 9872.

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H6L110105 Matrix.....: AIR
Date Sampled...: 11/30/06 Date Received..: 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen chloride			Work Order #...:		JK7JR1AJ	MS Lot-Sample #:		H6L110105-001
	ND	1970	2070	ug	105	KNOX 0050/26A	12/18/06	6363098
			Dilution Factor: 9872.					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H6L110105 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#: JK7JW1AJ-MS/JK7JW1AK-MSD MS Lot-Sample #: H6L110105-002					
	106	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6354402
	103	(75 - 125)	3.2	(0-20)	KNOX 0050/26A Mod	12/18/06	6354402
		Dilution Factor: 2400					
Chlorine		WO#: JK7JW1AG-MS/JK7JW1AH-MSD MS Lot-Sample #: H6L110105-002					
	114	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6354401
	118	(75 - 125)	1.8	(0-20)	KNOX 0050/26A Mod	12/18/06	6354401
		Dilution Factor: 2400					
Hydrogen bromide		WO#: JK7JR1AE-MS/JK7JR1AF-MSD MS Lot-Sample #: H6L110105-001					
	94	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6361375
	94	(75 - 125)	0.25	(0-20)	KNOX 0050/26A Mod	12/18/06	6361375
		Dilution Factor: 4860.					
Hydrogen chloride		WO#: JK7JX1AE-MS/JK7JX1AF-MSD MS Lot-Sample #: H6L110105-003					
	109	(75 - 125)			KNOX 0050/26A Mod	12/28/06	6363147
	99	(75 - 125)	9.9	(0-20)	KNOX 0050/26A Mod	12/28/06	6363147
		Dilution Factor: 19128					
Hydrogen fluoride		WO#: JK7JR1AG-MS/JK7JR1AH-MSD MS Lot-Sample #: H6L110105-001					
	103	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6361376
	104	(75 - 125)	0.94	(0-20)	KNOX 0050/26A Mod	12/18/06	6361376
		Dilution Factor: 5054.					
Hydrogen fluoride		WO#: JK7JW1AE-MS/JK7JW1AF-MSD MS Lot-Sample #: H6L110105-002					
	99	(75 - 125)			KNOX 0050/26A Mod	12/18/06	6354400
	98	(75 - 125)	0.59	(0-20)	KNOX 0050/26A Mod	12/18/06	6354400
		Dilution Factor: 2527.					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H6L110105 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#: JK7JW1AJ-MS/JK7JW1AK-MSD				MS Lot-Sample #: H6L110105-002		
	ND	480	510	ug	106		KNOX 0050/26A	12/18/06	6354402
	ND	480	494	ug	103	3.2	KNOX 0050/26A	12/18/06	6354402
			Dilution Factor: 2400						
Chlorine			WO#: JK7JW1AG-MS/JK7JW1AH-MSD				MS Lot-Sample #: H6L110105-002		
	440	480	987	ug	114		KNOX 0050/26A	12/18/06	6354401
	440	480	1000	ug	118	1.8	KNOX 0050/26A	12/18/06	6354401
			Dilution Factor: 2400						
Hydrogen bromide			WO#: JK7JR1AE-MS/JK7JR1AF-MSD				MS Lot-Sample #: H6L110105-001		
	ND	972	913	ug	94		KNOX 0050/26A	12/18/06	6361375
	ND	972	910	ug	94	0.25	KNOX 0050/26A	12/18/06	6361375
			Dilution Factor: 4860.						
Hydrogen chloride			WO#: JK7JX1AE-MS/JK7JX1AF-MSD				MS Lot-Sample #: H6L110105-003		
	ND	3830	4170	ug	109		KNOX 0050/26A	12/28/06	6363147
	ND	3830	3780	ug	99	9.9	KNOX 0050/26A	12/28/06	6363147
			Dilution Factor: 19128						
Hydrogen fluoride			WO#: JK7JR1AG-MS/JK7JR1AH-MSD				MS Lot-Sample #: H6L110105-001		
	ND	1010	1040	ug	103		KNOX 0050/26A	12/18/06	6361376
	ND	1010	1050	ug	104	0.94	KNOX 0050/26A	12/18/06	6361376
			Dilution Factor: 5054.						
Hydrogen fluoride			WO#: JK7JW1AE-MS/JK7JW1AF-MSD				MS Lot-Sample #: H6L110105-002		
	ND	505	499	ug	99		KNOX 0050/26A	12/18/06	6354400
	ND	505	496	ug	98	0.59	KNOX 0050/26A	12/18/06	6354400
			Dilution Factor: 2527.						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Raw Data

Anions

STL Knoxville IC Initial Calibration Data Review / Narrative Checklist
Methods: 300.0, 9056, 9057 and 26A, SOP: KNOX-WC-0005, Rev. 8

(ICS-1500)

Analysis Date:	10/18/06	File ID:	J18-LOWLEVEL-FCLNO2BRNO3-101806

Initial Calibration Review Items	N/A	Yes	No	If No, why is data reportable?	2nd √
1. Were at least 5 levels of each analyte analyzed?		✓			✓
2. Is low level standard concentration ≤ RL?		✓			✓
3. Are the correlation coefficients (r) ≥0.995; r^2≥0.990?		✓			✓
4. For method 300.0, was the calibration curve processed using linear reqression?	✓				NA
5. For manual integrated standards, are before/after chromatograms provided with initials/date/reason?	✓			Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system	NA

Analyst: CWK **Date:** 10/19/06

Comments:

Range: 0.075 - 2.0 mg/L

- 2nd order calibration using peak hgt. vs amount.

LOW LEVEL

2nd Level Reviewer: DDuckwal **Date:** 10/19/06

Comments:

Cal std (5) = ICWS-8919 (CL)

peak height = Ø + 2.19733(.9966) + Ø.033578(.9966)²
" " = Ø + 2.1899 + Ø.0334
" " = 2.223

Scanned 10/19/06 DKW

Operator:kaukerc Timebase:ICS1500 Sequence:J18_LOWLEVEL_FCLNO2BRNO3_101806 Page 1-1
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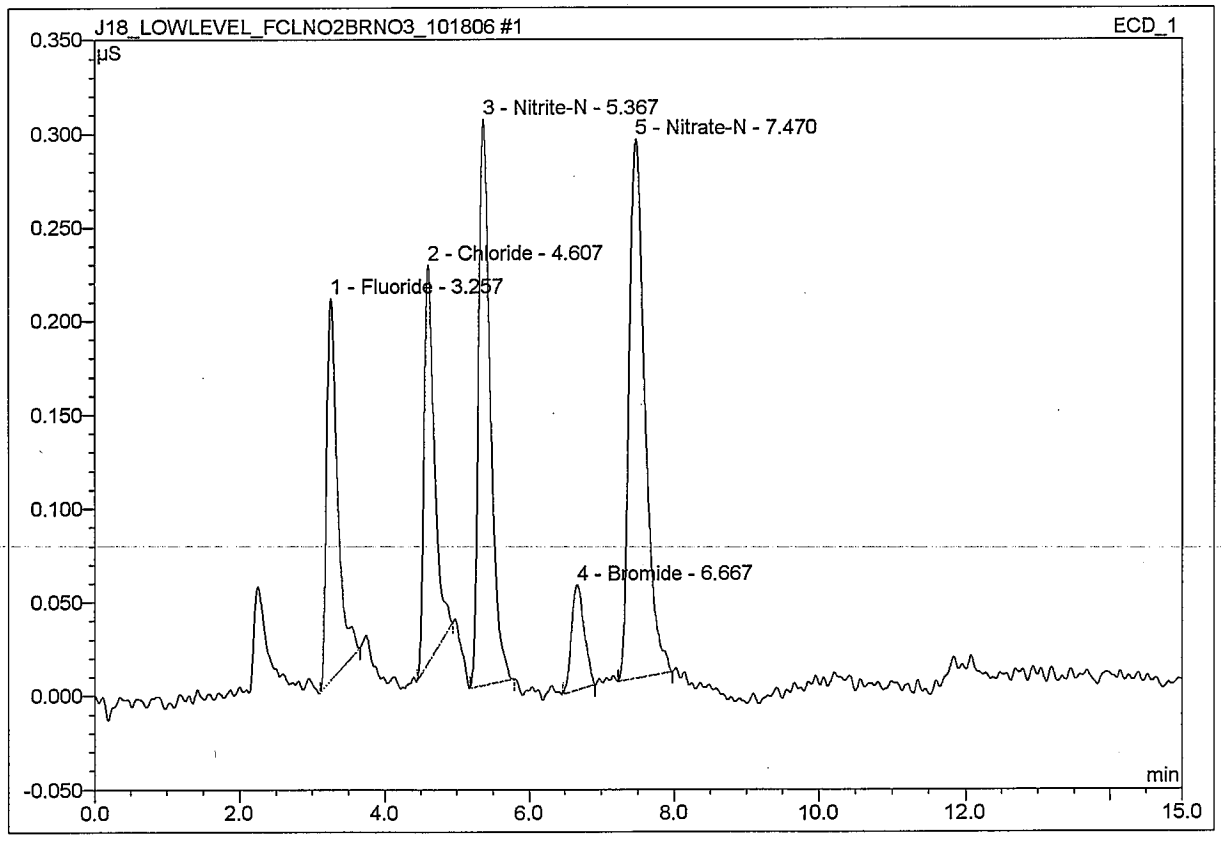
1 CAL STD #1 ICWS-8915

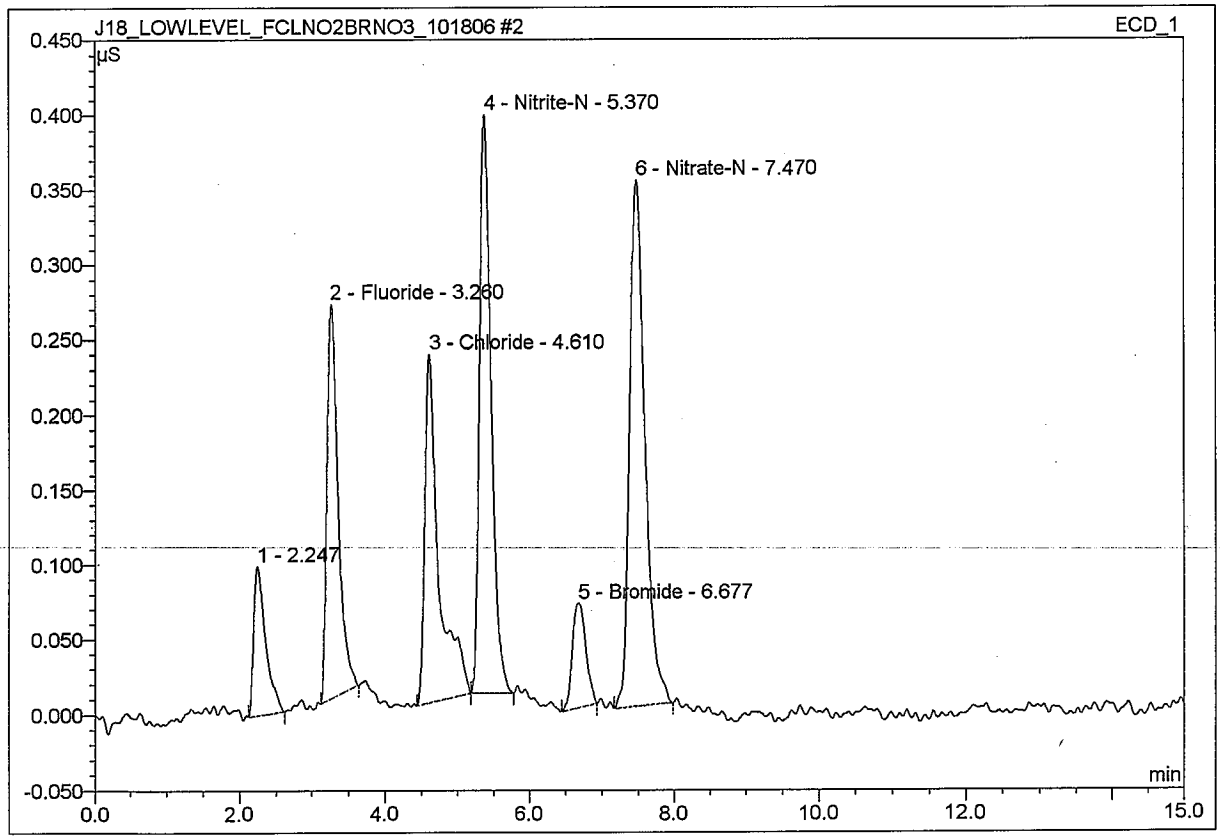
Sample Name:	**CAL STD #1 ICWS-8915**	*Injection Volume:*	**50.0**
Vial Number:	**1292**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 9:14**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.26	Fluoride	0.20347	0.035	16.69	0.0752	BMB
2	4.61	Chloride	0.21212	0.036	16.87	0.0964	BMB
3	5.37	Nitrite-N	0.30167	0.057	26.98	0.0791	BMB
4	6.67	Bromide	0.05610	0.011	5.39	0.0791	BMB
5	7.47	Nitrate-N	0.28758	0.072	34.07	0.0828	BMB

2 CAL STD #2 ICWS-8916

Sample Name:	**CAL STD #2 ICWS-8916**	*Injection Volume:*	**50.0**
Vial Number:	**1293**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 9:32**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

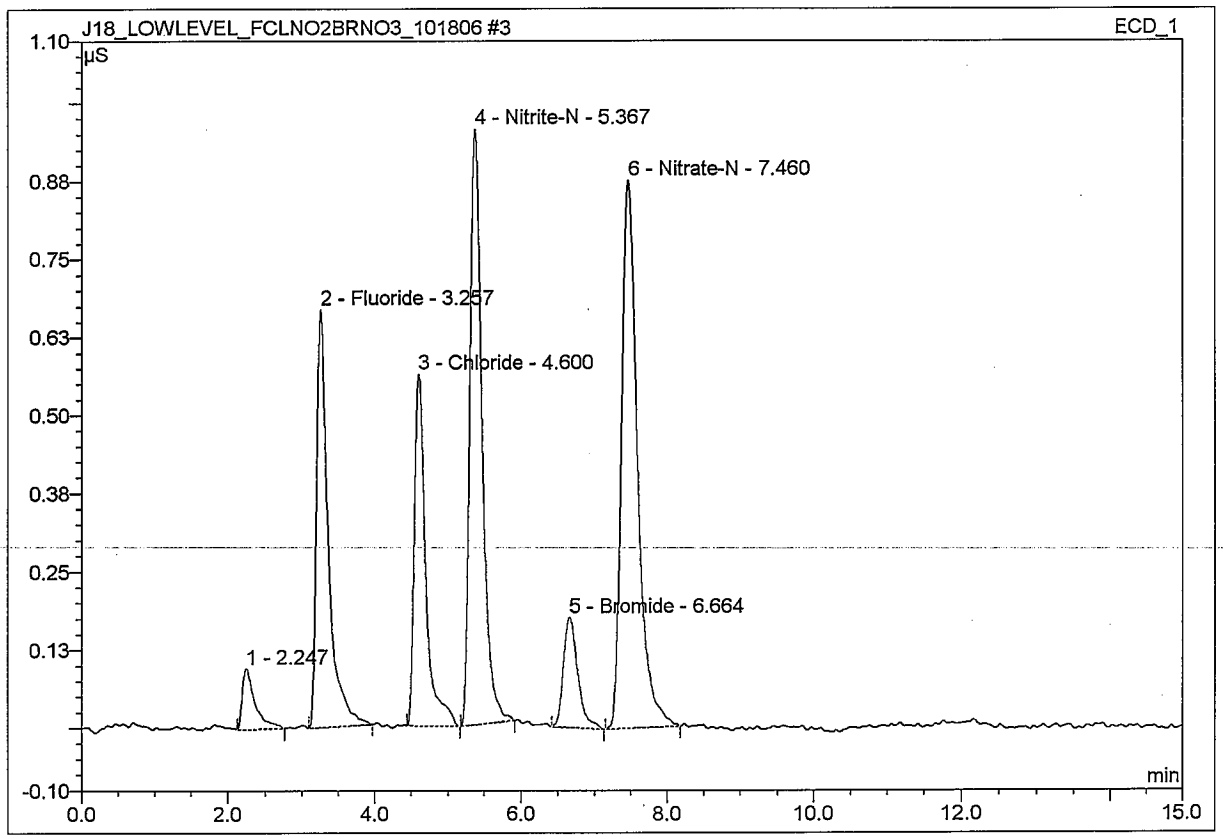


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.25	n.a.	0.09910	0.019	6.45	n.a.	BMB
2	3.26	Fluoride	0.26277	0.046	15.73	0.0970	BMB
3	4.61	Chloride	0.23228	0.052	17.83	0.1055	BMB
4	5.37	Nitrite-N	0.38584	0.072	24.74	0.1012	BMB
5	6.68	Bromide	0.06928	0.015	5.09	0.0977	BMB
6	7.47	Nitrate-N	0.35086	0.088	30.16	0.1009	BMB

Operator:kaukerc Timebase:ICS1500 Sequence:J18_LOWLEVEL_FCLNO2BRNO3_101806 Page 1-1
10/19/2006 12:58 PM

3 CAL STD #3 ICWS-8917

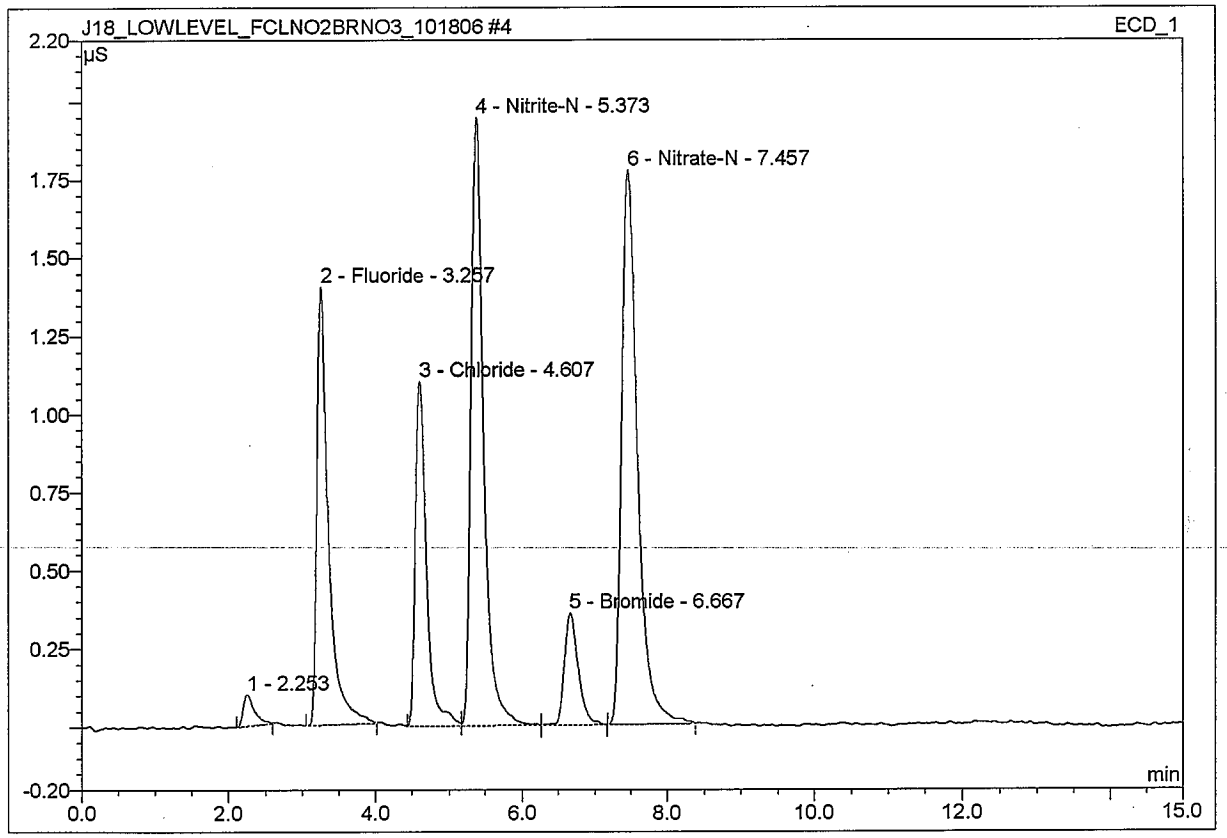
Sample Name:	**CAL STD #3 ICWS-8917**	*Injection Volume:*	**50.0**
Vial Number:	**1293**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 9:49**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.25	n.a.	0.09667	0.019	2.79	n.a.	BMB
2	3.26	Fluoride	0.66838	0.127	18.21	0.2438	BMB
3	4.60	Chloride	0.56206	0.103	14.73	0.2548	BMB
4	5.37	Nitrite-N	0.95211	0.184	26.44	0.2484	BMB
5	6.66	Bromide	0.17667	0.040	5.79	0.2488	BMB
6	7.46	Nitrate-N	0.87649	0.223	32.04	0.2502	BMB

4 CAL STD #4 ICWS-8918

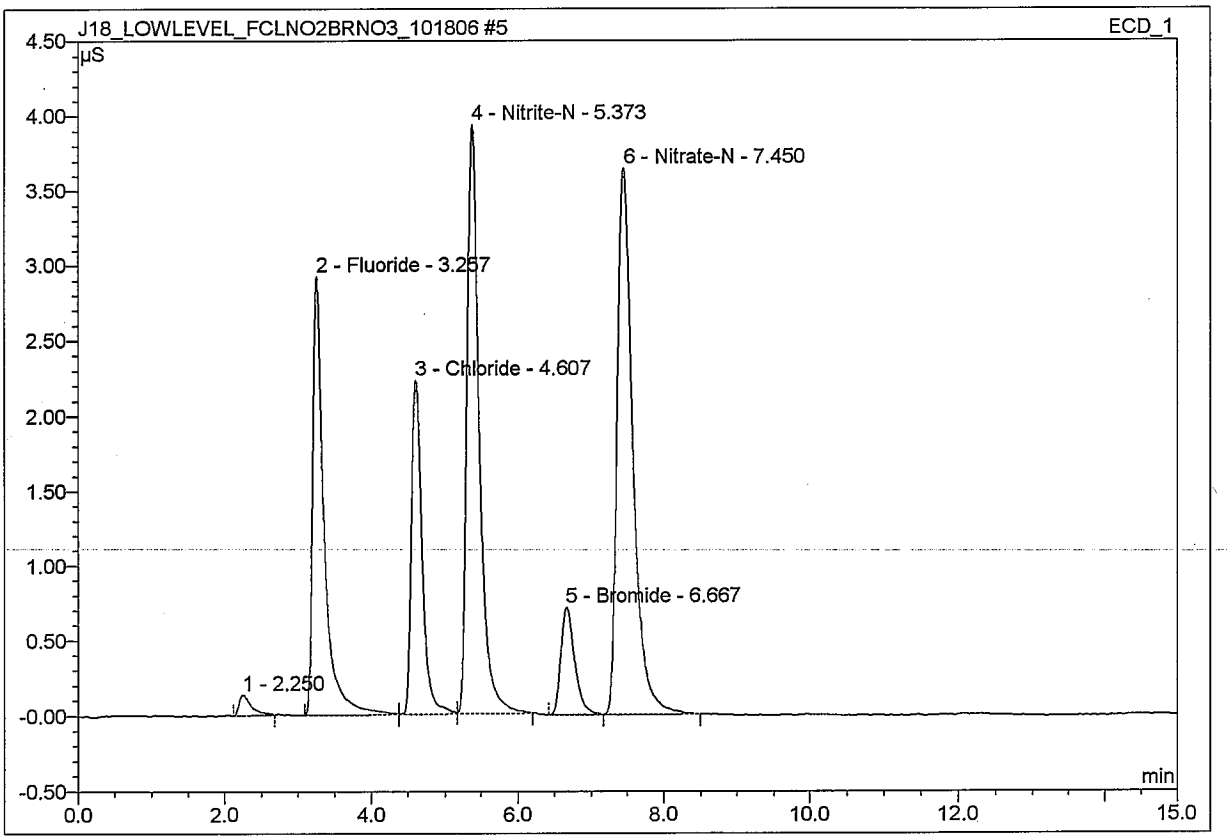
Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 10:07**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.25	n.a.	0.10012	0.018	1.29	n.a.	BMB
2	3.26	Fluoride	1.39754	0.256	18.63	0.4996	BMB
3	4.61	Chloride	1.09898	0.191	13.89	0.4964	BM
4	5.37	Nitrite-N	1.94194	0.385	27.97	0.5022	M
5	6.67	Bromide	0.35570	0.078	5.68	0.4998	MB
6	7.46	Nitrate-N	1.76858	0.448	32.55	0.4985	BMB

5 CAL STD #5 ICWS-8919

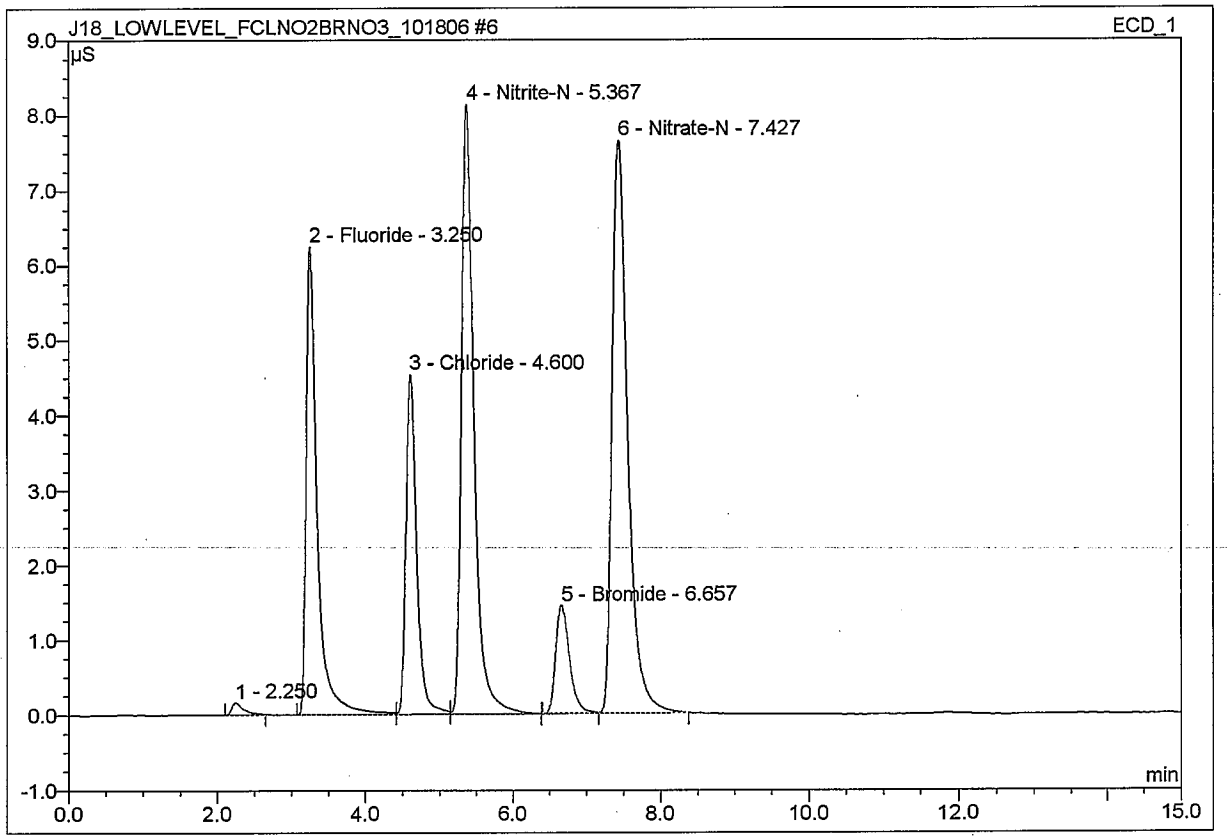
Sample Name:	**CAL STD #5 ICWS-8919**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 10:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.25	n.a.	0.13527	0.026	0.94	n.a.	BMB
2	3.26	Fluoride	2.91620	0.530	19.16	1.0032	BM
3	4.61	Chloride ✓	2.22320	0.373	13.49	0.9966	M
4	5.37	Nitrite-N	3.92501	0.773	27.95	0.9983	MB
5	6.67	Bromide	0.71491	0.156	5.62	1.0005	Ru
6	7.45	Nitrate-N	3.63765	0.908	32.83	0.9998	BMB

6 CAL STD #6 ICWS-8920

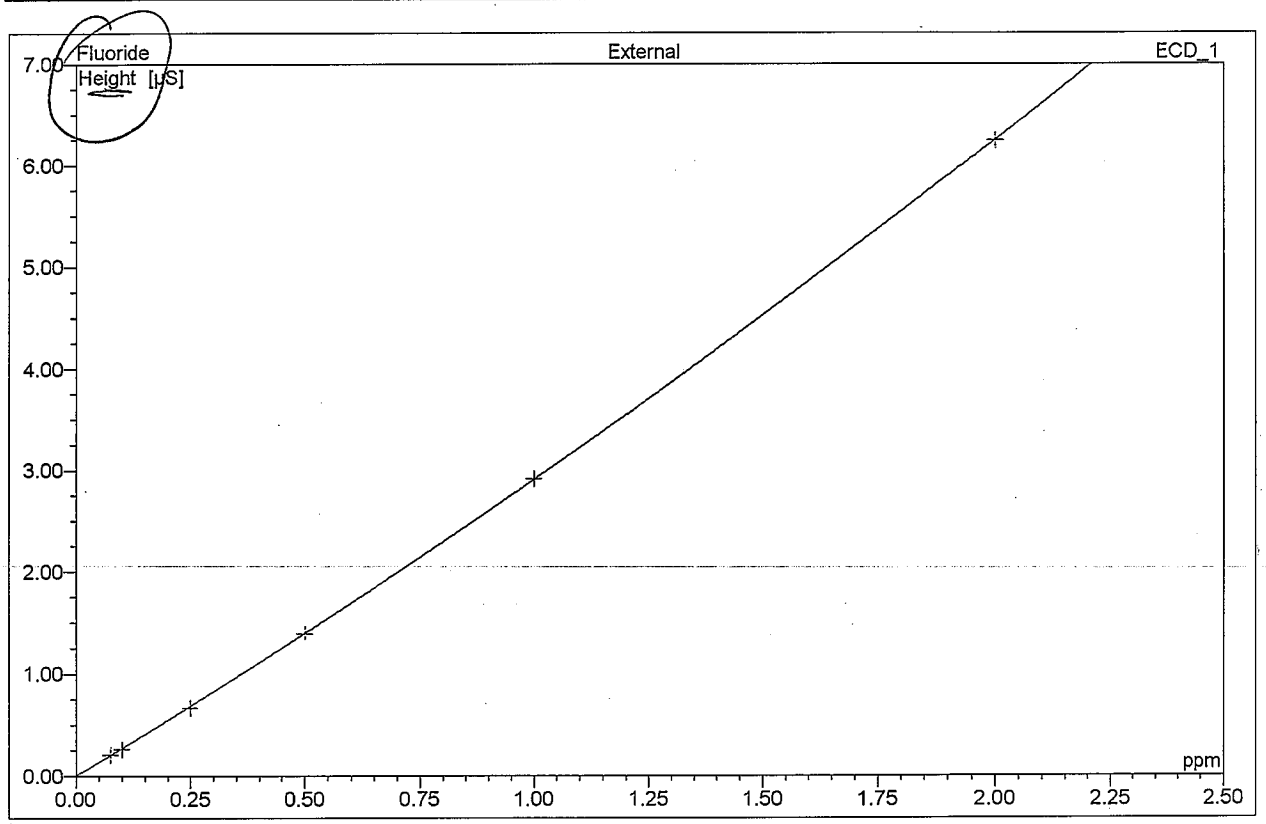
Sample Name:	**CAL STD #6 ICWS-8920**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**10/18/2006 10:41**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.25	n.a.	0.15975	0.030	0.53	n.a.	BMB
2	3.25	Fluoride	6.24513	1.086	19.22	1.9994	BM
3	4.60	Chloride	4.53115	0.754	13.35	2.0009	M
4	5.37	Nitrite-N	8.12633	1.598	28.28	2.0003	M
5	6.66	Bromide	1.44051	0.306	5.42	1.9999	Ru
6	7.43	Nitrate-N	7.63891	1.876	33.19	2.0001	MB

4 ~~CAL STD #4 ICWS-8918~~ DKW 10/19/06

Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

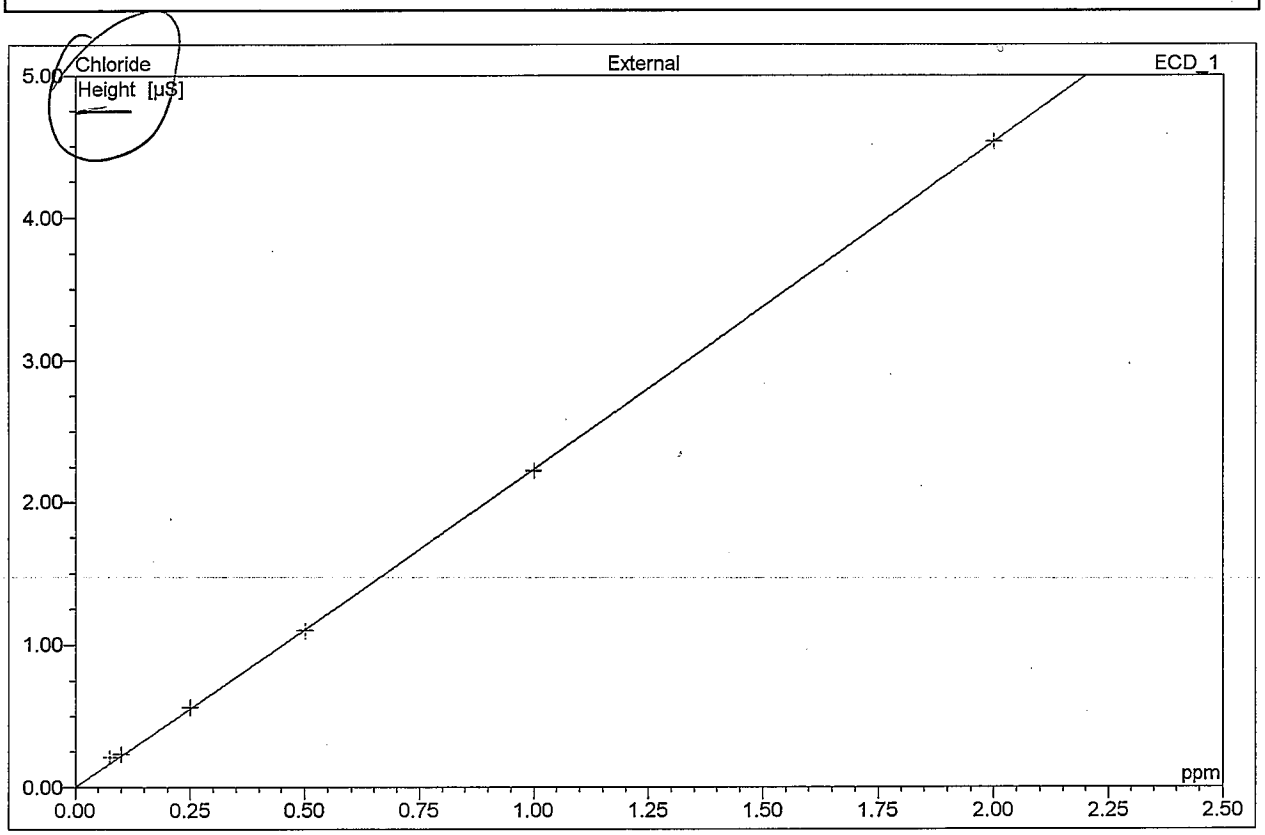


No.	Ret.Time min	Peak Name	Cal.Type	Points	R-Square	Offset	Slope	Curve
1	2.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2	3.26	Fluoride	Quad	6	1.0000	0.000000	2.68877	0.217432
3	4.61	Chloride	Quad	6	0.9998	0.000000	2.19733	0.033578
4	5.37	Nitrite-N	Quad	6	1.0000	0.000000	3.80119	0.130678
5	6.67	Bromide	Quad	6	1.0000	0.000000	0.70878	0.005755
6	7.46	Nitrate-N	Quad	6	1.0000	0.000000	3.45770	0.180759
Average:					1.0000	0.0000	2.5708	0.1136

Operator:kaukerc Timebase:ICS1500 Sequence:J18_LOWLEVEL_FCLNO2BRNO3_101806 Page 1-1
10/18/2006 11:02 AM

~~4 CAL STD #4 ICWS-8918~~ DKW 10/19/06

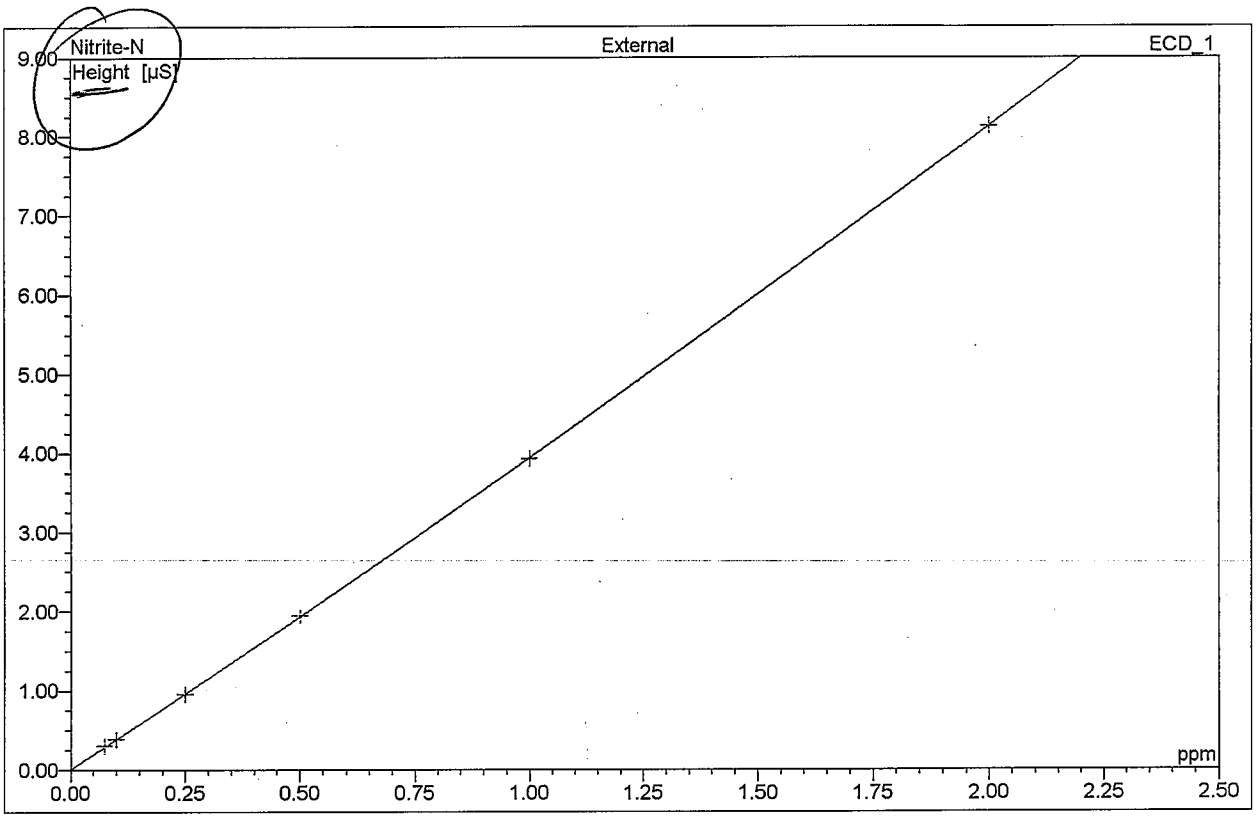
Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	R-Square	Offset	Slope	Curve
1	2.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2	3.26	Fluoride	Quad	6	1.0000	0.000000	2.68877	0.217432
3	4.61	Chloride	Quad	6	✓ 0.9998	0.000000	2.19733	0.033578
4	5.37	Nitrite-N	Quad	6	1.0000	0.000000	3.80119	0.130678
5	6.67	Bromide	Quad	6	1.0000	0.000000	0.70878	0.005755
6	7.46	Nitrate-N	Quad	6	1.0000	0.000000	3.45770	0.180759
Average:					1.0000	0.0000	2.5708	0.1136

~~4 CAL STD #4 ICWS-8918~~ DPW 10/19/06

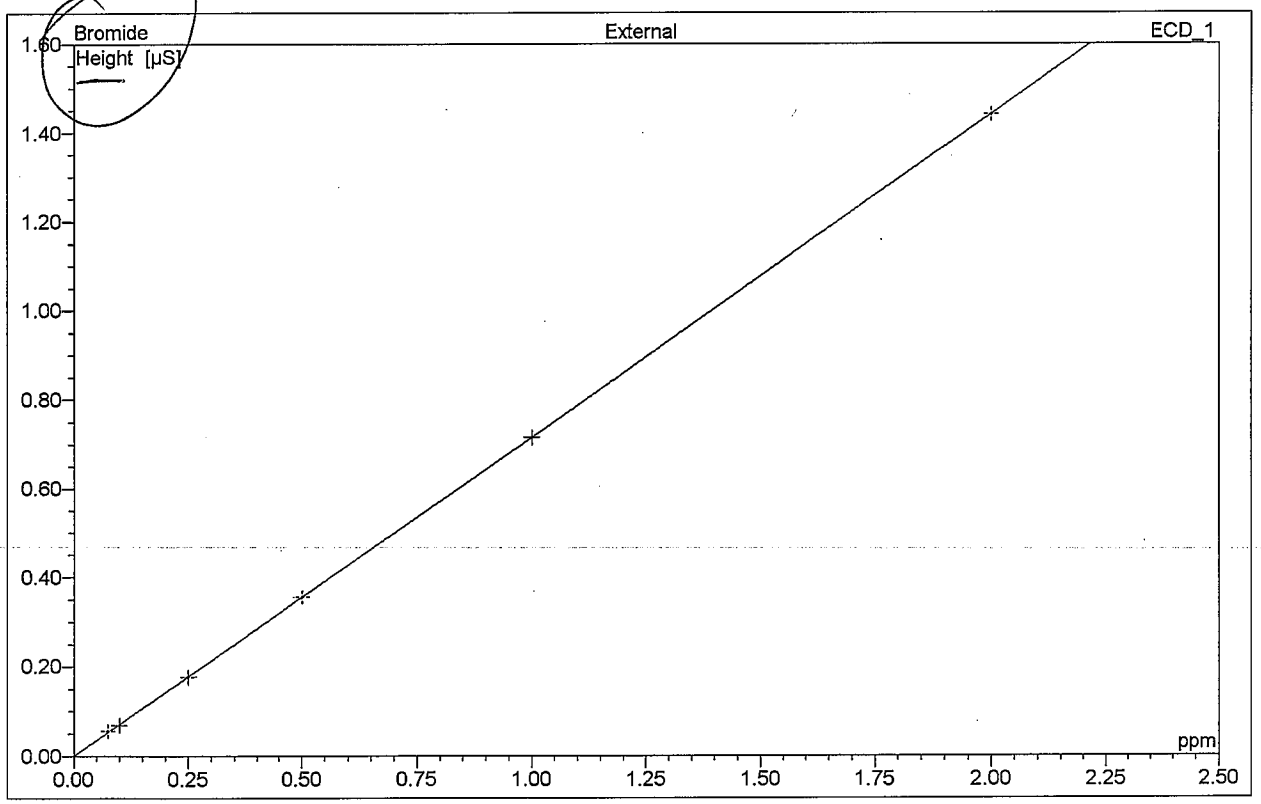
Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	R-Square	Offset	Slope	Curve
1	2.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2	3.26	Fluoride	Quad	6	1.0000	0.000000	2.68877	0.217432
3	4.61	Chloride	Quad	6	0.9998	0.000000	2.19733	0.033578
4	5.37	Nitrite-N	Quad	6	1.0000	0.000000	3.80119	0.130678
5	6.67	Bromide	Quad	6	1.0000	0.000000	0.70878	0.005755
6	7.46	Nitrate-N	Quad	6	1.0000	0.000000	3.45770	0.180759
Average:					1.0000	0.0000	2.5708	0.1136

~~4 CAL STD #4 ICWS-8918~~ DKW 10/19/06

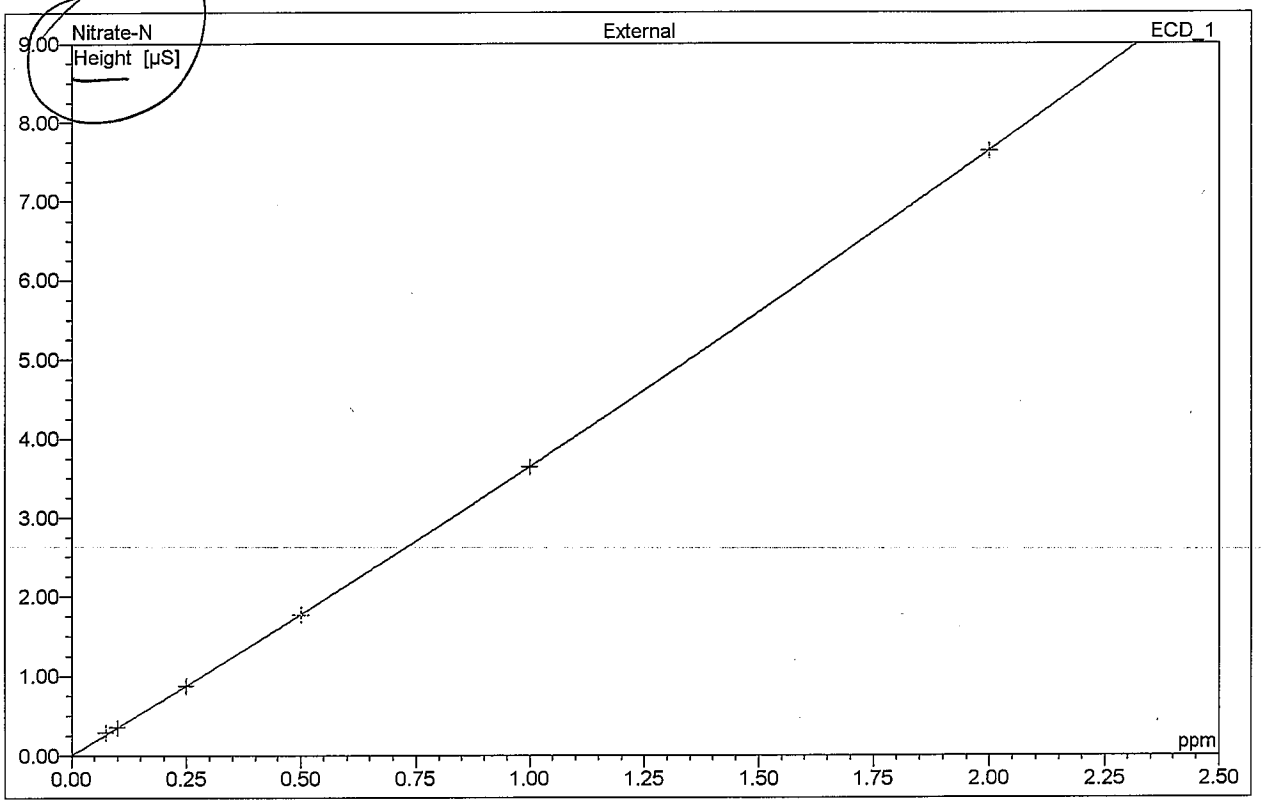
Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**###############**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	R-Square	Offset	Slope	Curve
1	2.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2	3.26	Fluoride	Quad	6	1.0000	0.000000	2.68877	0.217432
3	4.61	Chloride	Quad	6	0.9998	0.000000	2.19733	0.033578
4	5.37	Nitrite-N	Quad	6	1.0000	0.000000	3.80119	0.130678
5	6.67	Bromide	Quad	6	✓ 1.0000	0.000000	0.70878	0.005755
6	7.46	Nitrate-N	Quad	6	1.0000	0.000000	3.45770	0.180759
Average:					1.0000	0.0000	2.5708	0.1136

~~4 CAL STD #4 ICWS-8918~~ DFW 10/19/06

Sample Name:	**CAL STD #4 ICWS-8918**	*Injection Volume:*	**50.0**
Vial Number:	**1295**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**###############**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	R-Square	Offset	Slope	Curve
1	2.25	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2	3.26	Fluoride	Quad	6	1.0000	0.000000	2.68877	0.217432
3	4.61	Chloride	Quad	6	0.9998	0.000000	2.19733	0.033578
4	5.37	Nitrite-N	Quad	6	1.0000	0.000000	3.80119	0.130678
5	6.67	Bromide	Quad	6	1.0000	0.000000	0.70878	0.005755
6	7.46	Nitrate-N	Quad	6	✓ 1.0000	0.000000	3.45770	0.180759
Average:					1.0000	0.0000	2.5708	0.1136

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 9/25/06 Chemist: DKW Expiration Date: 12/25/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-8837	F-	17125	ERA	12/31/07	1000 ppm	5.	50	100. mg/L (ppm)
2. (intermed. calib. source)	Cl-	36065		6/30/07				
3.	NO2N	17075		7/31/07				
4.	BR-	27025		2/28/07				
5.	NO3N-	17026		2/28/08				
6. ICWI-8838	F-	1-38F-2	SPEX	8/15/07	1000 ppm	5.	50	100. ppm (mg/L)
7. (intermed 2nd source)	Cl-	1-5CL-2		3/15/07				
8.	NO2N-	1-13NO2N-2		9/15/07				
9.	BR-	1-1BR-2		4/30/07				
10.	NO3N-	1-27NO3N-2		5/15/07				
11.								
12.								
13.								
14.								

Reviewed By: _____

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 10/18/06 Chemist: CWF Expiration Date: 10/19/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-8915	F-	ICWI-	CWF ~~8838~~ 8837 10/18/06	12/25/06	100 ppm	0.075	100ml	0.075 ppm
2. (Cal Std 1)	Cl-							
3.	NO2-N							
4.	Br-							
5.	NO3-N							
6. ICWS-8916	F-					0.100		0.100 ppm
7. (Cal Std 2)	Cl-							
8.	NO2-N							
9.	Br-							
10.	NO3-N							
11. ICWS 8917	F-					0.250		0.250 ppm
12. (Cal Std 3)	Cl-							
13.	NO2-N							
14.	Br-							
	NO3-N							

Reviewed By: _____

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 10/18/06 Chemist: CWK Expiration Date: 10/19/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-8918	F-	ICWI-	8837	12/25/06	100 ppm	0.500	100 ml	0.50 ppm
2. (Cal std 4)	Cl-							
3.	NO_2-N							
4.	Br-							
5.	NO_3-N							
6. ICWS-8919	F-					1.00		1.0 ppm
7. (Cal std 5)	Cl-							
8.	NO_2-N							
9.	Br-							
10.	NO_3-N							
11. ICWS-8920	F-					2.00		2.0 ppm
12. (Cal std 6)	Cl-							
13.	NO_2-N							
14.	Br-							
	NO_3-N							

Reviewed By: _____

STL Knoxville IC Initial Calibration Data Review / Narrative Checklist
Methods: 300.0, 9056, 9057 and 26A, SOP: KNOX-WC-0005, Rev. 8

DX600 (ARAGORN)

Analysis Date:	12/14/06	File ID:	L14A_LOW_AIR_ANIONS_121406

Initial Calibration Review Items	N/A	Yes	No	If No, why is data reportable?	2nd √
1. Were at least 5 levels of each analyte analyzed?		✓			✓
2. Is low level standard concentration ≤ RL?		✓			✓
3. Are the correlation coefficients (r) ≥0.995; r^2≥0.990?		✓			✓
4. For method 300.0, was the calibration curve processed using linear reqression?	✓				N/A
5. For manual integrated standards, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system	✓

Analyst: [signature] Date: 12/15/06

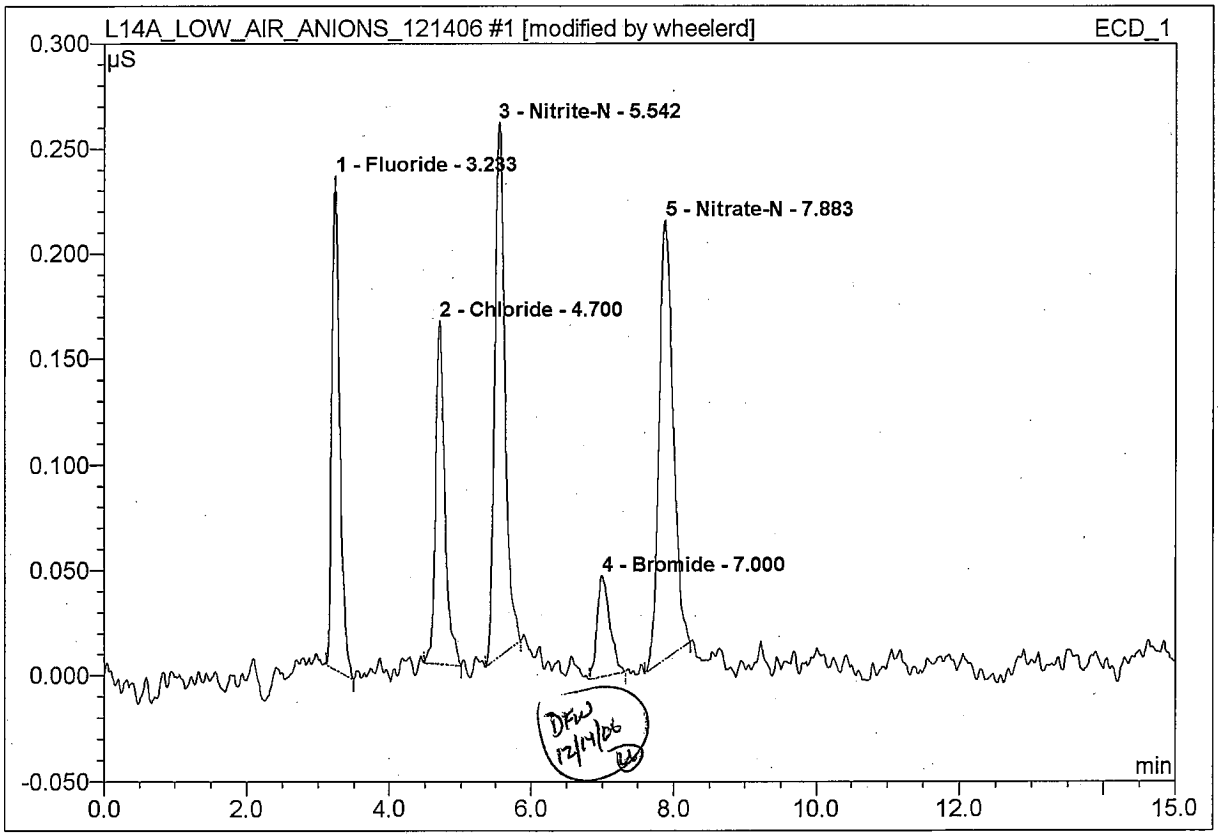
Comments: Low level anion calibration for air analysis — Range = 0.075 – 2 ppm F⁻; Cl⁻; NO2N⁻; NO3N⁻; BR⁻ — Quad fit using peak height vs. amount —

2nd Level Reviewer: [signature] Date: 12/15/06

Comments:

1 CAL STD 1 = ICWS-9045 @ (0.075ppm)

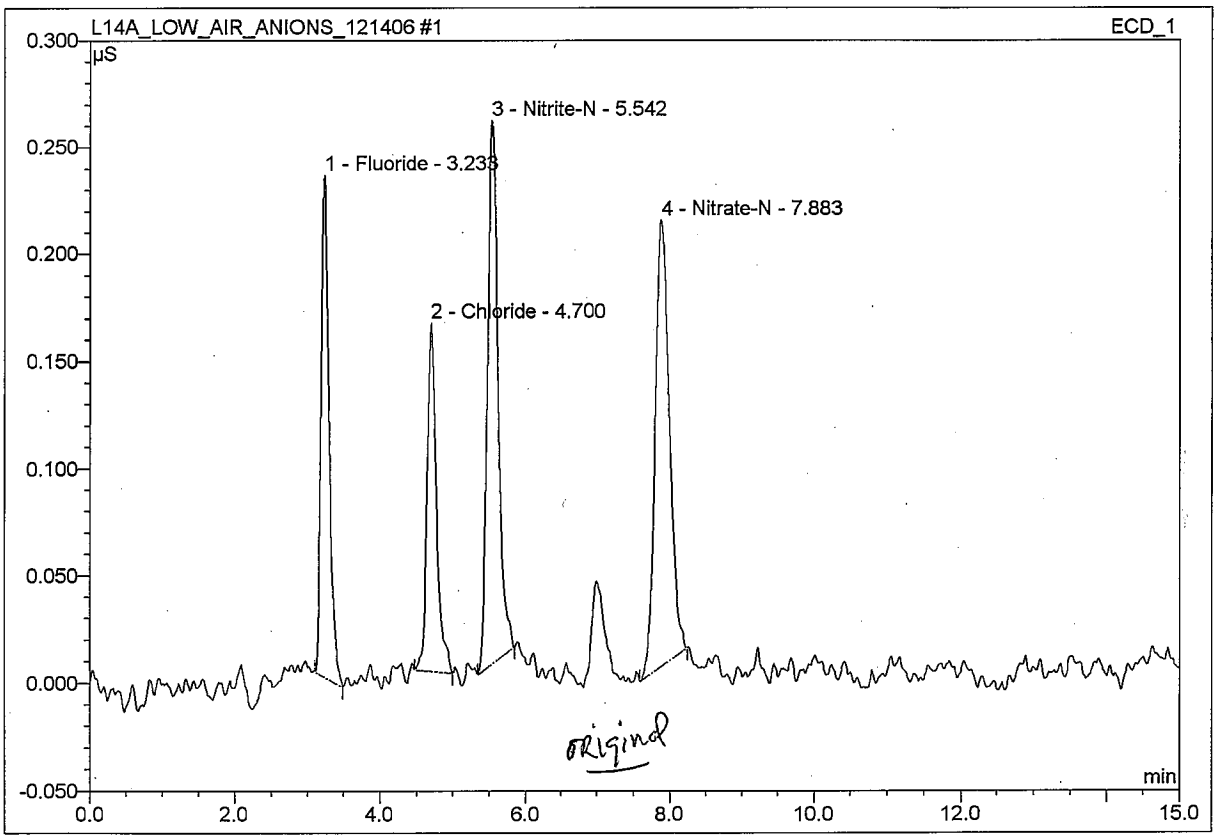
Sample Name:	**CAL STD 1 = ICWS-9045 @ (0.075ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**98**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 16:54**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.23417	0.030	19.30	0.0748	BMB
2	4.70	Chloride	0.16248	0.024	15.76	0.0868	BMB
3	5.54	Nitrite-N	0.25345	0.043	27.70	0.0748	BMB
4	7.00	Bromide	0.04768	0.010	6.42	0.0837	BMB*
5	7.88	Nitrate-N	0.20803	0.048	30.83	0.0756	BMB

1 CAL STD 1 = ICWS-9045 @ (0.075ppm)

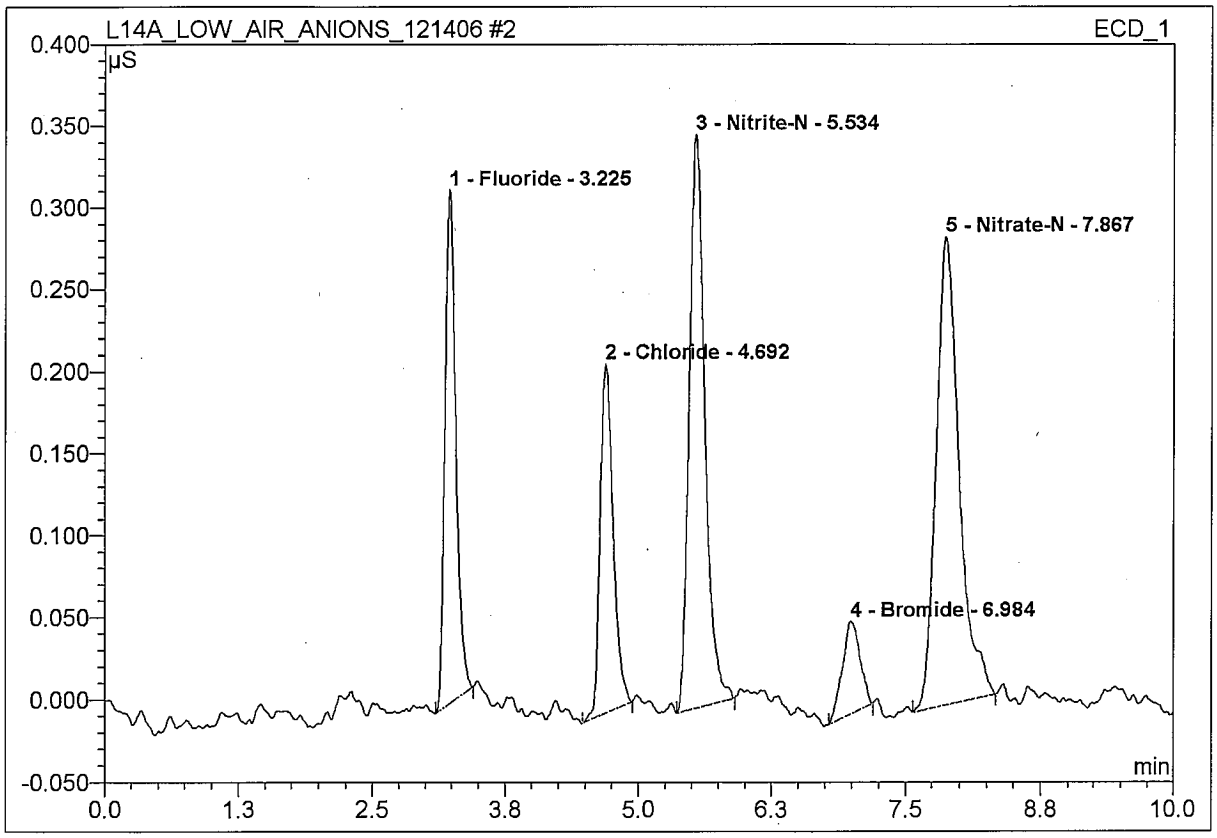
Sample Name:	**CAL STD 1 = ICWS-9045 @ (0.075ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**98**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 16:54**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.23417	0.030	20.62	n.a.	BMB
2	4.70	Chloride	0.16248	0.024	16.84	n.a.	BMB
3	5.54	Nitrite-N	0.25345	0.043	29.60	n.a.	BMB
4	7.88	Nitrate-N	0.20803	0.048	32.94	n.a.	BMB

2 CAL STD 2 = ICWS-9046 @ (0.10ppm)

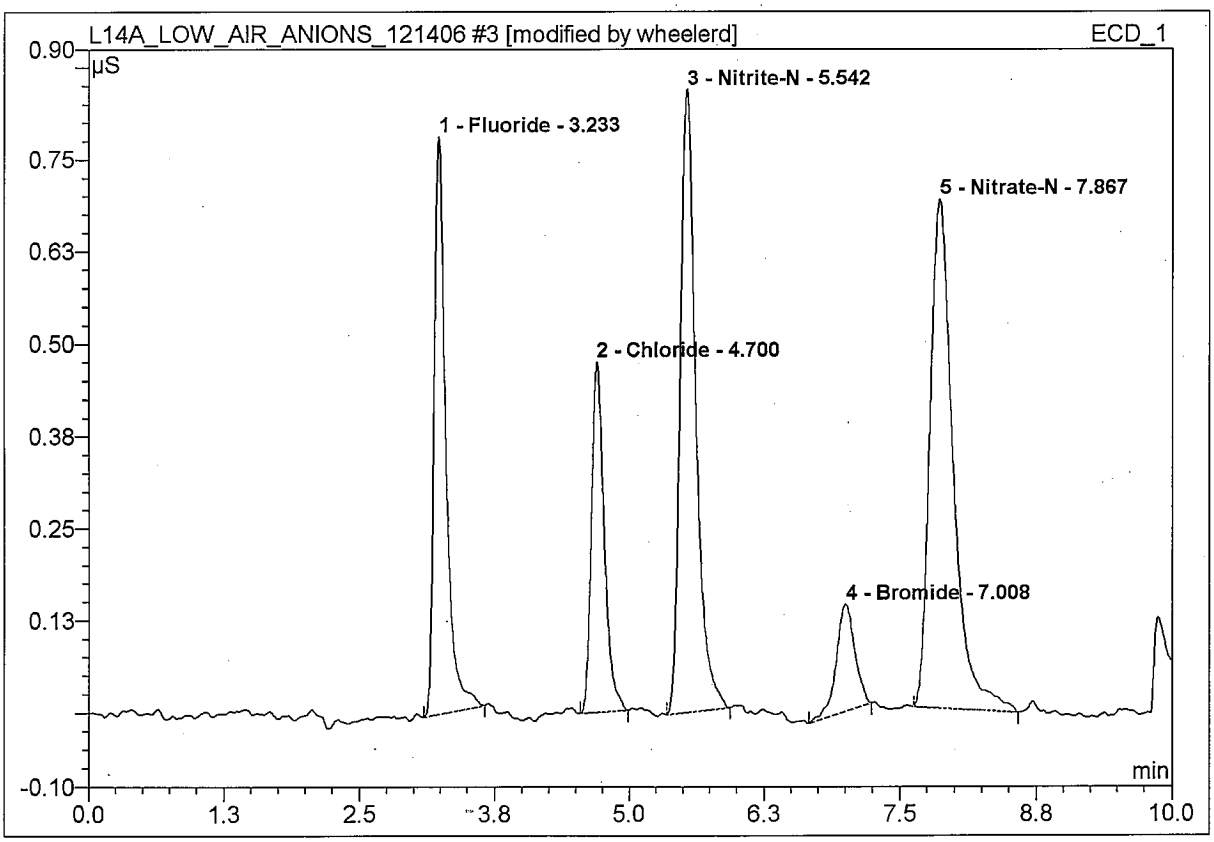
Sample Name:	**CAL STD 2 = ICWS-9046 @ (0.10ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**99**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 17:11**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.31346	0.037	18.04	0.0999	BMB
2	4.69	Chloride	0.21253	0.030	14.47	0.1134	BMB
3	5.53	Nitrite-N	0.34978	0.059	28.59	0.1031	BMB
4	6.98	Bromide	0.05646	0.011	5.19	0.0991	BMB
5	7.87	Nitrate-N	0.28533	0.070	33.71	0.1036	BMB

3 CAL STD 3 = ICWS-9047 @ (0.25ppm)

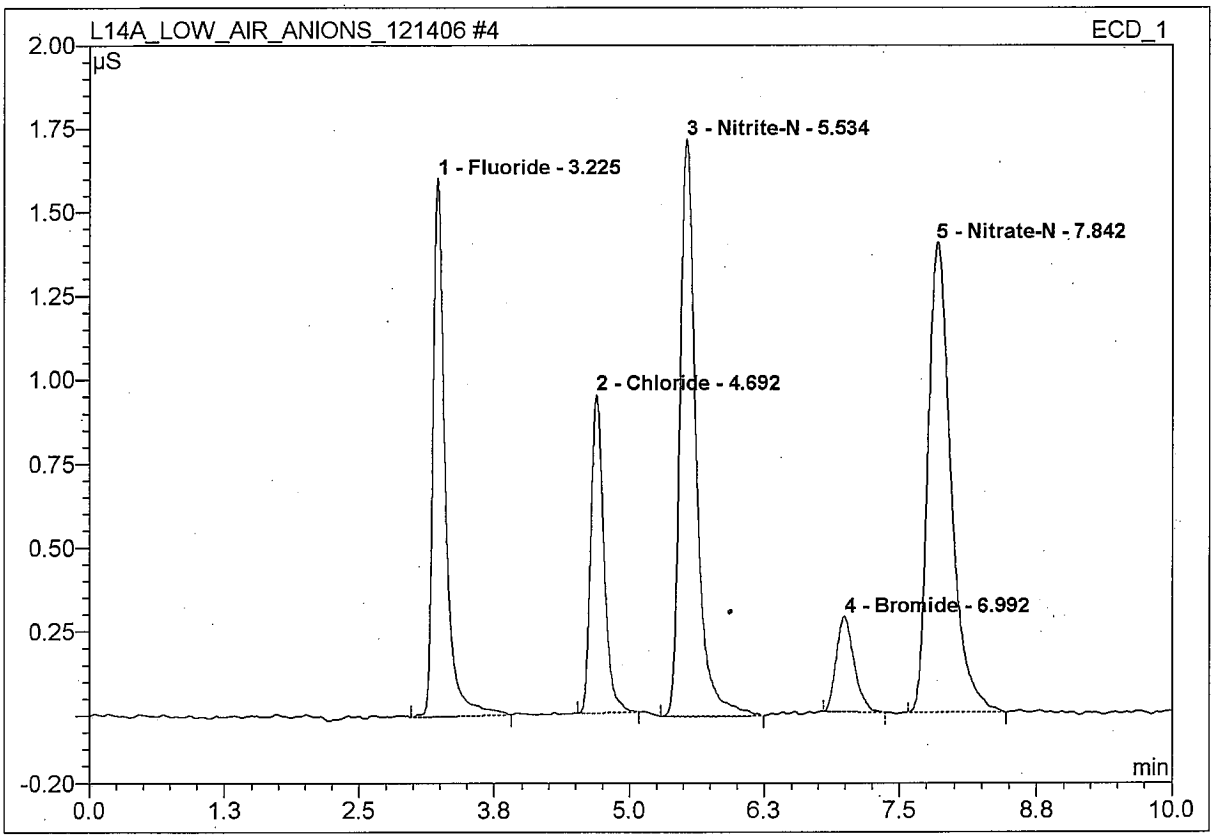
Sample Name:	**CAL STD 3 = ICWS-9047 @ (0.25ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**100**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 17:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.78262	0.100	19.79	0.2477	BMB
2	4.70	Chloride	0.47425	0.066	13.11	0.2518	BMB
3	5.54	Nitrite-N	0.84353	0.144	28.39	0.2473	BMB
4	7.01	Bromide	0.14435	0.029	5.64	0.2526	BMB
5	7.87	Nitrate-N	0.68927	0.167	33.06	0.2483	BMB

4 CAL STD 4 = ICWS-9048 @ (0.50ppm)

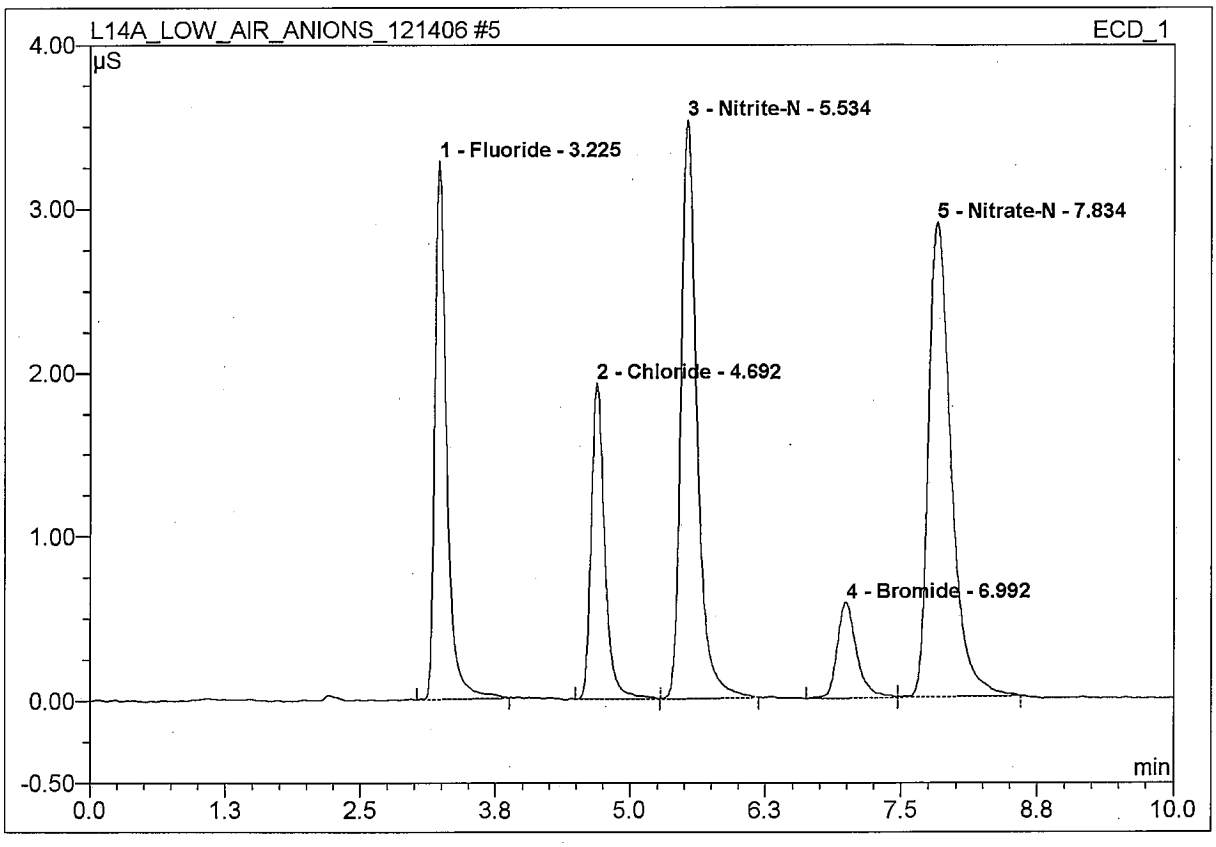
Sample Name:	**CAL STD 4 = ICWS-9048 @ (0.50ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**101**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 17:36**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	1.60279	0.210	20.40	0.5010	BMB
2	4.69	Chloride	0.94632	0.132	12.83	0.4981	BMB
3	5.53	Nitrite-N	1.71930	0.302	29.30	0.4988	BMB
4	6.99	Bromide	0.28167	0.054	5.25	0.4908	BMB
5	7.84	Nitrate-N	1.39855	0.332	32.22	0.4972	BMB

5 CAL STD 5 = ICWS-9049 @ (1.ppm)

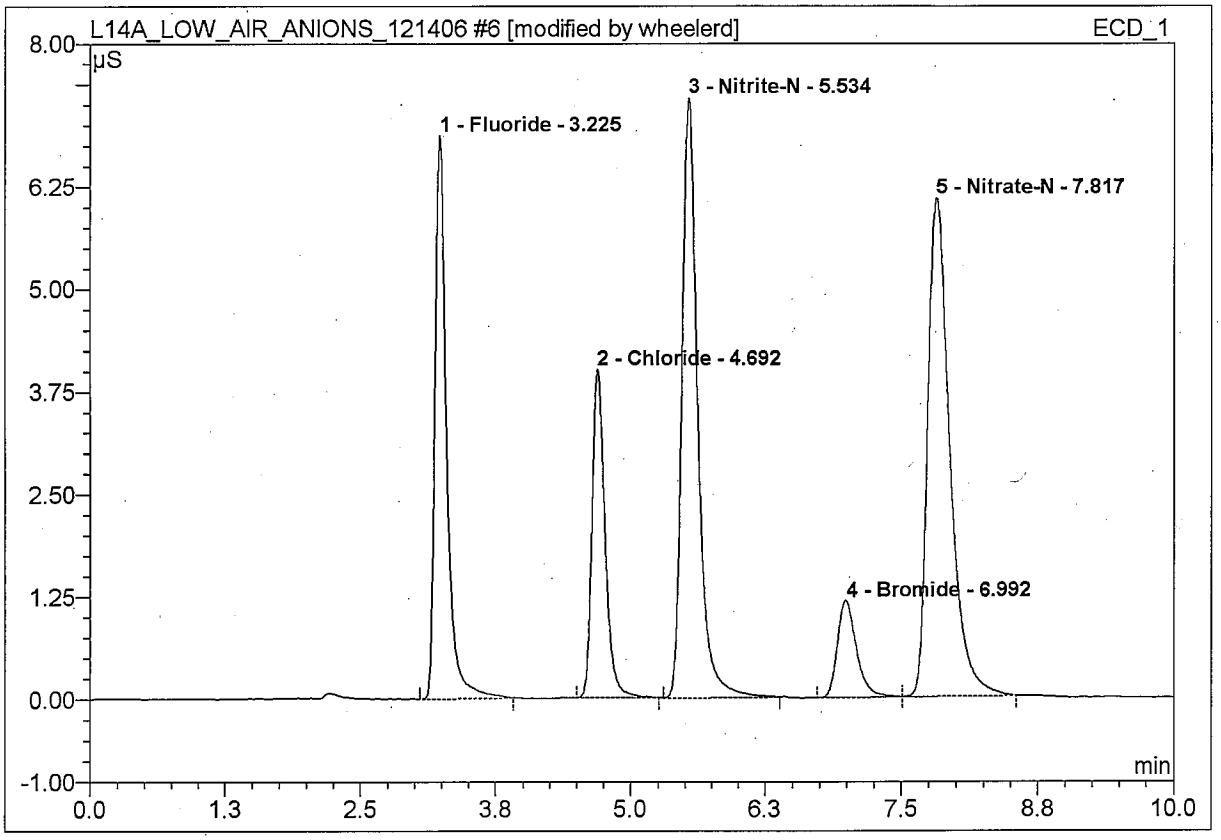
Sample Name:	**CAL STD 5 = ICWS-9049 @ (1.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**102**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 17:48**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	3.27751	0.412	19.61	1.0002	BMB
2	4.69	Chloride	1.92630	0.278	13.23	0.9967	BMB
3	5.53	Nitrite-N	3.52256	0.606	28.87	1.0015	BMB
4	6.99	Bromide	0.58187	0.122	5.80	1.0046	BM
5	7.83	Nitrate-N	2.89372	0.682	32.48	1.0020	MB

6 CAL STD 6 = ICWS-9050 @ (2.ppm)

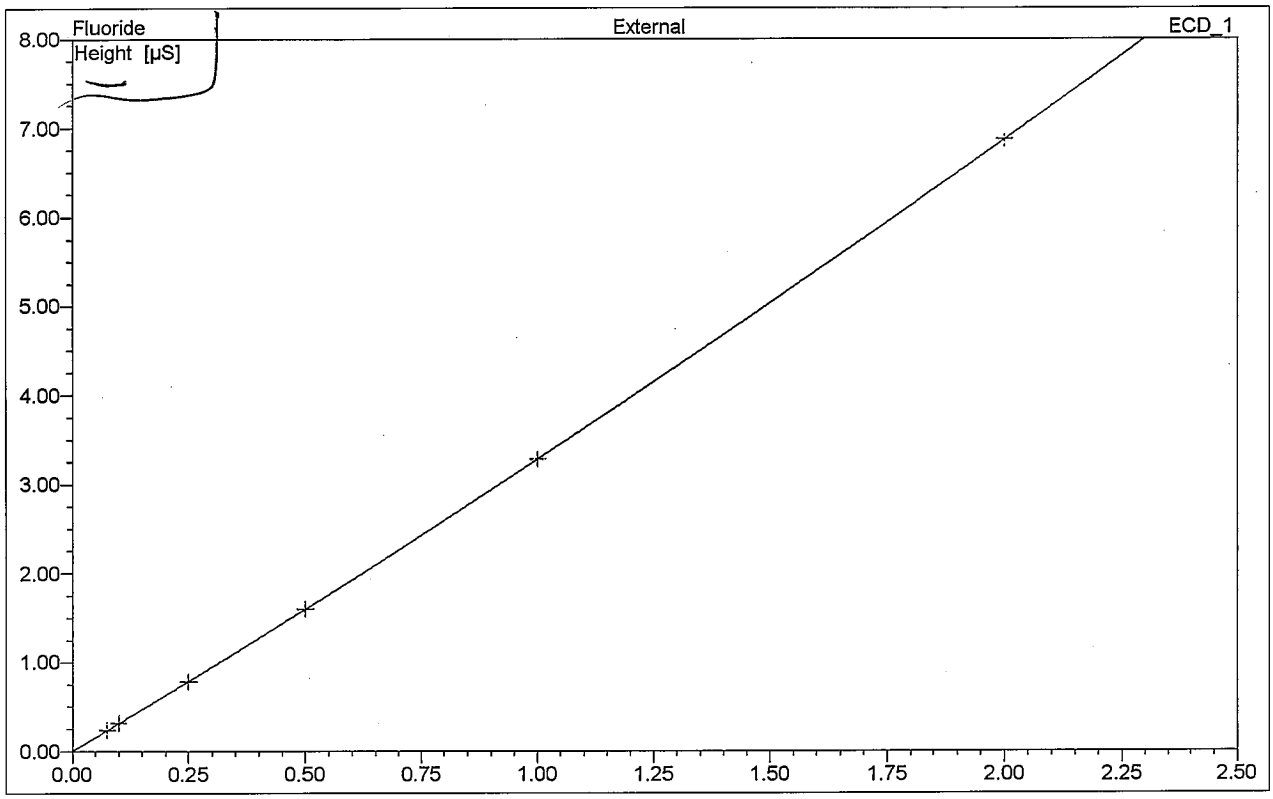
Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/14/2006 18:01**	*Sample.Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	6.86489	0.858	19.88	1.9999	BMB
2	4.69	Chloride	3.99899	0.564	13.08	2.0008	BMB
3	5.53	Nitrite-N	7.31424	1.247	28.92	1.9998	BMB
4	6.99	Bromide	1.17848	0.240	5.56	1.9994	BM
5	7.82	Nitrate-N	6.07244	1.404	32.55	1.9997	MB

~~6 CAL STD 6 = ICWS-9050 @ (2.ppm)~~ DKW 12/15/06

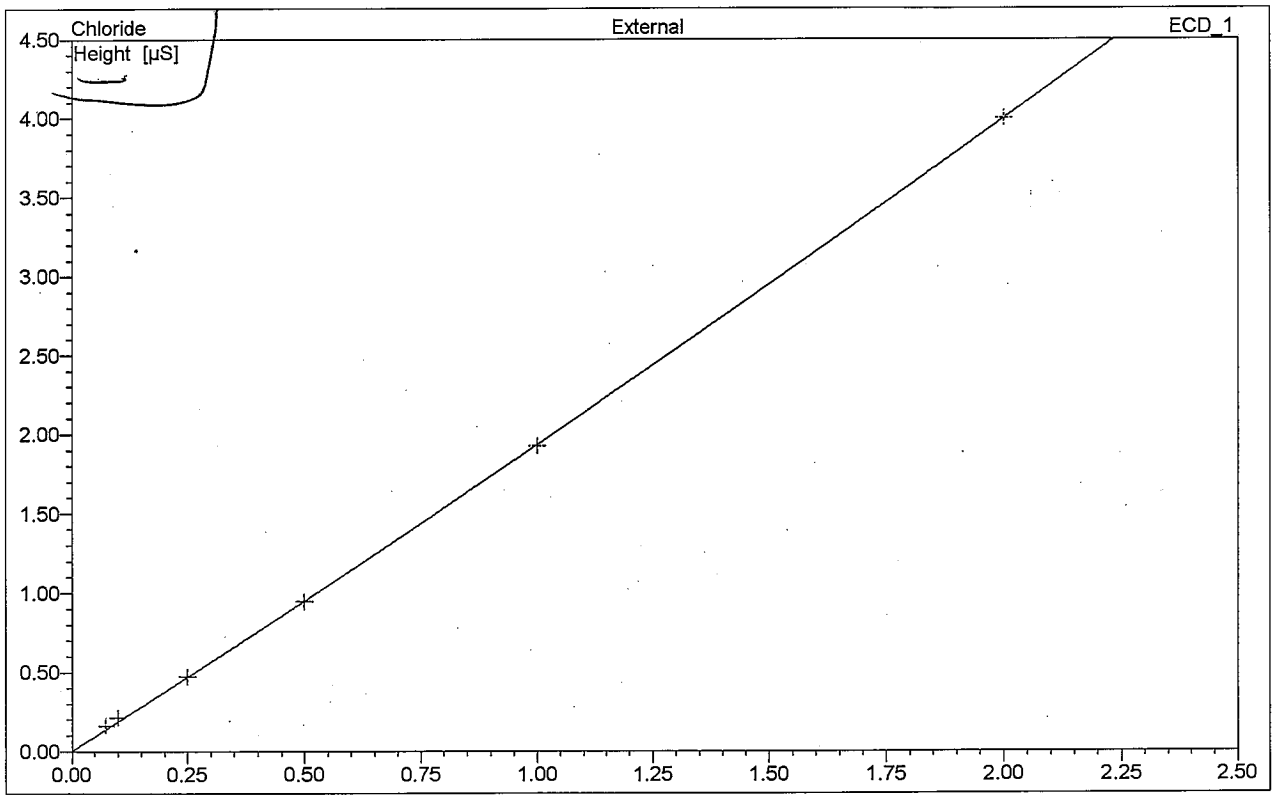
Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9997	0.0000	3.120830	0.155880
2	4.69	Chloride	Quad	6	0.9997	0.0000	1.867234	0.065694
3	5.53	Nitrite-N	Quad	6	0.9998	0.0000	3.376824	0.140386
4	6.99	Bromide	Quad	6	0.9999	0.0000	0.568855	0.010287
5	7.82	Nitrate-N	Quad	6	0.9997	0.0000	2.738783	0.148955
Average:					0.9998	0.0000	2.3345	0.1042

~~6 CAL STD 6 = ICWS-9050 @ (2.ppm)~~ DKW 12/15/06

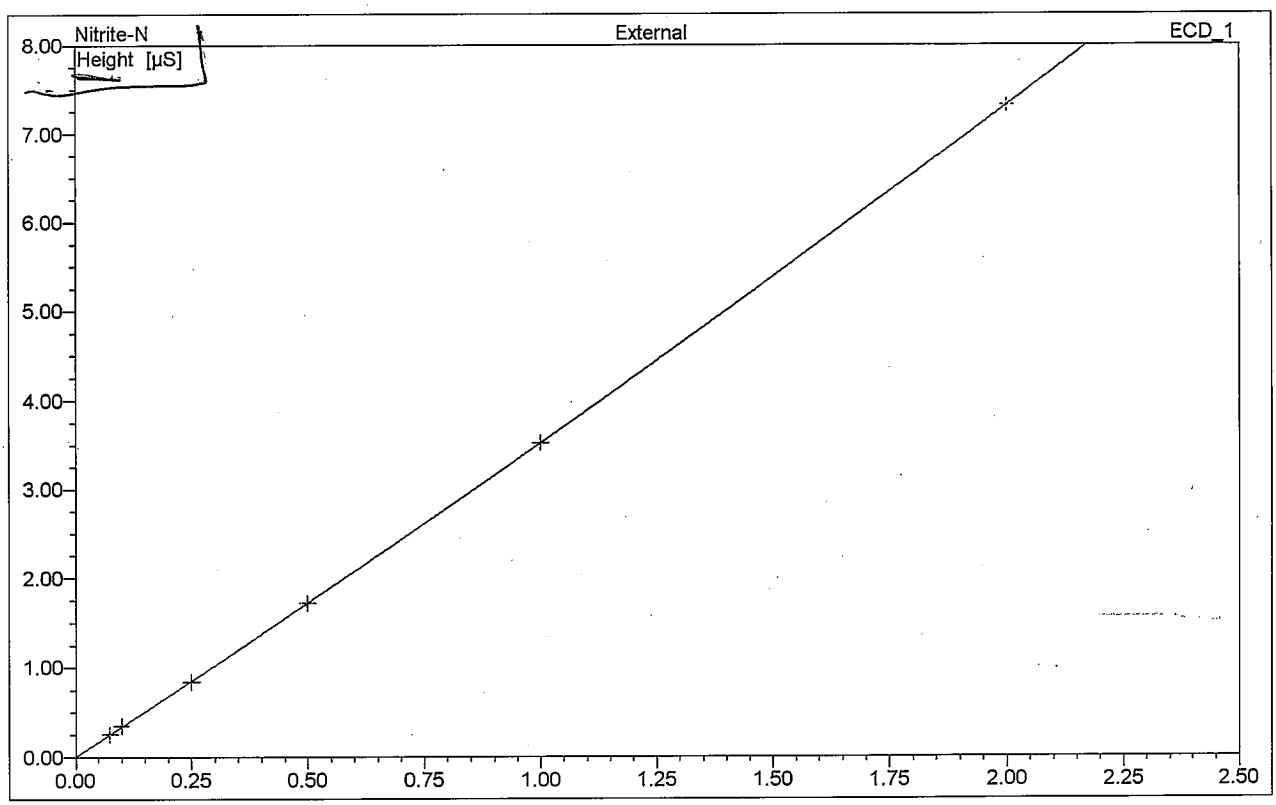
Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9997	0.0000	3.120830	0.155880
2	4.69	Chloride	Quad	6	0.9997	0.0000	1.867234	0.065694
3	5.53	Nitrite-N	Quad	6	0.9998	0.0000	3.376824	0.140386
4	6.99	Bromide	Quad	6	0.9999	0.0000	0.568855	0.010287
5	7.82	Nitrate-N	Quad	6	0.9997	0.0000	2.738783	0.148955
Average:					0.9998	0.0000	2.3345	0.1042

~~6 CAL STD 6 = ICWS-9050 @ (2.ppm)~~ DKW 12/15/06

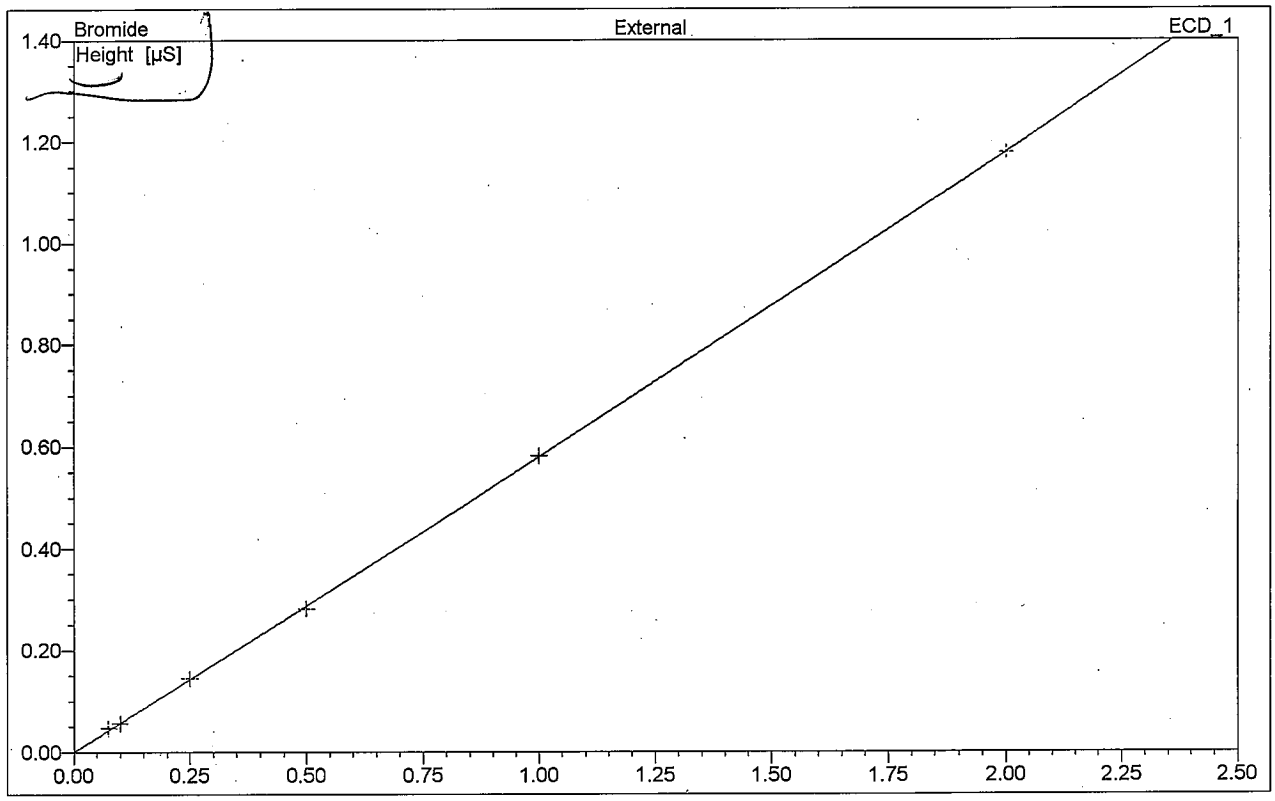
Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**##############**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9997	0.0000	3.120830	0.155880
2	4.69	Chloride	Quad	6	0.9997	0.0000	1.867234	0.065694
3	5.53	Nitrite-N	Quad	6	0.9998	0.0000	3.376824	0.140386
4	6.99	Bromide	Quad	6	0.9999	0.0000	0.568855	0.010287
5	7.82	Nitrate-N	Quad	6	0.9997	0.0000	2.738783	0.148955
Average:					0.9998	0.0000	2.3345	0.1042

~~6 CAL STD 6 = ICWS-9050 @ (2.ppm)~~ DKW 12/15/06

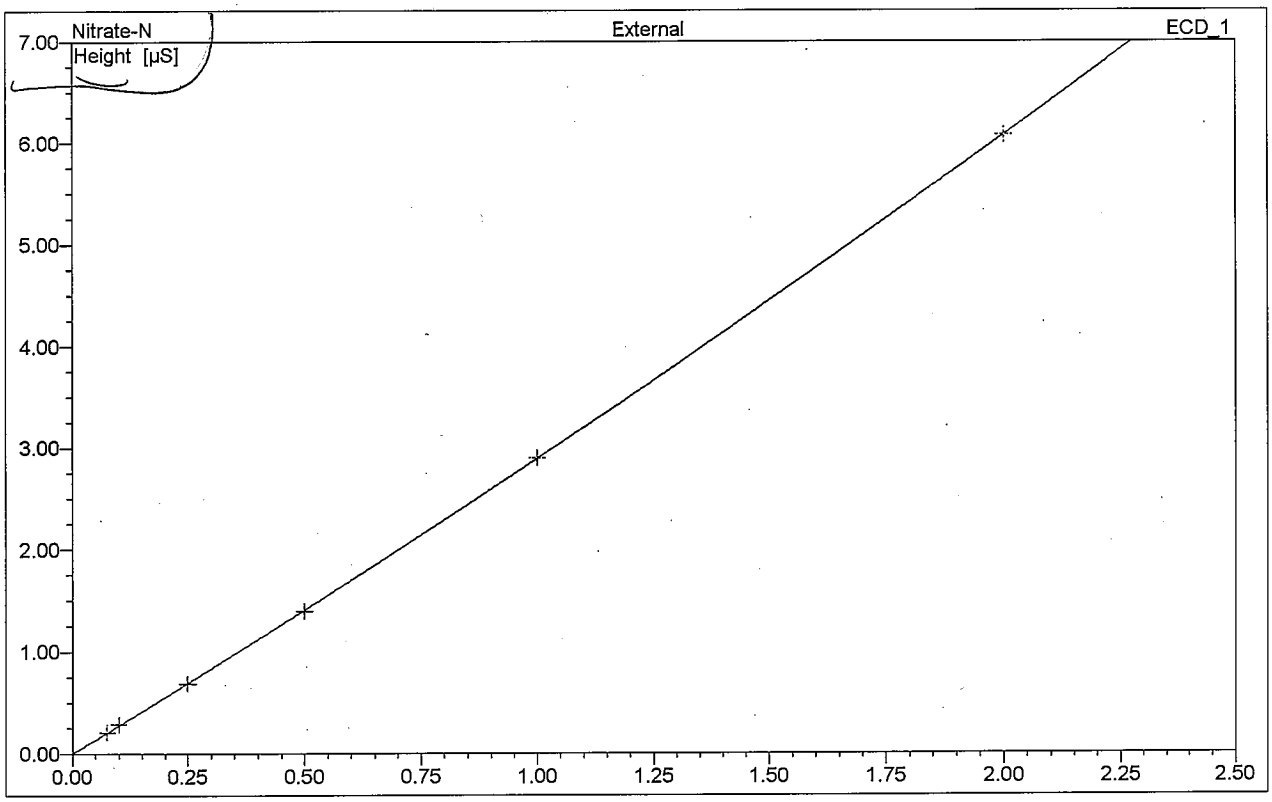
Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**###############**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9997	0.0000	3.120830	0.155880
2	4.69	Chloride	Quad	6	0.9997	0.0000	1.867234	0.065694
3	5.53	Nitrite-N	Quad	6	0.9998	0.0000	3.376824	0.140386
4	6.99	Bromide	Quad	6	0.9999	0.0000	0.568855	0.010287
5	7.82	Nitrate-N	Quad	6	0.9997	0.0000	2.738783	0.148955
Average:					0.9998	0.0000	2.3345	0.1042

~~6 CAL STD 6 = ICWS-9050 @ (2.ppm)~~ DKW 12/15/06

Sample Name:	**CAL STD 6 = ICWS-9050 @ (2.ppm)**	*Injection Volume:*	**50.0**
Vial Number:	**103**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**###############**	*Sample Weight:*	**1.0000**
Run Time (min):	**10.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9997	0.0000	3.120830	0.155880
2	4.69	Chloride	Quad	6	0.9997	0.0000	1.867234	0.065694
3	5.53	Nitrite-N	Quad	6	0.9998	0.0000	3.376824	0.140386
4	6.99	Bromide	Quad	6	0.9999	0.0000	0.568855	0.010287
5	7.82	Nitrate-N	Quad	6	0.9997	0.0000	2.738783	0.148955
Average:					0.9998	0.0000	2.3345	0.1042

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 9/25/06 Chemist: DKW Expiration Date: 12/25/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-8837	F-	17125	ERA	12/31/07	1000 ppm	5.	50	100. mg/L (ppm)
2. (Intermed. calib. source)	Cl-	36065		6/30/07				
3.	NO2N	17075		7/31/07				
4.	BR-	27025		2/28/07				
5.	NO3N-	17026		2/28/08				
6. ICWI-8838	F-	1-38F-2	SPEX	8/15/07	1000 ppm	5.	50	100. ppm (mg/L)
7. (intermed 2nd source)	Cl-	1-5CL-2		3/15/07				
8.	NO2N-	1-13NO2N-2		9/15/07				
9.	BR-	1-1BR-2		4/30/07				
10.	NO3N-	1-27NO3N-2		5/15/07				
11.								
12.								
13.								
14.								

Reviewed By: DW 10/5/06

WC031R3.DOC, 8/28/03

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/14/06 Chemist: DRW Expiration Date: 12/15/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9045	F-	ICWI-	8837	12/25/06	100. ppm	0.075	100.	0.075 ppm ✓
2. (Cal 1)	Cl-							
3.	NO2N-							
4.	BR-							
5.	NO3N-							
6. ICWS-9046	F-					0.100		0.100 ppm ✓
7. (Cal 2)	Cl-							
8.	NO2N-							
9.	BR-							
10.	NO3N-							
11. ICWS-9047	F-					0.250		0.250 ppm ✓
12. (Cal 3)	Cl-							
13.	NO2N-							
14. (DRW 12/14/06)	~~NO3~~ BR							
15	NO3N-							

Reviewed By: RW 12/15/06

WC031R3.DOC, 8/28/03

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/14/06 Chemist: DFW Expiration Date: 12/15/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9048	F-	ICWI-	8837	12/25/06	100 PPM	0.500	100.	0.500 PPM
2. (col 4)	Cl-							
3.	NO2N-							
4.	BR-							
5.	NO3N-							
6. ICWS-9049	F-					1.		1. ppm
7. (col 5)	Cl-							
8. (+ CCW)	NO2N-							
9.	BR-							
10.	NO3N-							
11. ICWS-9050)	F-					2.		2. ppm
12. (col 6)	Cl-							
13.	NO2N-							
14.	BR-							
15	NO3N-							

Reviewed By: RW 12/15/06

WC031R3.DOC, 8/28/03

STL Knoxville Anions in Air Data Review / Narrative Checklist for Methods 9056/9057/26A, SOP KNOX-WC-0005, Rev. 8

Front Half

Lot #:	H6L110105, H6L110106	Analysis Date:	12/18/06	File ID:	L18A_LOWAIR_ANIONS_121806	ICAL File ID:	L14A_LOW AIR_ANIONS_121406

Review Items	NA	Yes	No	If No, why is data reportable?	2nd √
1. Were PM checklists (L40), Lot Summary and any applicable QAS reviewed?		✓			✓
2. ICV within 90-110%R?		✓			✓
3. ICB/CCB < 1/2 RL?		✓		☐ **[ccb1] No analyte > MDL in associated samples.**	✓
4. CCVs/CCBs run after every 10 samples, and at end of sequence?		✓			✓
5. Is %D ≤10% for each CCV?		✓			✓
6. If CCV failed, was it rerun only once?	✓				N/A
7. LCS/LCSD analytes within 90-110%R? *If no, list LCS ID:*		✓		☐ **[lcs3] LCS recovery >upper control limit & sample results <RL.**	✓
8. Method blank < 1/2 RL? *If no, list blank ID:*		✓		☐ **[mb3] No analyte > RL in associated samples.** ☐ [mb7] Sample results > 10x higher than blank.	✓
9. Matrix spikes run at required frequency?		✓			✓
10. Matrix spikes within 75-125% recovery? *If no, list MS ID:* _____		✓		☐ [air ms1] MS %R slightly outside limits for 1 sample. ☐ [air ms2] MS %R slightly outside limits for >1 sample. ☐ Air train reagent blank – spike result not reported.	✓
11. Were MS run #'s assigned to all matrix spikes except reagent blanks?		✓			✓
12. Sample analyses done within holding time (HT)? *If no, list samples:*		✓		☐ [ht1] HT expired upon receipt. ☐ *[ht2] Analysis requested after HT expired.*	✓
13. Were results processed using correct ICAL?		✓			✓
14. Are positive results within the calibration range?		✓			✓
15. Is integration acceptable for all samples, QC samples and standards?		✓			✓
16. For manual integrated standards and QC samples, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system.	✓
17. Calculations checked for error? (Document manual calculation checks.)		✓			✓
18. Were spreadsheets checked for transcription errors?		✓			✓
19. Final report/F6 correct? (Verify results, RLs, units, qualifiers, DFs, dates, spikes.)		✓			✓
20. Are all nonconformances documented and discussed in narrative?	✓			List NCM #:	✓
21. Appropriate air train autotext selected for narrative?		✓		☐ [air1] Cl^- reported as HCl and Cl_2. ☐ [air2] Cl^- reported as HCl only. ☐ [air3] Cl^-, F^- reported as HCl, Cl_2, HF. ☑ [air4] Cl^-, F^-, Br^- reported as HCl, Cl_2, HF, HBr, Br_2. ☐ [air5] Cl^-, F^-, NO_2^-, NO_3^- reported as HCl, Cl_2, HF, HNO_2, HNO_3. ☐ [air6] Cl^-, F^-, Br^-, I^- reported as HCl, Cl_2, HF, HBr, Br_2, I^-. ☐ [air7] Cl^-, F^-, NO_2^-, NO_3^- reported as Cl^-, F^-, NO_2^-, NO_3^-.	✓
22. Sample pH adjustment included in narrative?	✓			☐ [air pH] Sample pH adjusted prior to analysis.	N/A
23. Audit sample results included in narrative?	✓			☐ [audit2] Audit results in mg/L.	N/A

1st Level Reviewer: DWhite	Date: 12/28/06	2nd Level Reviewer:	Date:
JK7JR - 1/10 - MS (Br⁻)		JL69FIAC: HBr - 0.7219 ug/ml X 100 ml X 80.9119/79.904 = 73.1006 ug ✓	
p. height = Ø + Ø.568855(.1878) + Ø.010287(.1878)²			
" " = Ø + Ø.1068 + Ø.0004			
" " = Ø.1072			

Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6361376
Prep Date: 12/18/2006 0800
Comp Date: 12/18/2006 0800

Analyte: Hydrogen Fluoride
CAS #: 7664-39-3
QuantIMS #: 5646

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 600

Reviewed by: RMW
Date: 12/29/06
MW Factor: 1.053051836

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	1		4M	0.1	0.050	JK7JR1AD	480	10	0.0000	ND	505.4649	252.7324	5,054.65	121806	1126
H6L110105	1	S	4M	0.1	0.050	JK7JR1AG	480	10	2.0606	1041.5609	505.4649	252.7324	5,054.65	121806	1243
H6L110105	1	D	4M	0.1	0.050	JK7JR1AH	480	10	2.0802	1051.4680	505.4649	252.7324	5,054.65	121806	1300
H6L110105	3		4M	0.1	0.050	JK7JX1AD	465	10	0.0000	ND	489.6691	244.8346	4,896.69	121806	1447
H6L110105	5		4M	0.1	0.050	JK7J11AD	600	10	0.0000	ND	631.8311	315.9156	6,318.31	121806	1504
H6L110106	2		4M	0.1	0.050	JK7J71AD	425	10	0.0000	ND	447.5470	223.7735	4,475.47	121806	1144
H6L110106	2	S	4M	0.1	0.050	JK7J71AG	425	10	2.1079	943.3844	447.5470	223.7735	4,475.47	121806	1410
H6L110106	2	D	4M	0.1	0.050	JK7J71AH	425	10	2.1436	959.3618	447.5470	223.7735	4,475.47	121806	1428
H6L110106	6		4M	0.1	0.050	JK7KG1AD	400	10	0.0000	ND	421.22	210.61	4,212.21	121806	1521
H6L110106	10		4M	0.1	0.050	JK7KT1AD	363	10	0.3969	ND	382.26	191.13	3,822.58	121806	1539
H6L110106	13		4M	0.1	0.050	JK7K01AD	100	10	0.0000	ND	105.31	52.65	1,053.05	121806	1556
H6L110106	13	S	4M	0.1	0.050	JK7K01AF	100	10	1.9596	206.3560	105.31	52.65	1,053.05	121806	1614
H6L110106	16		4M	0.1	0.050	JK7K41AD	100	10	0.0000	ND	105.31	52.65	1,053.05	121806	1631
H6L110106	16	S	4M	0.1	0.050	JK7K41AF	100	10	2.0853	219.5929	105.31	52.65	1,053.05	121806	1649
H6L270000	376	B	4M	0.1	0.050	JL69G1AA	100	1	0.0000	ND	10.53	5.27	105.31	121806	1052
H6L270000	376	C	4M	0.1	0.050	JL69G1AC	100	1	0.7480	78.7683	10.53	5.27	105.31	121806	1017
H6L270000	376	L	4M	0.1	0.050	JL69G1AD	100	1	0.7519	79.1790	10.53	5.27	105.31	121806	1034

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JL69G1AC	0.75	105.31	78.98
LCSD	ICWI-8838	100.00	0.750	100.0	JL69G1AD	0.75	105.31	78.98
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7JR1AG	0.20	5,054.65	1,010.93
MSD (1)	ICWI-8838	100.00	0.020	10.0	JK7JR1AH	0.20	5,054.65	1,010.93
MS (2)	ICWI-8838	100.00	0.020	10.0	JK7J71AG	0.20	4,475.47	895.09
MSD (2)	ICWI-8838	100.00	0.020	10.0	JK7J71AH	0.20	4,475.47	895.09
MS (3)	ICWI-8838	100.00	0.020	10.0	JK7K01AF	0.20	1,053.05	210.61
MSD (3)								
MS (4)	ICWI-8838	100.00	0.020	10.0	JK7K41AF	0.20	1,053.05	210.61
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6363098
Prep Date: 12/18/2006 0800
Comp Date: 12/18/2006 0800

Analyte: Hydrogen Chloride
CAS #: 7647-01-0
QuantIMS #: 2702

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 600

Reviewed by: RMW
Date: 12/29/06
MW Factor: 1.028429188

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	1		4L	0.1	0.042	JK7JR1AA	480	20	0.1989	ND	987.2920	414.6626	9,872.92	121806	1208
H6L110105	1	S	4L	0.1	0.042	JK7JR1AJ	480	20	4.1992	2072.9183	987.2920	414.6626	9,872.92	121806	1318
H6L110106	13		4L	0.1	0.042	JK7K01AA	100	20	0.0000	ND	205.6858	86.3881	2,056.86	121806	1741
H6L110106	16		4L	0.1	0.042	JK7K41AA	100	10	0.0000	ND	102.8429	43.1940	1,028.43	121806	1631
H6L110106	16	S	4L	0.1	0.042	JK7K41AG	100	10	2.2346	229.8128	102.8429	43.1940	1,028.43	121806	1649
H6L290000	98	B	4L	0.1	0.042	JL8TM1AA	100	1	0.0000	ND	10.2843	4.3194	102.84	121806	1052
H6L290000	98	C	4L	0.1	0.042	JL8TM1AC	100	1	0.7502	77.1528	10.2843	4.3194	102.84	121806	1017
H6L290000	98	L	4L	0.1	0.042	JL8TM1AD	100	1	0.7593	78.0886	10.2843	4.3194	102.84	121806	1034

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JL8TM1AC	0.75	102.84	77.13
LCSD	ICWI-8838	100.00	0.750	100.0	JL8TM1AD	0.75	102.84	77.13
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7JR1AJ	0.20	9,872.92	1,974.58
MSD (1)								
MS (2)	ICWI-8838	100.00	0.020	10.0	JK7K41AG	0.20	1,028.43	205.69
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6361375
Prep Date: 12/18/2006 0800
Comp Date: 12/18/2006 0800

Analyte: Hydrogen Bromide
CAS #: 10035-10-6
QuantIMS #: 5645

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 600

Reviewed by: RW
Date: 12/29/06
MW Factor: 1.012613887

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	1		4J	0.1	0.050	JK7JR1AC	480	10	0.0000	ND	486.0547	243.0273	4,860.55	121806	1126
H6L110105	1	S	4J	0.1	0.050	JK7JR1AE	480	10	1.8777	912.6648	486.0547	243.0273	4,860.55	121806	1243
H6L110105	1	D	4J	0.1	0.050	JK7JR1AF	480	10	1.8730	910.3804	486.0547	243.0273	4,860.55	121806	1300
H6L110105	3		4J	0.1	0.050	JK7JX1AC	465	10	0.0000	ND	470.8655	235.4327	4,708.65	121806	1447
H6L110105	5		4J	0.1	0.050	JK7J11AC	600	10	0.0000	ND	607.5683	303.7842	6,075.68	121806	1504
H6L110106	2		4J	0.1	0.050	JK7J71AC	425	10	0.0000	ND	430.3609	215.1805	4,303.61	121806	1144
H6L110106	2	S	4J	0.1	0.050	JK7J71AE	425	10	2.0871	898.2062	430.3609	215.1805	4,303.61	121806	1410
H6L110106	2	D	4J	0.1	0.050	JK7J71AF	425	10	2.1017	904.4895	430.3609	215.1805	4,303.61	121806	1428
H6L110106	6		4J	0.1	0.050	JK7KG1AC	400	10	0.0000	ND	405.05	202.52	4,050.46	121806	1521
H6L110106	10		4J	0.1	0.050	JK7KT1AC	363	10	0.0000	ND	367.58	183.79	3,675.79	121806	1539
H6L110106	13		4J	0.1	0.050	JK7K01AC	100	10	0.0000	ND	101.26	50.63	1,012.61	121806	1556
H6L110106	13	S	4J	0.1	0.050	JK7K01AE	100	10	2.0459	207.1707	101.26	50.63	1,012.61	121806	1614
H6L110106	16		4J	0.1	0.050	JK7K41AC	100	10	0.0000	ND	101.26	50.63	1,012.61	121806	1631
H6L110106	16	S	4J	0.1	0.050	JK7K41AE	100	10	1.9983	202.3506	101.26	50.63	1,012.61	121806	1649
H6L270000	375	B	4J	0.1	0.050	JL69F1AA	100	1	0.0000	ND	10.13	5.06	101.26	121806	1052
H6L270000	375	C	4J	0.1	0.050	JL69F1AC	100	1	0.7219	73.1006	10.13	5.06	101.26	121806	1017
H6L270000	375	L	4J	0.1	0.050	JL69F1AD	100	1	0.7410	75.0347	10.13	5.06	101.26	121806	1034

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JL69F1AC	0.75	101.26	75.95
LCSD	ICWI-8838	100.00	0.750	100.0	JL69F1AD	0.75	101.26	75.95
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7JR1AE	0.20	4,860.55	972.11
MSD (1)	ICWI-8838	100.00	0.020	10.0	JK7JR1AF	0.20	4,860.55	972.11
MS (2)	ICWI-8838	100.00	0.020	10.0	JK7J71AE	0.20	4,303.61	860.72
MSD (2)	ICWI-8838	100.00	0.020	10.0	JK7J71AF	0.20	4,303.61	860.72
MS (3)	ICWI-8838	100.00	0.020	10.0	JK7K01AE	0.20	1,012.61	202.52
MSD (3)								
MS (4)	ICWI-8838	100.00	0.020	10.0	JK7K41AE	0.20	1,012.61	202.52
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
Dionex IC Runlog Cover Page

Analyst:	DEW	Date:	12/18/06	Sequence ID:	L18A_LOW_AIR_ANIONS_12\806

Instrument:		Method:	
"Aragorn"	☑ DX-600		☐ KNOX-WC-0003, SW-846 0061/7199
	☐ ICS-1500		☐ KNOX-WC-0005, ☐ SW-846 9056 ☐ EPA 300.0 ☐ SW-846 9057-Mod ☑ EPA 26A-Mod
	☐ DX-320		☐ KNOX-WC-0014, EPA 314.0

Preventive Maintenance	Instrument Conditions		
Daily:	Flow Rate =	1.00	mL/min
☐ Check pump and gas pressure	Pressure =	2200.	psi
☐ Check all lines for crimping, leaks and discoloration	Conductance =	22.8	µS
As Needed:	Suppressor Current =	43.	mA
☐ Change column and guard column	Eluent Generator =	N/A	mM KOH
☐ Change column and/or guard column bed support			
☐ Clean conductivity cell			
☐ De-gas pump head when flow is erratic			
☐ Check/replace eluant end line filter			

MS/MSD Spike Information

WO #	Compound	Spike ID	Parent Conc.	Spike Added (mL)	Final Volume (mL)	Final Conc.
JK7JR	F^-	ICWI-8838	100. ppm	0.02	10 ml	0.20 ppm
	Cl^-					
	Br^-					
JK7J7	F^-					
	Cl^-					
	Br^-					
JK7K0	F^-					
	Cl^-					
	Br^-					
JK7K4	F^-					
	Cl^-					
	Br^-					
				DEW 12/28/06		

Comments:

HF Batch - 6361376
HBr Batch - 6361375

☐ Sodium Thiosulfate added to NaOH impinger samples.

Sequence: L18A_LOW_AIR_ANIONS_121806
Operator: wheelerd

Printed: 12/19/2006 7:35:58 AM

DFW 12/19/06

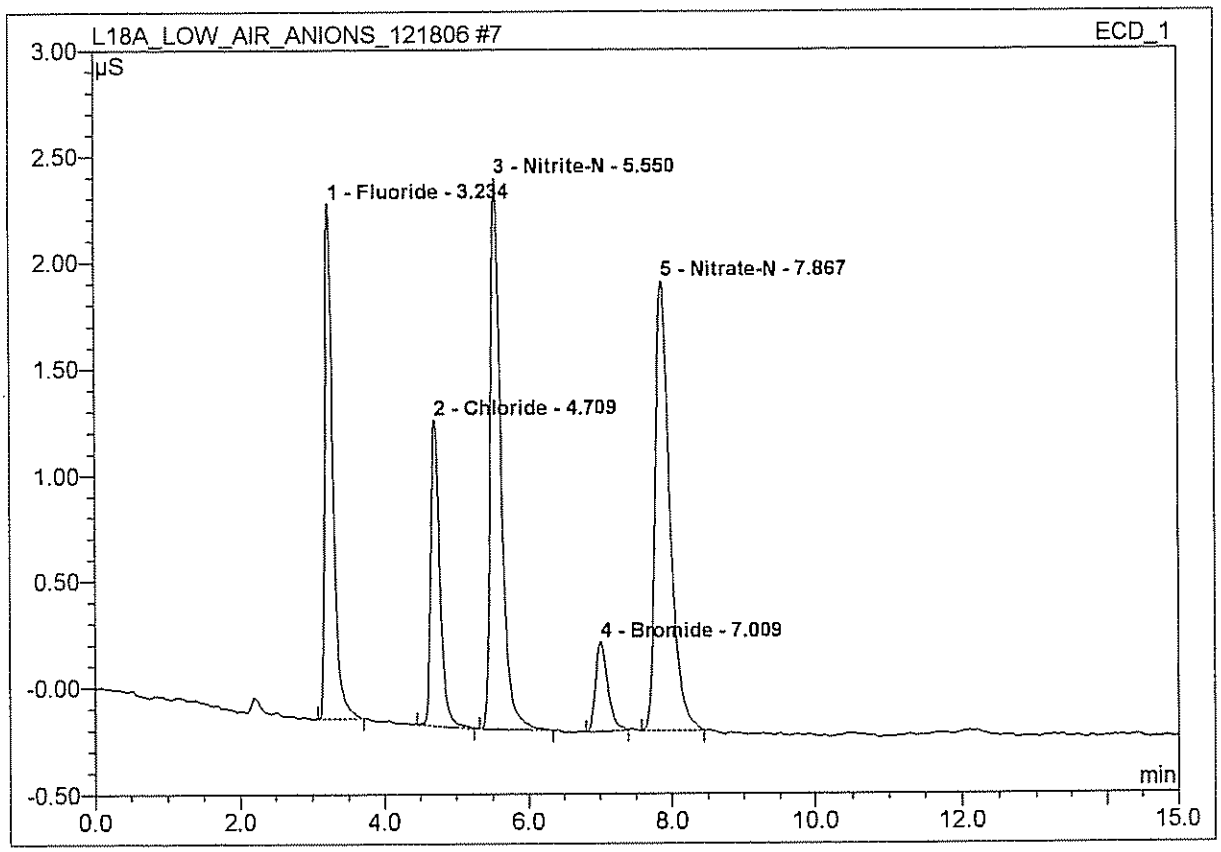
Title:
Datasource: Aragorn_net
Location: IC_ARAGORN
Timebase: IC_Aragorn
#Samples: 36

Created: 12/18/2006 10:16:29 AM by wheelerd
Last Update: 12/19/2006 7:35:45 AM by wheelerd

No.	Name	Sample ID	Inj. Vol.	Inj. Date/Time	Dil. Factor	*Multiplier [Liters]	Weight
1	CAL STD 1 = ICWS-9045 @ (0.075ppm)		50.0	12/14/2006 4:54:12 PM	1.0000		1.0000
2	CAL STD 2 = ICWS-9046 @ (0.10ppm)		50.0	12/14/2006 5:11:38 PM	1.0000		1.0000
3	CAL STD 3 = ICWS-9047 @ (0.25ppm)		50.0	12/14/2006 5:24:03 PM	1.0000		1.0000
4	CAL STD 4 = ICWS-9048 @ (0.50ppm)		50.0	12/14/2006 5:36:29 PM	1.0000		1.0000
5	CAL STD 5 = ICWS-9049 @ (1.ppm)		50.0	12/14/2006 5:48:54 PM	1.0000		1.0000
6	CAL STD 6 = ICWS-9050 @ (2.ppm)		50.0	12/14/2006 6:01:20 PM	1.0000		1.0000
7	ICV/LCS= ICWS-9056		50.0	12/18/2006 10:17:27 AM	1.0000		1.0000
8	ICV/LCSD= ICWS-9057		50.0	12/18/2006 10:34:53 AM	1.0000		1.0000
9	ICB/ METHOD BLANK		50.0	12/18/2006 10:52:18 AM	1.0000		1.0000
10	H6L110105-JK7JR-1/10		50.0	12/18/2006 11:26:40 AM	10.0000		1.0000
11	H6L110106-JK7J7-1/10		50.0	12/18/2006 11:44:06 AM	10.0000		1.0000
12	H6L110105-JK7JR-1/20		50.0	12/18/2006 12:08:40 PM	20.0000		1.0000
13	H6L110105-JK7JR-1/10-MS		50.0	12/18/2006 12:43:28 PM	10.0000		1.0000
14	H6L110105-JK7JR/1/10-MSD		50.0	12/18/2006 1:00:54 PM	10.0000		1.0000
15	H6L110105-JK7JR-1/20-MS		50.0	12/18/2006 1:18:20 PM	20.0000		1.0000
16	CCV = ICWS-9058		50.0	12/18/2006 1:35:45 PM	1.0000		1.0000
17	CCB		50.0	12/18/2006 1:53:11 PM	1.0000		1.0000
18	H6L110106-JK7J7-1/10-MS		50.0	12/18/2006 2:10:37 PM	10.0000		1.0000
19	H6L110106-JK7J7-1/10-MSD		50.0	12/18/2006 2:28:03 PM	10.0000		1.0000
20	H6L110105-JK7JX-1/10		50.0	12/18/2006 2:47:03 PM	10.0000		1.0000
21	H6L110105-JK7J1-1/10		50.0	12/18/2006 3:04:28 PM	10.0000		1.0000
22	H6L110106-JK7KG-1/10		50.0	12/18/2006 3:21:54 PM	10.0000		1.0000
23	H6L110105-JK7KT-1/10		50.0	12/18/2006 3:39:19 PM	10.0000		1.0000
24	H6L110106-JK7K0-1/10		50.0	12/18/2006 3:56:45 PM	10.0000		1.0000
25	H6L110106-JK7K0-1/10-MS		50.0	12/18/2006 4:14:11 PM	10.0000		1.0000
26	H6L110106-JK7K4-1/10		50.0	12/18/2006 4:31:36 PM	10.0000		1.0000
27	H6L110106-JK7K4-1/10-MS		50.0	12/18/2006 4:49:02 PM	10.0000		1.0000
28	CCV= ICWS-9058		50.0	12/18/2006 5:06:27 PM	1.0000		1.0000
29	CCB		50.0	12/18/2006 5:23:52 PM	1.0000		1.0000
30	H6L110106-JK7K0-1/20		50.0	12/18/2006 5:41:18 PM	20.0000		1.0000
31	H6L110106-JK7K0-1/20-MS		50.0	12/18/2006 5:58:43 PM	20.0000		1.0000
32	H6L110106-JK7K0-1/40		50.0	12/18/2006 6:16:09 PM	40.0000		1.0000
33	H6L110106-JK7K0-1/40-MS		50.0	12/18/2006 6:33:34 PM	40.0000		1.0000
34	CCV= ICWS-9058		50.0	12/18/2006 6:50:59 PM	1.0000		1.0000
35	CCB		50.0	12/18/2006 7:08:24 PM	1.0000		1.0000
36	SHUTDOWN		50.0	12/18/2006 7:25:50 PM	1.0000		1.0000

7 ICV/LCS= ICWS-9056

Sample Name:	**ICV/LCS= ICWS-9056**	*Injection Volume:*	**50.0**
Vial Number:	**104**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 10:17**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

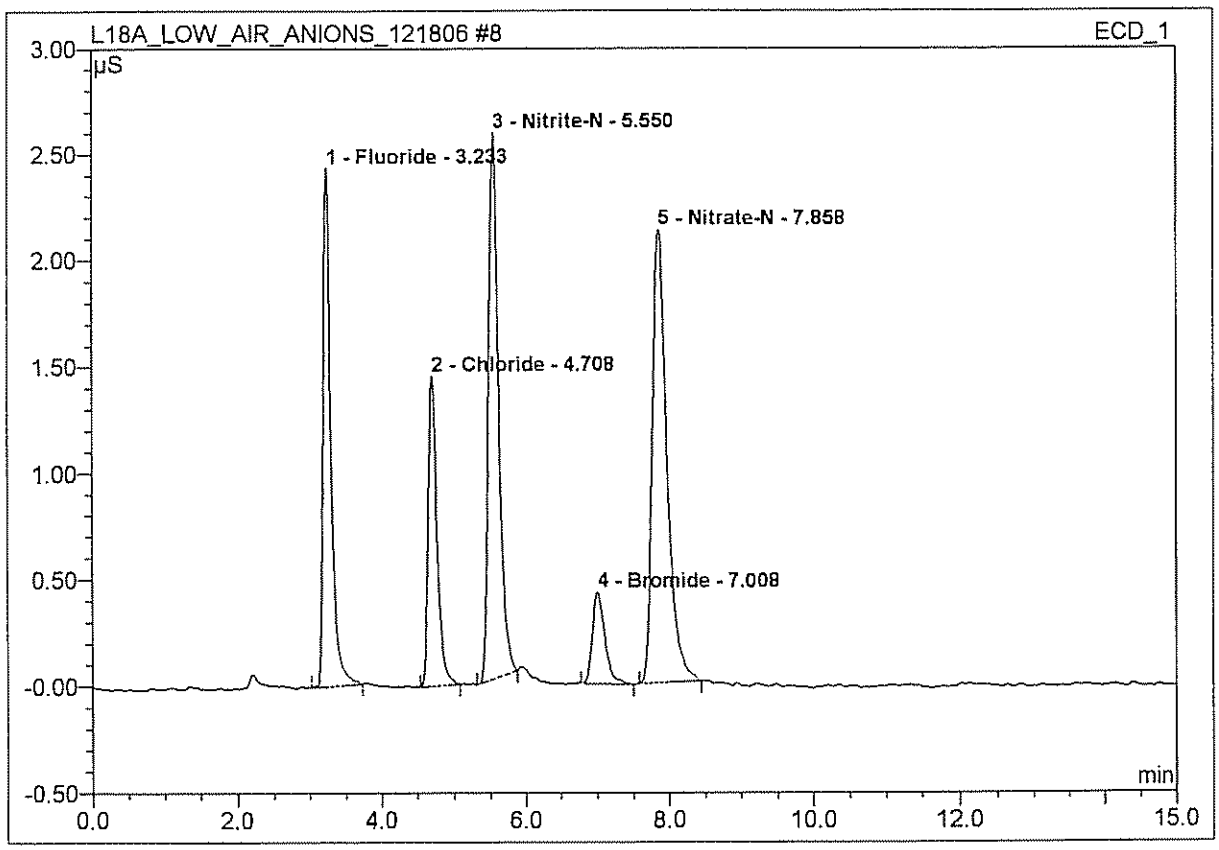


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	2.42157	0.305	19.82	0.7480	BMB
2	4.71	Chloride	1.43770	0.207	13.45	0.7502	BMB
3	5.55	Nitrite-N	2.59076	0.450	29.23	0.7442	BMB
4	7.01	Bromide	0.41601	0.083	5.39	0.7219	BMB
5	7.87	Nitrate-N	2.11264	0.495	32.11	0.7415	BMB

HF - JL69G-1AC
HBr - JL69F-1AC
HCl - JL8TM-1AC

8 ICV/LCSD= ICWS-9057

Sample Name:	**ICV/LCSD= ICWS-9057**	*Injection Volume:*	**50.0**
Vial Number:	**105**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 10:34**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

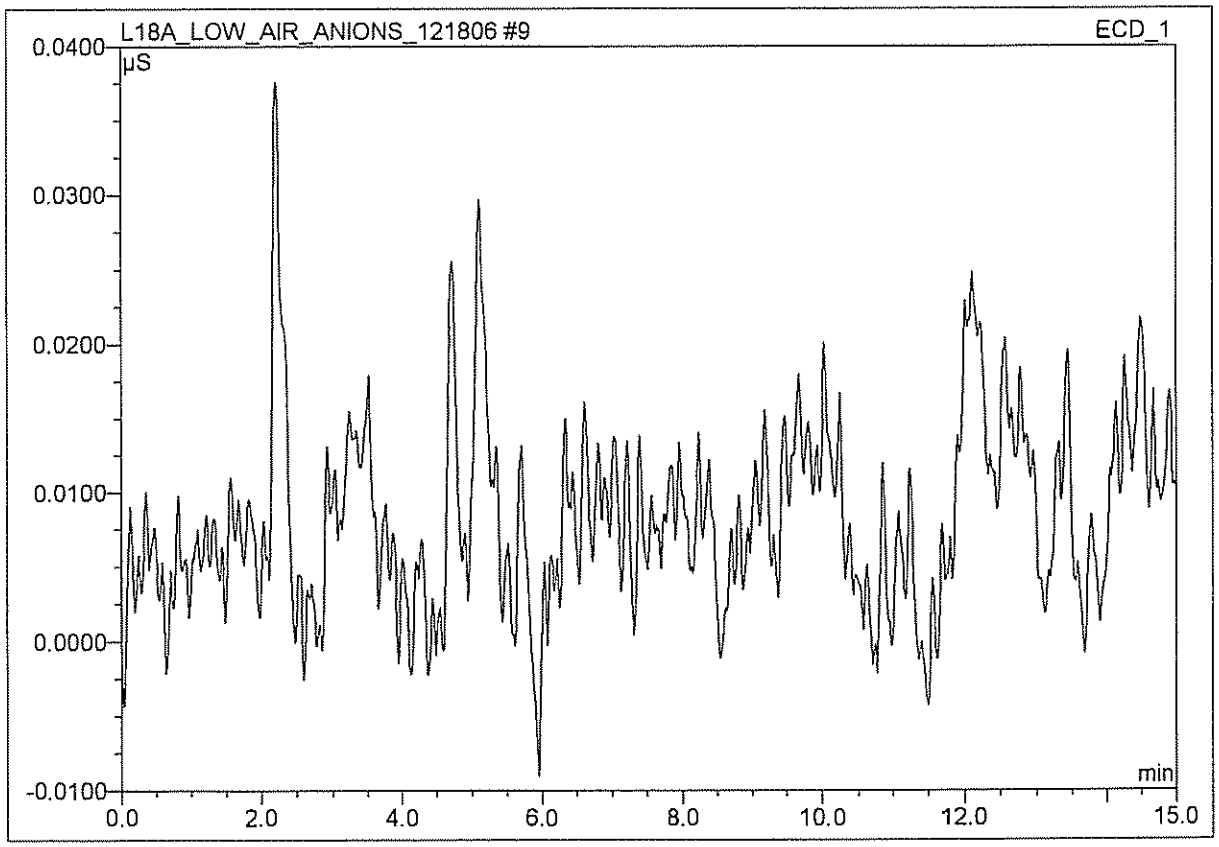


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	2.43474	0.307	20.23	0.7519	BMB
2	4.71	Chloride	1.45569	0.205	13.51	0.7593	BMB
3	5.55	Nitrite-N	2.56761	0.424	27.92	0.7377	BMB
4	7.01	Bromide	0.42719	0.086	5.70	0.7410	BMB
5	7.86	Nitrate-N	2.12412	0.495	32.64	0.7454	BMB

HF - JL69G-1AD
HBr - JL69F-1AD
HCl - JL8TM-1AD

9 ICB/ METHOD BLANK

Sample Name:	**ICB/ METHOD BLANK**	*Injection Volume:*	**50.0**
Vial Number:	**139**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 10:52**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



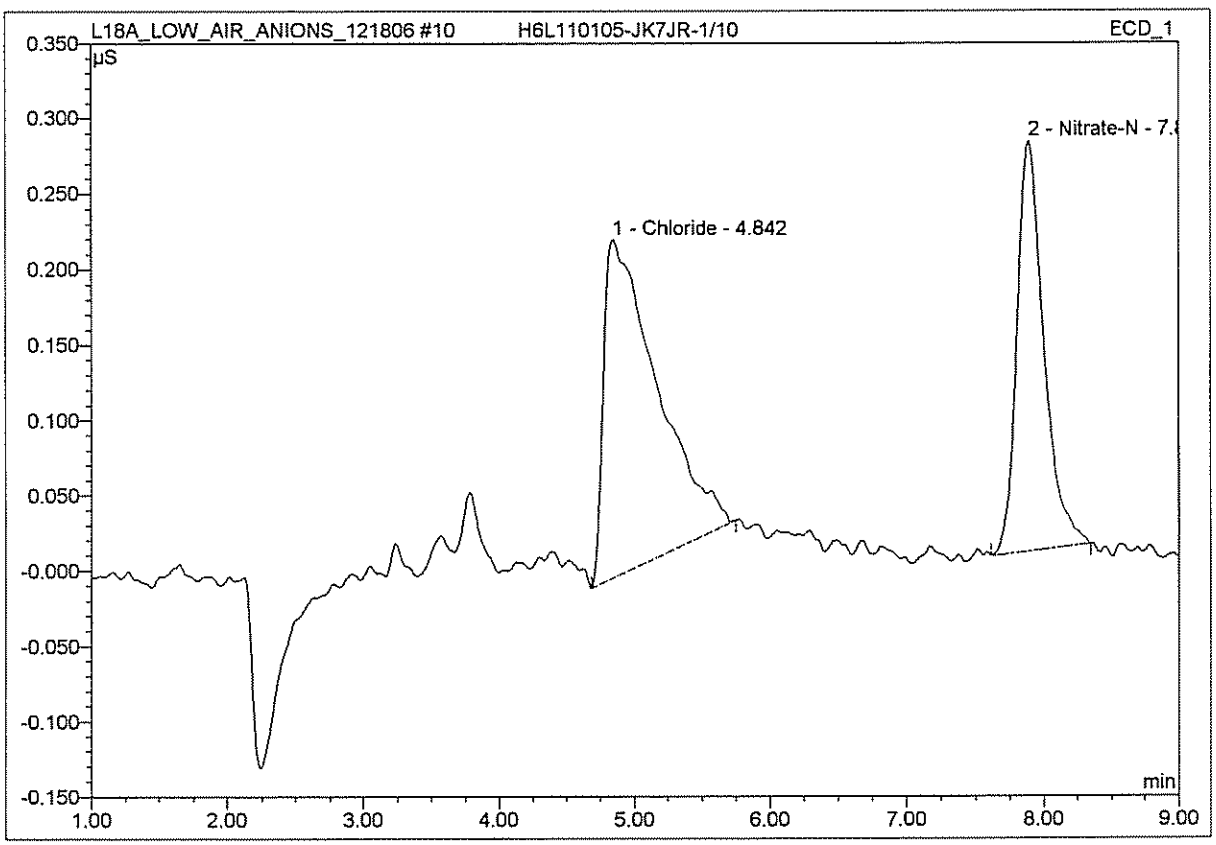
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

HF- JL69G-1AA
HBr- JL69F-1AA
HCl- JL8TM-1AA

10 H6L110105-JK7JR-1/10

Sample Name:	**H6L110105-JK7JR-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**140**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 11:26**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

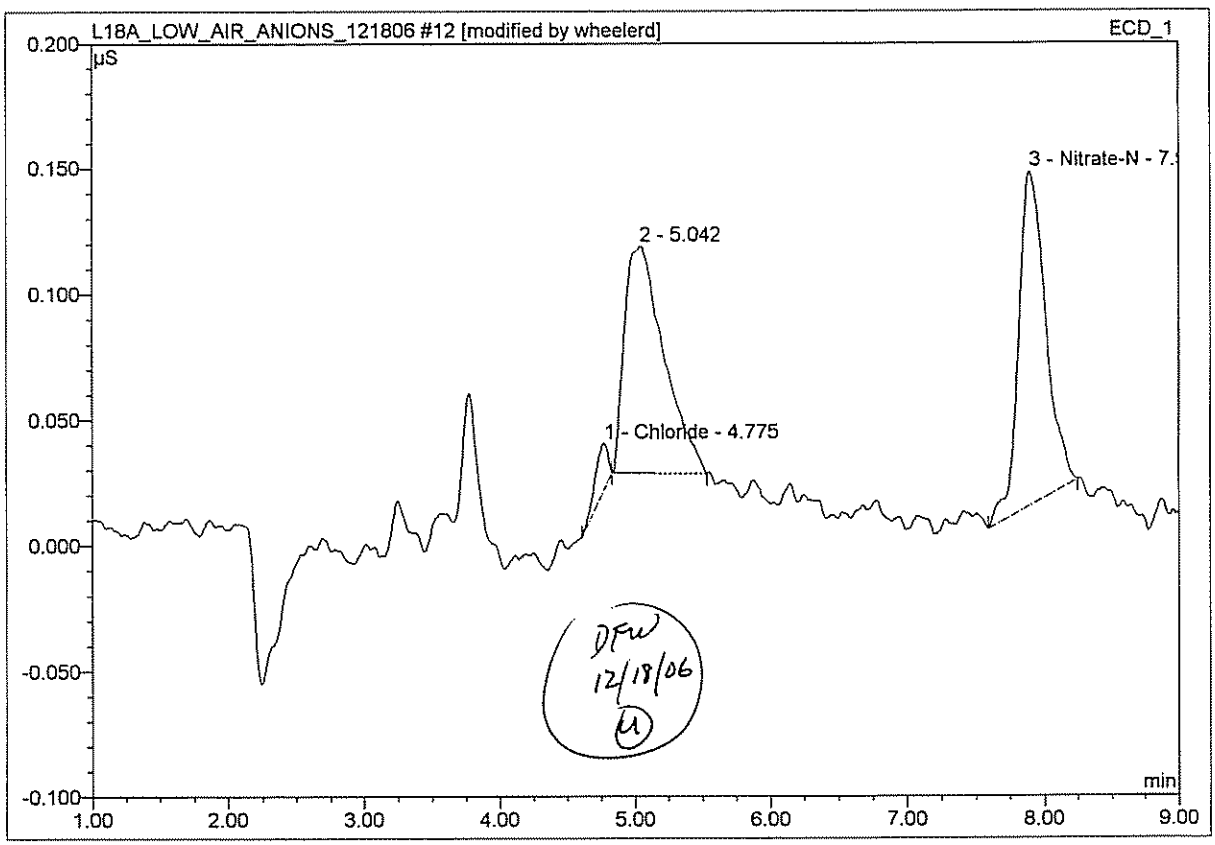


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.84	Chloride	0.22437	0.101	0.17	1.1966	BMB
2	7.89	Nitrate-N	0.27174	0.062	0.10	0.9869	BMB
3	11.88	n.a.	##########	59.905	99.73	n.a.	BMB

HF - ND ✓
HBr - ND ✓
See 1/20 for Cl^-

12 H6L110105-JK7JR-1/20

Sample Name:	**H6L110105-JK7JR-1/20**	*Injection Volume:*	**50.0**
Vial Number:	**142**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/18/2006 12:08**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

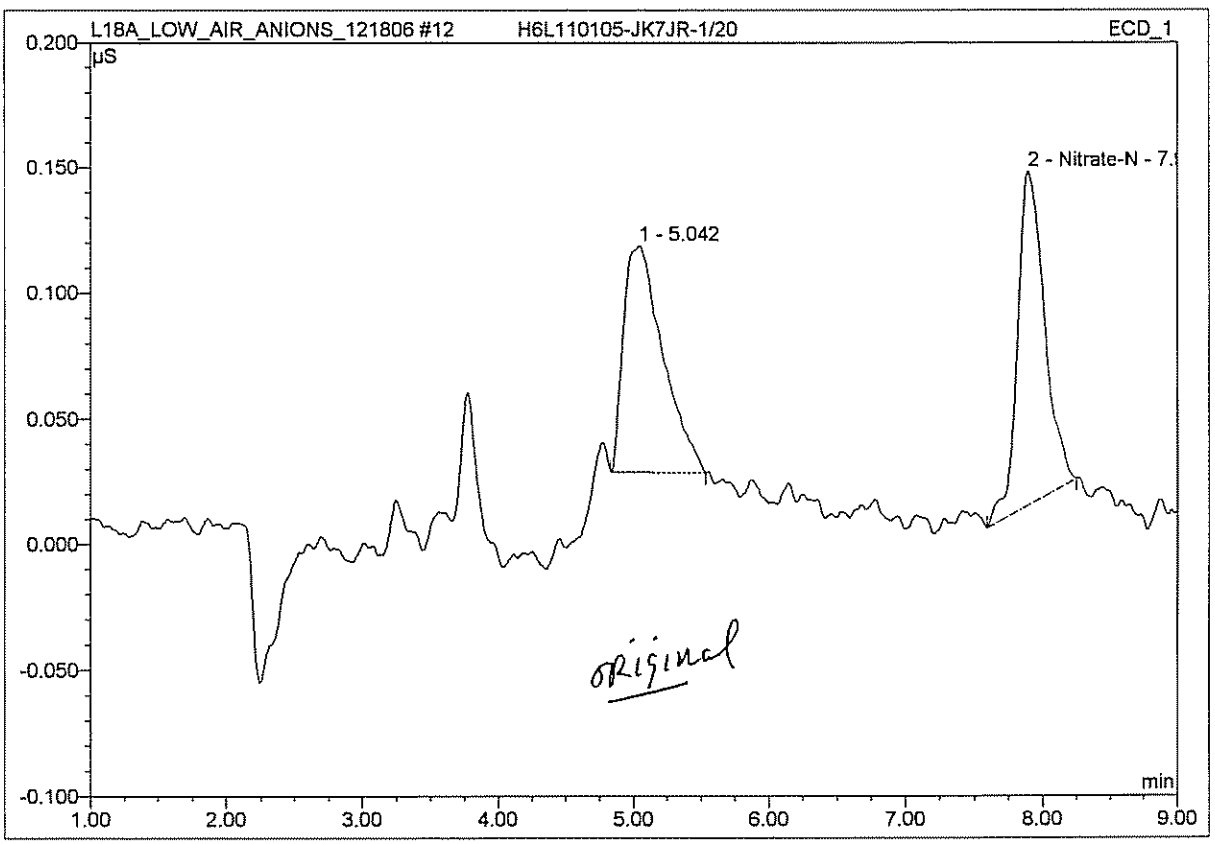


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.78	Chloride	0.01857	0.002	0.01	0.1989	BMb*
2	5.04	n.a.	0.09017	0.030	0.11	n.a.	bMB*
3	7.90	Nitrate-N	0.13289	0.031	0.11	0.9679	BMB
4	11.98	n.a.	87.71361	28.254	99.78	n.a.	BMB

✓ <MDL

12 H6L110105-JK7JR-1/20

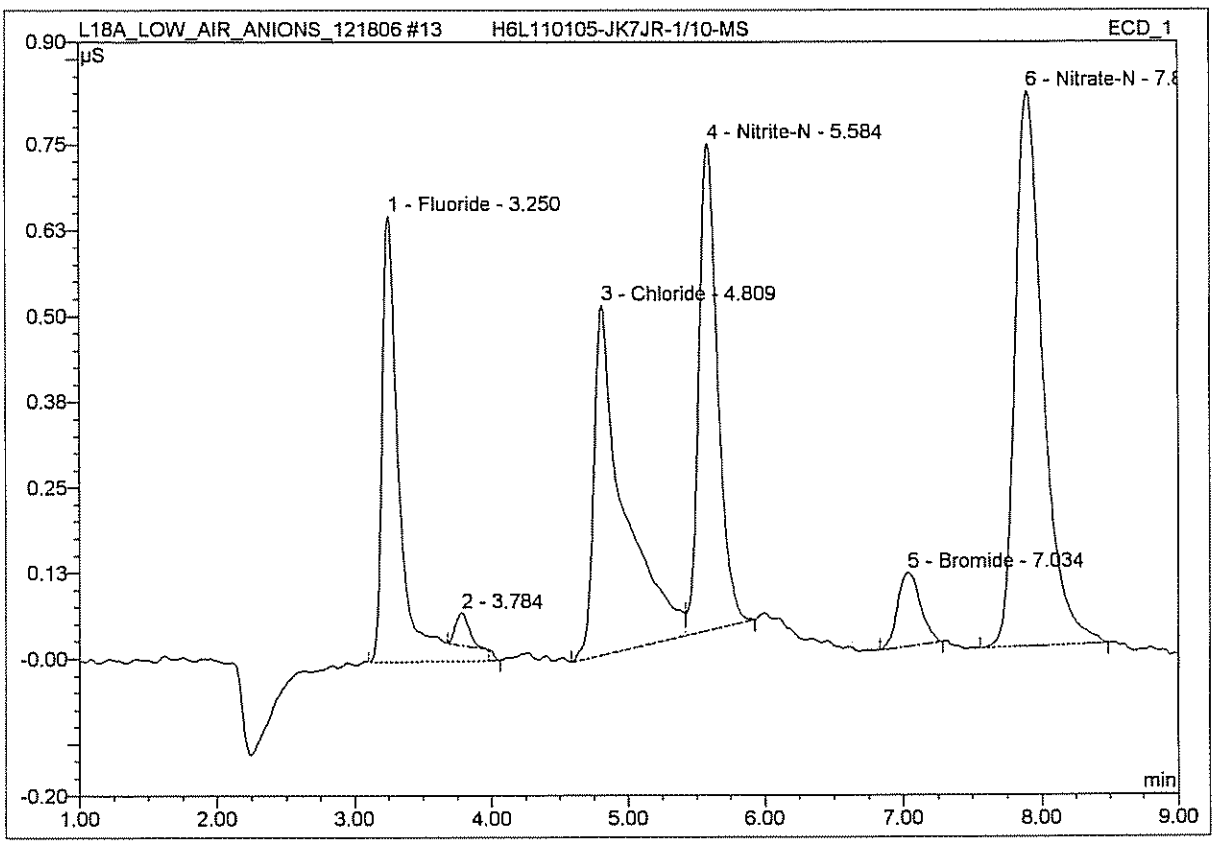
Sample Name:	**H6L110105-JK7JR-1/20**	*Injection Volume:*	**50.0**
Vial Number:	**142**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/18/2006 12:08**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	5.04	n.a.	0.09017	0.030	0.11	n.a.	BMB
2	7.90	Nitrate-N	0.13289	0.031	0.11	0.9679	BMB
3	11.98	n.a.	87.71361	28.254	99.78	n.a.	BMB

13 H6L110105-JK7JR-1/10-MS

Sample Name:	**H6L110105-JK7JR-1/10-MS**	*Injection Volume:*	**50.0**
Vial Number:	**143**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 12:43**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

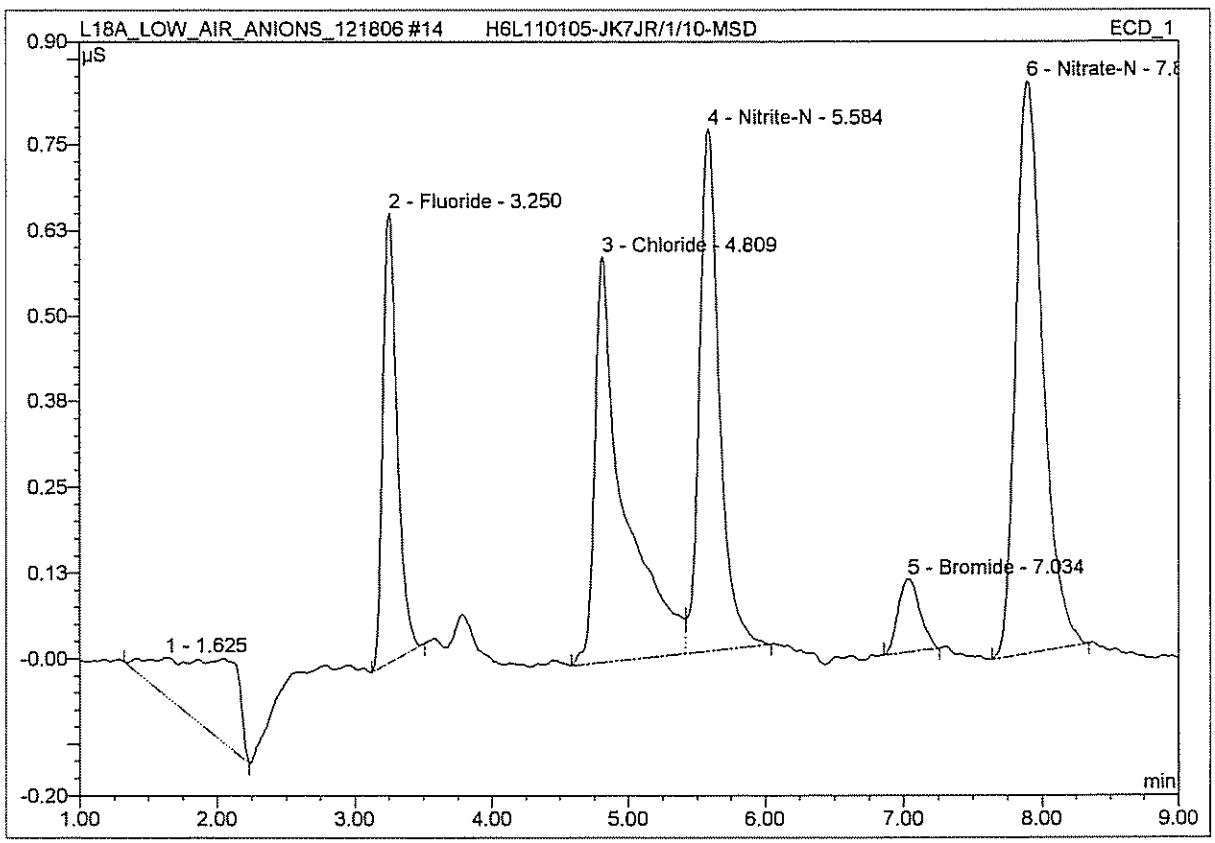


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.25	Fluoride	0.64968	0.098	0.17	2.0606	BMB
2	3.78	n.a.	0.04771	0.005	0.01	n.a.	Rd
3	4.81	Chloride	0.50954	0.129	0.22	2.7031	BM
4	5.58	Nitrite-N	0.70996	0.114	0.20	2.0844	MB
5	7.03	Bromide	0.10718	0.020	0.04	1.8777	BMB
6	7.89	Nitrate-N	0.81102	0.190	0.33	2.9150	BMB
7	11.90	n.a.	#########	57.455	99.04	n.a.	BMB

(Cl- @ 1/20)

14 H6L110105-JK7JR/1/10-MSD

Sample Name:	**H6L110105-JK7JR/1/10-MSD**	*Injection Volume:*	**50.0**
Vial Number:	**143**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 13:00**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



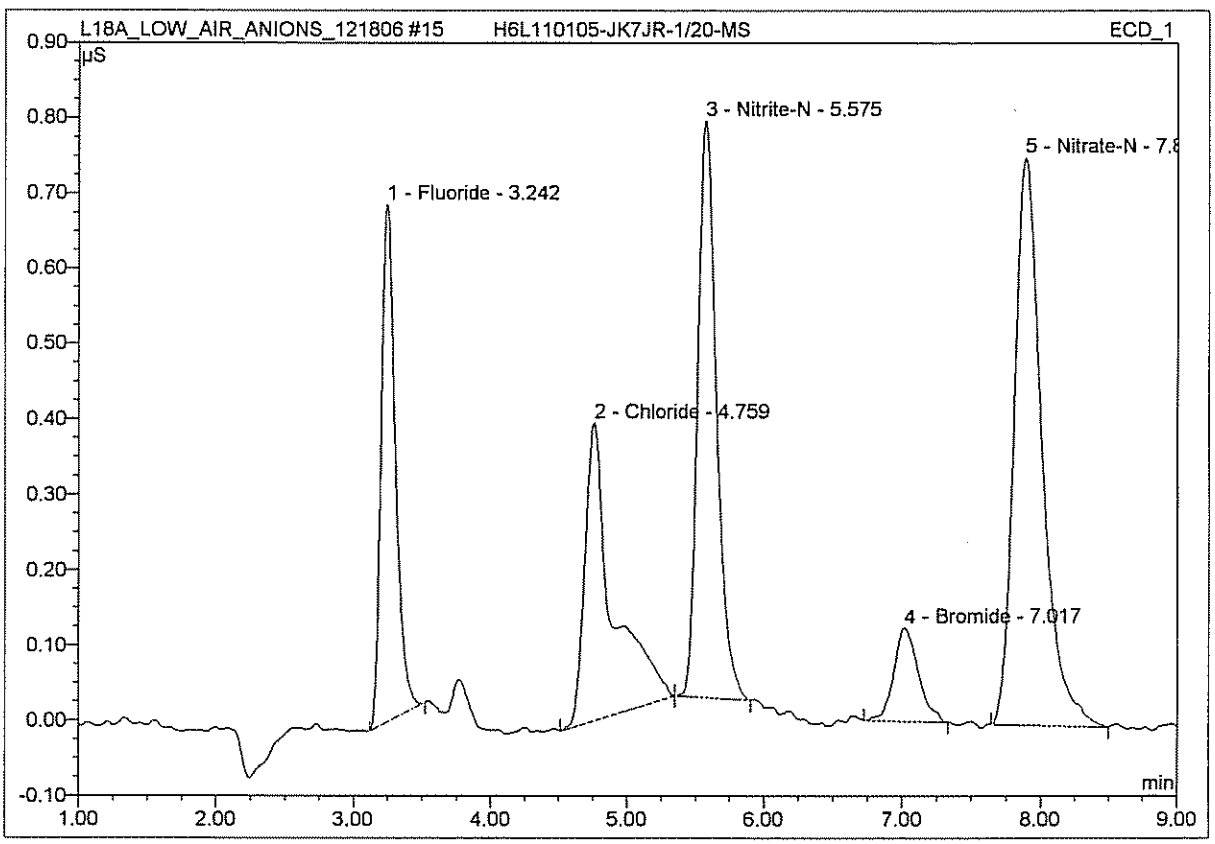
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	1.63	n.a.	0.05595	0.061	0.10	n.a.	BMB
2	3.25	Fluoride	0.65594	0.080	0.13	2.0802	BMB
3	4.81	Chloride	0.59188	0.145	0.24	3.1352	BM
4	5.58	Nitrite-N	0.76124	0.129	0.21	2.2336	MB
5	7.03	Bromide	0.10691	0.019	0.03	1.8730	BMB
6	7.89	Nitrate-N	0.83533	0.189	0.31	3.0010	BMB
7	11.89	n.a.	##########	60.336	98.98	n.a.	BMB

(Cl⁻ @ 1/20)

15 H6L110105-JK7JR-1/20-MS

Cl-

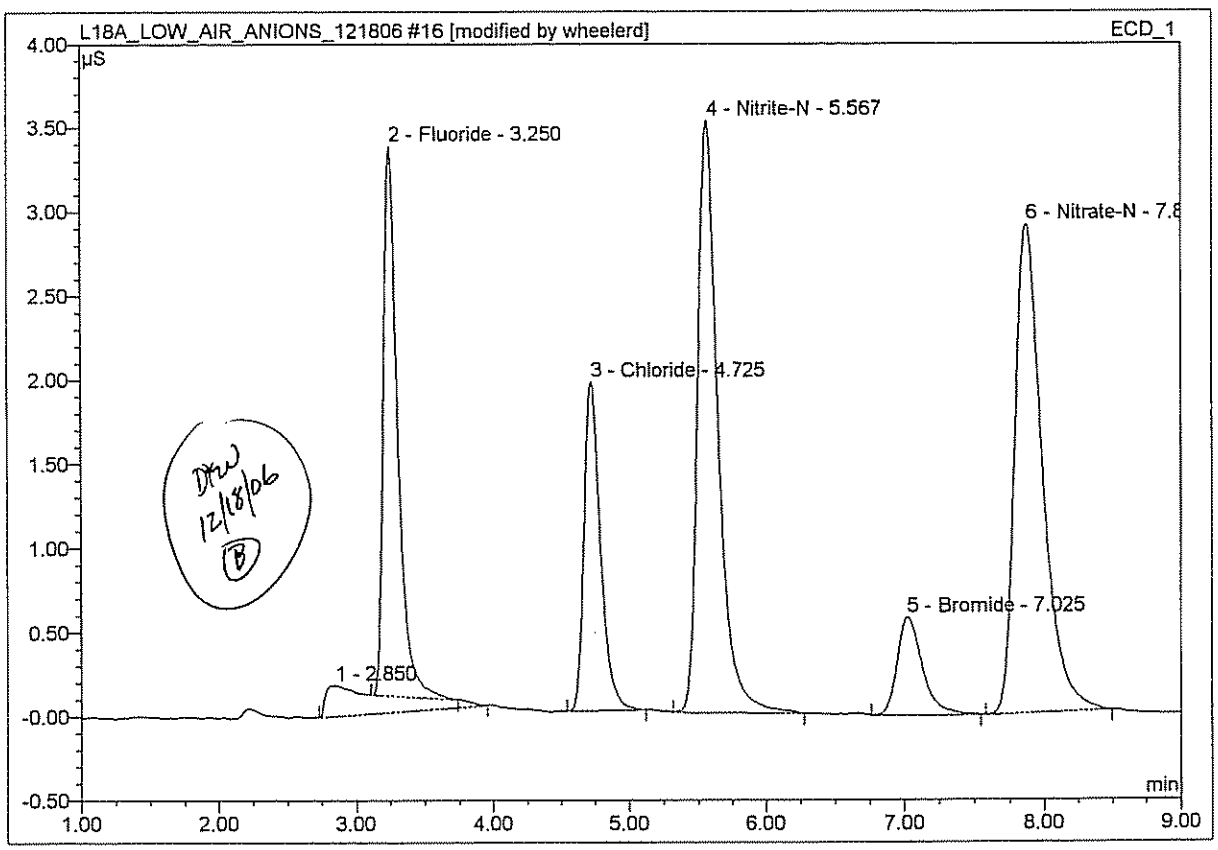
Sample Name:	**H6L110105-JK7JR-1/20-MS**	*Injection Volume:*	**50.0**
Vial Number:	**144**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/18/2006 13:18**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.24	Fluoride	0.68741	0.083	0.27	4.3579	BMB
2	4.76	Chloride	0.39494	0.093	0.31	4.1992	BMB
3	5.58	Nitrite-N	0.76522	0.122	0.40	4.4903	bMB
4	7.02	Bromide	0.12440	0.025	0.08	4.3565	BMB
5	7.89	Nitrate-N	0.75269	0.177	0.58	5.4168	BMB
6	11.97	n.a.	92.95436	30.056	98.36	n.a.	BMB

16 CCV = ICWS-9058

Sample Name:	**CCV = ICWS-9058**	*Injection Volume:*	**50.0**
Vial Number:	**147**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 13:35**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

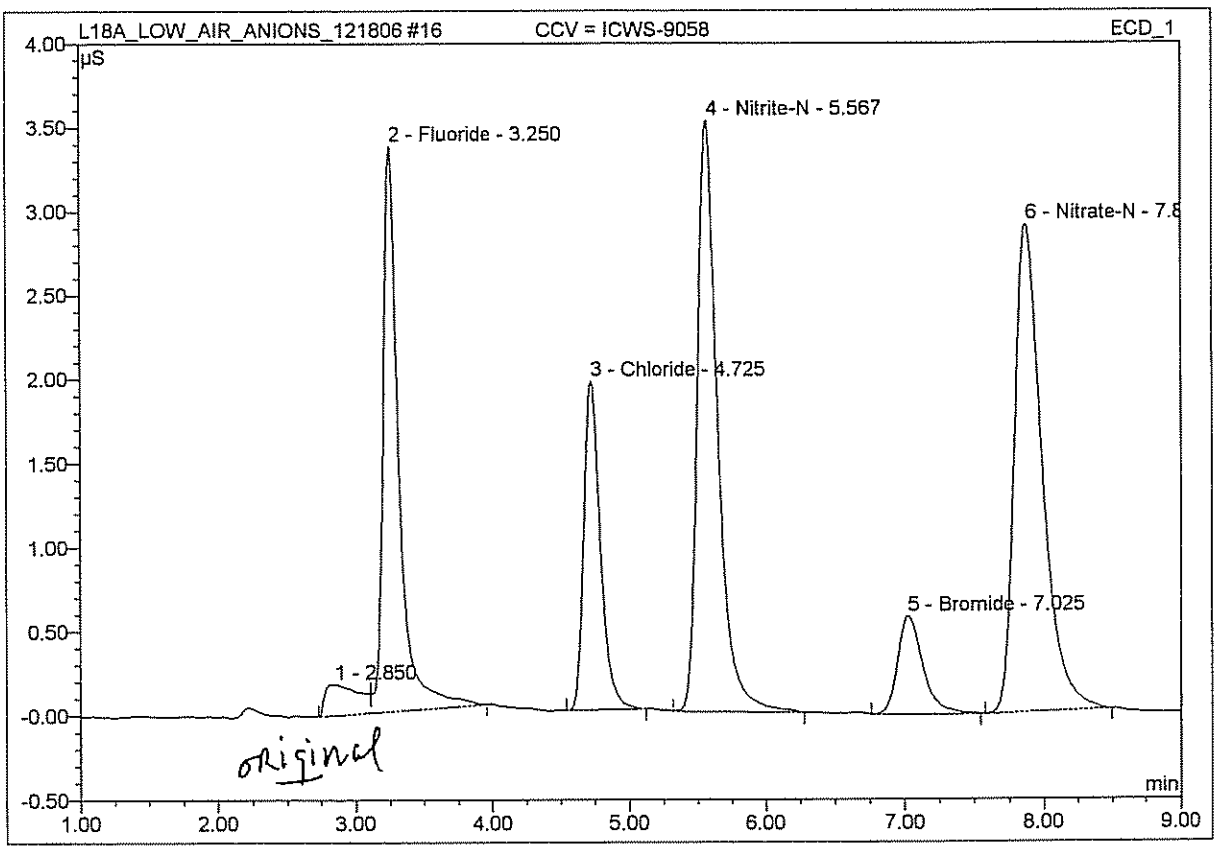


DTW 12/18/06 B

No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.85	n.a.	0.18302	0.106	4.79	n.a.	BMB*
2	3.25	Fluoride	3.26791	0.404	18.23	0.9974	Rd*
3	4.73	Chloride	1.95319	0.274	12.36	1.0101	BMB
4	5.57	Nitrite-N	3.51969	0.608	27.45	1.0007	BMB
5	7.03	Bromide	0.58477	0.123	5.55	1.0095	BMB
6	7.88	Nitrate-N	2.90661	0.677	30.56	1.0062	BMB
7	12.05	n.a.	0.07024	0.023	1.05	n.a.	BMB

16 CCV = ICWS-9058

Sample Name:	CCV = ICWS-9058	*Injection Volume:*	**50.0**
Vial Number:	**147**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 13:35**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



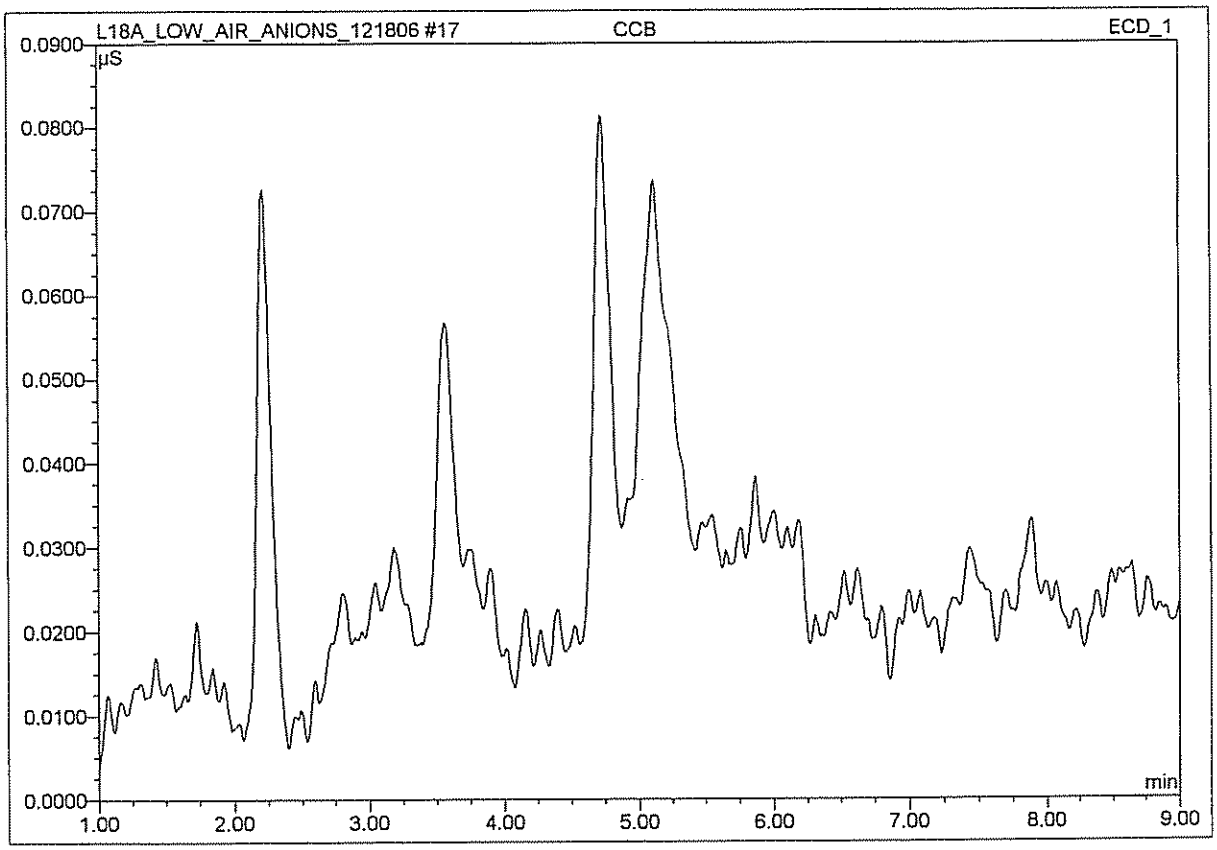
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.85	n.a.	0.18302	0.052	2.35	n.a.	BM
2	3.25	Fluoride	3.36406	0.458	20.68	1.0254	MB
3	4.73	Chloride	1.95319	0.274	12.36	1.0101	BMB
4	5.57	Nitrite-N	3.51969	0.608	27.45	1.0007	BMB
5	7.03	Bromide	0.58477	0.123	5.55	1.0095	BMB
6	7.88	Nitrate-N	2.90661	0.677	30.56	1.0062	BMB
7	12.05	n.a.	0.07024	0.023	1.05	n.a.	BMB

Operator:wheelerd Timebase:IC_Aragorn Sequence:L18A_LOW_AIR_ANIONS_121806

12/18/2006 2:24 PM

17 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**148**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 13:53**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



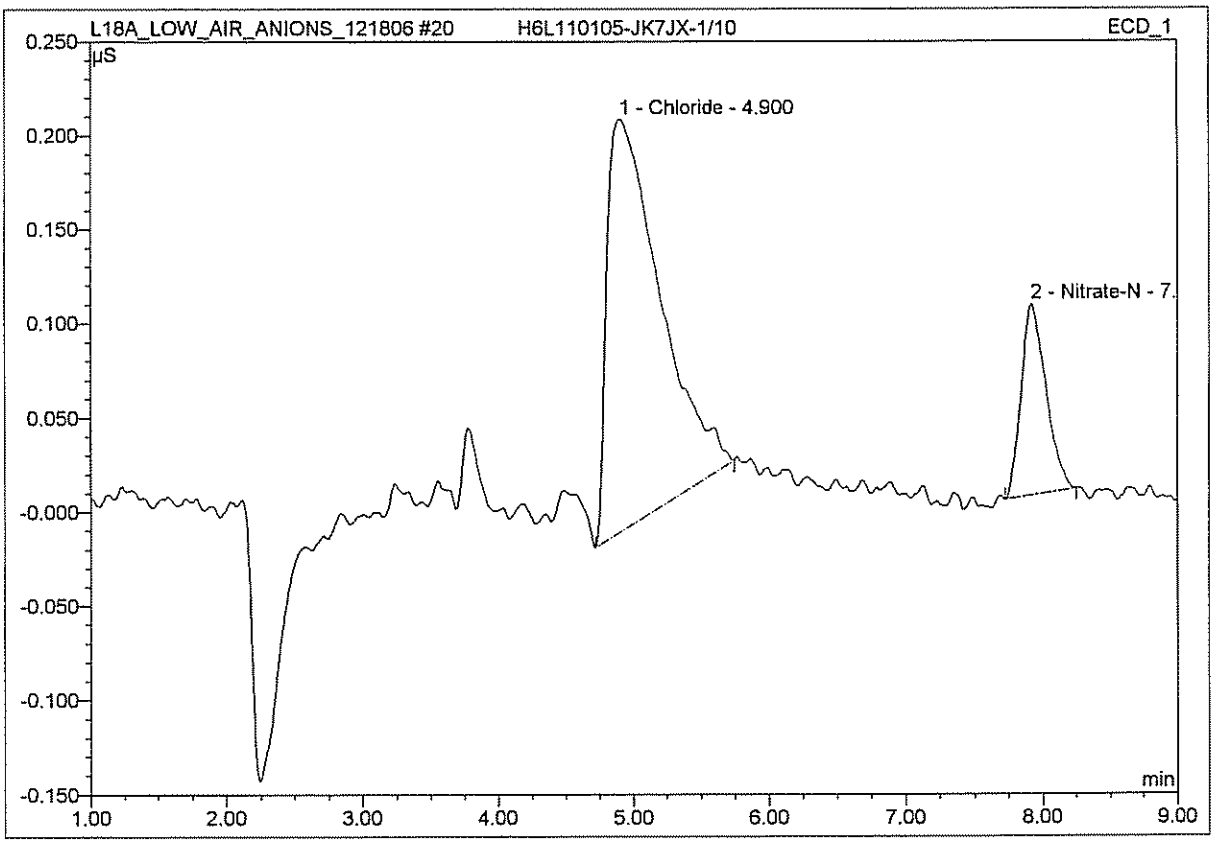
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

Chromeleon (c) Dionex 1996-2001
Version 6.60 Build 1428

20 H6L110105-JK7JX-1/10

Sample Name:	**H6L110105-JK7JX-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**151**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 14:47**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

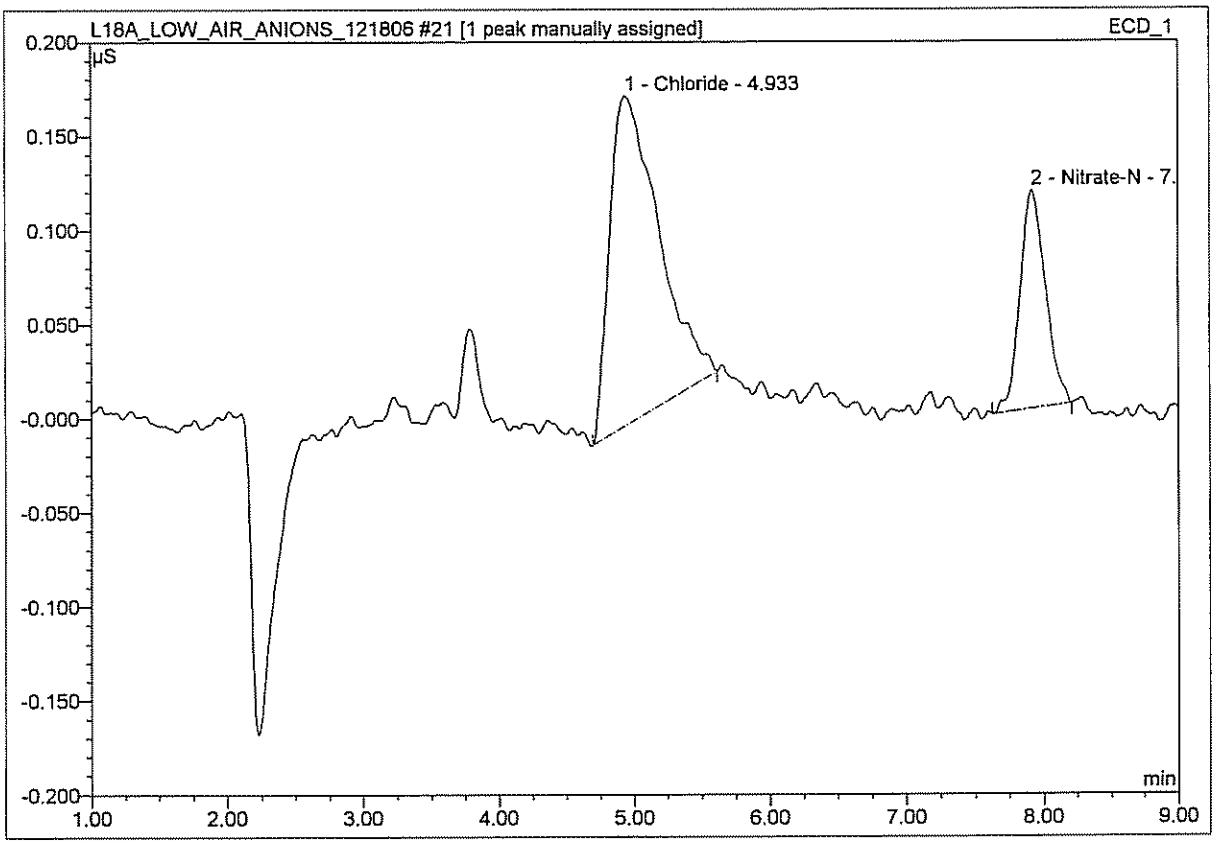


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.90	Chloride	0.21936	0.099	0.16	1.1700	BMB
2	7.92	Nitrate-N	0.10116	0.021	0.03	0.3686	BMB
3	10.78	n.a.	0.15002	0.046	0.07	n.a.	BMB
4	11.89	n.a.	#########	61.095	99.73	n.a.	BMB

HF - ND ✓
HBr - ND ✓

21 H6L110105-JK7J1-1/10

Sample Name:	**H6L110105-JK7J1-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**152**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 15:04**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

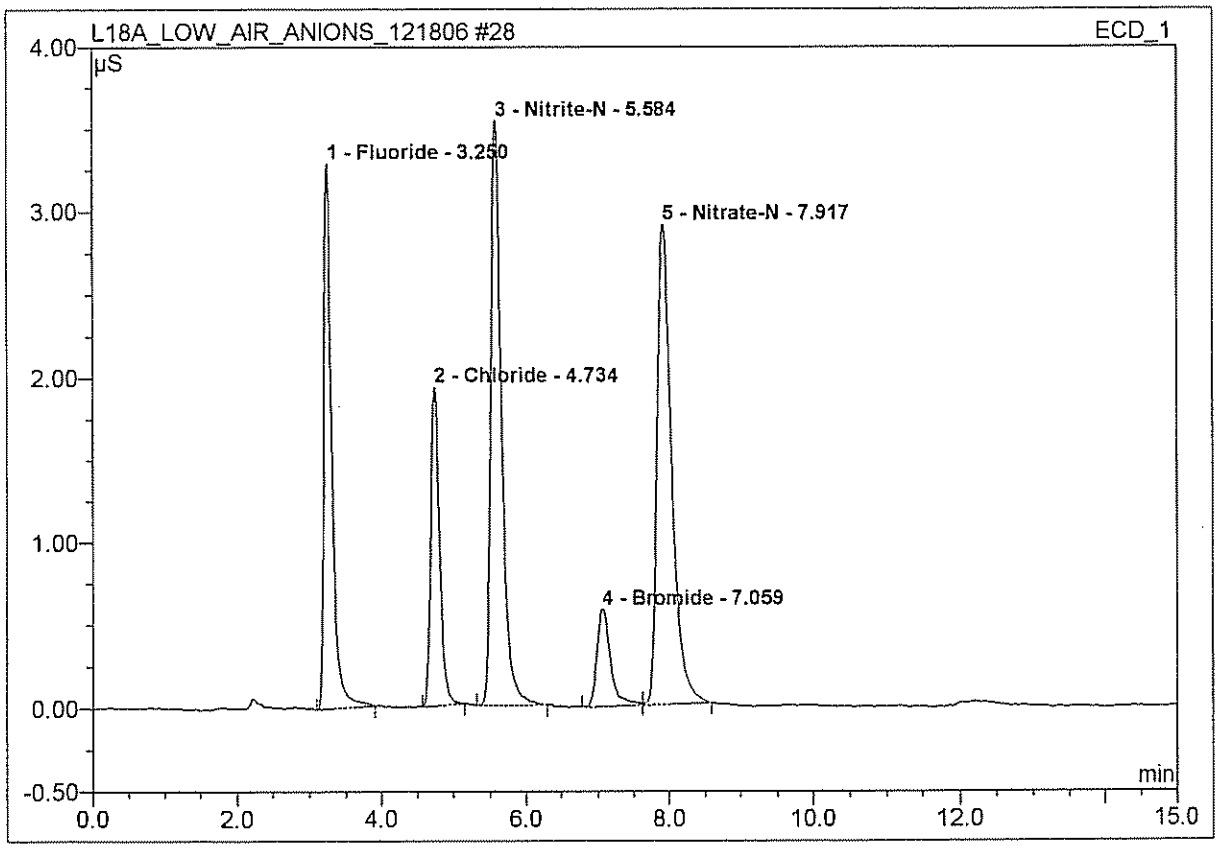


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.93	Chloride	0.17515	0.073	0.15	0.9350	BMB^
2	7.92	Nitrate-N	0.11589	0.025	0.05	0.4222	BMB
3	11.92	n.a.	##########	47.743	99.79	n.a.	BMB

HF - ND ✓
HBr - ND ✓

28 CCV= ICWS-9058

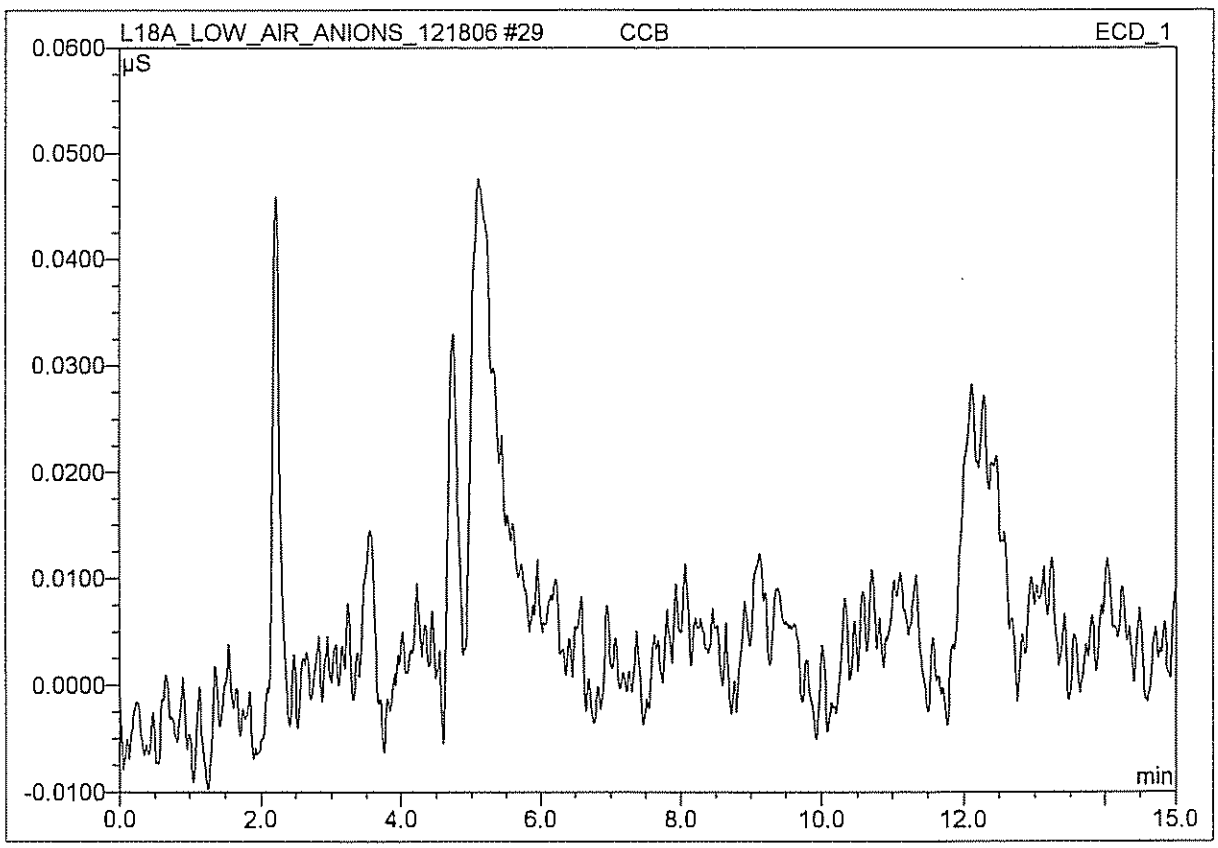
Sample Name:	**CCV= ICWS-9058**	*Injection Volume:*	**50.0**
Vial Number:	**166**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 17:06**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.25	Fluoride	3.29330	0.422	19.95	1.0048	BMB
2	4.73	Chloride	1.92845	0.274	12.94	0.9978	BMB
3	5.58	Nitrite-N	3.53011	0.610	28.81	1.0035	BMB
4	7.06	Bromide	0.58345	0.124	5.88	1.0073	BM
5	7.92	Nitrate-N	2.89375	0.686	32.42	1.0020	MB

29 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**167**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 17:23**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

STL Knoxville Anions in Air Data Review / Narrative Checklist for Methods 9056/9057/26A, SOP KNOX-WC-0005, Rev. 8

Lot #:	HGL110105 (BH)	Analysis Date:	12/18/06	File ID:	L18-LowLevel-FClNO2BrNO3-1218/06	ICAL File ID:	J18-LOWLEVEL-FClNO3BrNO3-101806

Review Items	NA	Yes	No	If No, why is data reportable?	2nd ✓
1. Were PM checklists (L40), Lot Summary and any applicable QAS reviewed?		✓			✓
2. ICV within 90-110%R?		✓			✓
3. ICB/CCB < 1/2 RL?		✓		☐ **[ccb1] No analyte > MDL in associated samples.**	✓
4. CCVs/CCBs run after every 10 samples, and at end of sequence?		✓			✓
5. Is %D ≤10% for each CCV?		✓			✓
6. If CCV failed, was it rerun only once?	✓				N/A
7. LCS/LCSD analytes within 90-110%R? *If no, list LCS ID:*		✓		☐ **[lcs3] LCS recovery >upper control limit & sample results <RL.**	✓
8. Method blank < 1/2 RL? *If no, list blank ID:*		✓		☐ **[mb3] No analyte > RL in associated samples.** ☐ [mb7] Sample results > 10x higher than blank.	✓
9. Matrix spikes run at required frequency?		✓			✓
10. Matrix spikes within 75-125% recovery? *If no, list MS ID:* _____		✓		☐ [air ms1] MS %R slightly outside limits for 1 sample. ☐ [air ms2] MS %R slightly outside limits for >1 sample. ☐ Air train reagent blank – spike result not reported.	✓
11. Were MS run #'s assigned to all matrix spikes except reagent blanks?		✓			✓
12. Sample analyses done within holding time (HT)? *If no, list samples:*		✓		☐ [ht1] HT expired upon receipt. ☐ *[ht2] Analysis requested after HT expired.*	✓
13. Were results processed using correct ICAL?		✓			✓
14. Are positive results within the calibration range?		✓			✓
15. Is integration acceptable for all samples, QC samples and standards?		✓			✓
16. For manual integrated standards and QC samples, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system.	✓
17. Calculations checked for error? (Document manual calculation checks.)		✓			✓
18. Were spreadsheets checked for transcription errors?		✓			✓
19. Final report/F6 correct? (Verify results, RLs, units, qualifiers, DFs, dates, spikes.)		✓			✓
20. Are all nonconformances documented and discussed in narrative?		✓		List NCM #:	✓
21. Appropriate air train autotext selected for narrative?		✓		☐ [air1] Cl^- reported as HCl and Cl_2. ☐ [air2] Cl^- reported as HCl only. ☐ [air3] Cl^-, F^- reported as HCl, Cl_2, HF. ☑ [air4] Cl^-, F^-, Br^- reported as HCl, Cl_2, HF, HBr, Br_2. ☐ [air5] Cl^-, F^-, NO_2^-, NO_3^- reported as HCl, Cl_2, HF, HNO_2, HNO_3. ☐ [air6] Cl^-, F^-, Br^-, I^- reported as HCl, Cl_2, HF, HBr, Br_2, I^-. ☐ [air7] Cl^-, F^-, NO_2^-, NO_3^- reported as Cl^-, F^-, NO_2^-, NO_3^-.	✓
22. Sample pH adjustment included in narrative?	✓			☐ [air pH] Sample pH adjusted prior to analysis.	N/A
23. Audit sample results included in narrative?	✓			☐ [audit2] Audit results in mg/L.	N/A

1st Level Reviewer: [signature]	Date: 12/28/06	2nd Level Reviewer: [signature]	Date: 12/28/06
Height = 2.19733 (0.7584) + 0.033578 (0.7584)² = 1.68577		JK7JW(ms): HF – 1.8737 ug/ml x 240 ml x 20.00630/18.9984 =	
JLWAA1AC(Cl⁻)		498.8 ug	

Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6354400
Prep Date: 12/18/2006 0000
Comp Date: 12/18/2006 0000

Analyte: Hydrogen Fluoride
CAS #: 7664-39-3
QuantIMS #: 5646

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 1500

Reviewed by: [signature]
Date: 12/27/06
MW Factor: 1.053051836

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	2		4M	0.1	0.050	JK7JW1AD	240	10	0.1539	ND	252.7324	126.3662	2,527.32	121806	1124
H6L110105	2	S	4M	0.1	0.050	JK7JW1AE	240	10	1.9737	498.8180	252.7324	126.3662	2,527.32	121806	1255
H6L110105	2	D	4M	0.1	0.050	JK7JW1AF	240	10	1.9620	495.8610	252.7324	126.3662	2,527.32	121806	1325
H6L110105	4		4M	0.1	0.050	JK7J01AD	250	10	0.1032	ND	263.2630	131.6315	2,632.63	121806	1421
H6L110105	6		4M	0.1	0.050	JK7J21AD	270	10	0.0850	ND	284.3240	142.1620	2,843.24	121806	1450
H6L200000	400	B	4M	0.1	0.050	JLV9M1AA	100	1	0.0000	ND	10.5305	5.2653	105.31	121806	1042
H6L200000	400	C	4M	0.1	0.050	JLV9M1AC	100	1	0.7543	79.4317	10.5305	5.2653	105.31	121806	1008
H6L200000	400	L	4M	0.1	0.050	JLV9M1AD	100	1	0.7548	79.4844	10.5305	5.2653	105.31	121806	1025

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JLV9M1AC	0.75	105.31	78.98
LCSD	ICWI-8838	100.00	0.750	100.0	JLV9M1AD	0.75	105.31	78.98
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7JW1AE	0.20	2,527.32	505.46
MSD (1)	ICWI-8838	100.00	0.020	10.0	JK7JW1AF	0.20	2,527.32	505.46
MS (2)								
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6354401
Prep Date: 12/18/2006 0000
Comp Date: 12/18/2006 0000

Analyte: Chlorine
CAS #: 7782-50-5
QuantIMS #: 515

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 1500

Reviewed by: RMW
Date: 12/28/06
MW Factor: 1.0

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	2		4K	0.1	0.042	JK7JW1AA	240	10	1.8322	439.7280	240.0000	100.8000	2,400.00	121806	1124
H6L110105	2	S	4K	0.1	0.042	JK7JW1AG	240	10	4.1136	987.2640	240.0000	100.8000	2,400.00	121806	1255
H6L110105	2	D	4K	0.1	0.042	JK7JW1AH	240	10	4.1875	1005.0000	240.0000	100.8000	2,400.00	121806	1325
H6L110105	4		4K	0.1	0.042	JK7J01AA	250	10	1.9197	479.9250	250.0000	105.0000	2,500.00	121806	1421
H6L110105	6		4K	0.1	0.042	JK7J21AA	270	10	1.7890	483.0300	270.0000	113.4000	2,700.00	121806	1450
H6L200000	401	B	4K	0.1	0.042	JLWAA1AA	100	1	0.0000	ND	10.0000	4.2000	100.00	121806	1042
H6L200000	401	C	4K	0.1	0.042	JLWAA1AC	100	1	0.7584	75.8400	10.0000	4.2000	100.00	121806	1008
H6L200000	401	L	4K	0.1	0.042	JLWAA1AD	100	1	0.7601	76.0100	10.0000	4.2000	100.00	121806	1025

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JLWAA1AC	0.75	100.00	75.00
LCSD	ICWI-8838	100.00	0.750	100.0	JLWAA1AD	0.75	100.00	75.00
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7JW1AG	0.20	2,400.00	480.00
MSD (1)	ICWI-8838	100.00	0.020	10.0	JK7JW1AH	0.20	2,400.00	480.00
MS (2)								
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6354402
Prep Date: 12/18/2006 0000
Comp Date: 12/18/2006 0000

Analyte: Bromine
CAS #: 7726-95-6
QuantIMS #: 3450

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 1500

Reviewed by: RMW
Date: 12/28/06
MW Factor: 1.0

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	2		4I	0.1	0.024	JK7JW1AC	240	10	0.0000	ND	240.0000	57.6000	2,400.00	121806	1124
H6L110105	2	S	4I	0.1	0.024	JK7JW1AJ	240	10	2.1243	509.8320	240.0000	57.6000	2,400.00	121806	1255
H6L110105	2	D	4I	0.1	0.024	JK7JW1AK	240	10	2.0576	493.8240	240.0000	57.6000	2,400.00	121806	1325
H6L110105	4		4I	0.1	0.024	JK7J01AC	250	10	0.0000	ND	250.0000	60.0000	2,500.00	121806	1421
H6L110105	6		4I	0.1	0.024	JK7J21AC	270	10	0.0000	ND	270.0000	64.8000	2,700.00	121806	1450
H6L200000	402	B	4I	0.1	0.024	JLWCC1AA	100	1	0.0000	ND	10.0000	2.4000	100.00	121806	1042
H6L200000	402	C	4I	0.1	0.024	JLWCC1AC	100	1	0.7556	75.5600	10.0000	2.4000	100.00	121806	1008
H6L200000	402	L	4I	0.1	0.024	JLWCC1AD	100	1	0.7604	76.0400	10.0000	2.4000	100.00	121806	1025

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-8838	100.00	0.750	100.0	JLWCC1AC	0.75	100.00	75.00
LCSD	ICWI-8838	100.00	0.750	100.0	JLWCC1AD	0.75	100.00	75.00
MS (1)	ICWI-8838	100.00	0.020	10.0	JK7JW1AJ	0.20	2,400.00	480.00
MSD (1)	ICWI-8838	100.00	0.020	10.0	JK7JW1AK	0.20	2,400.00	480.00
MS (2)								
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
Dionex IC Runlog Cover Page

Analyst:	DKW	Date:	12/18/06	Sequence ID:	L18-LowLevel_FClNO2BrNO3_12180 6

Instrument:	☐ DX-600	Method:	☐ KNOX-WC-0003, SW-846 0061/7199
	☑ ICS-1500		☐ KNOX-WC-0005, ☐ SW-846 9056 ☐ EPA 300.0 ☐ SW-846 9057-Mod ☑ EPA 26A-Mod
	☐ DX-320		☐ KNOX-WC-0014, EPA 314.0

Preventive Maintenance	Instrument Conditions		
Daily:	Flow Rate =	1.00	mL/min
☑ Check pump and gas pressure	Pressure =	1850.	psi
☑ Check all lines for crimping, leaks and discoloration	Conductance =	24.9	µS
As Needed:	Suppressor Current =	43.	mA
☐ Change column and guard column	Eluent Generator =	N/A	mM KOH
☐ Change column and/or guard column bed support			
☐ Clean conductivity cell			
☐ De-gas pump head when flow is erratic			
☐ Check/replace eluant end line filter			

MS/MSD Spike Information

WO #	Compound	Spike ID	Parent Conc.	Spike Added (mL)	Final Volume (mL)	Final Conc.
JK7JW	Fluoride	ICWI-8838	100 ppm	0.02	10. (1/10)	8.2 ppm (2)
↓	Chloride	↓	↓	↓	↓ ↓	↓ ↓
↓	Bromide	↓	↓	↓	↓ ↓	↓ ↓

DKW 12/18/06

Comments: Caustic impinger fractions —

(F- Batch # 6354400
Cl- " # 6354401
Br- " # 6354402)

☑ Sodium Thiosulfate added to NaOH impinger samples.

Sequence: L18_LOWLEVEL_FCLNO2BRNO3_121806
Operator: wheelerd

Printed: 12/18/2006 4:41:28 PM

Title:
Datasource: ICS_1500_net
Location: ICS1500
Timebase: ICS1500
#Samples: 18

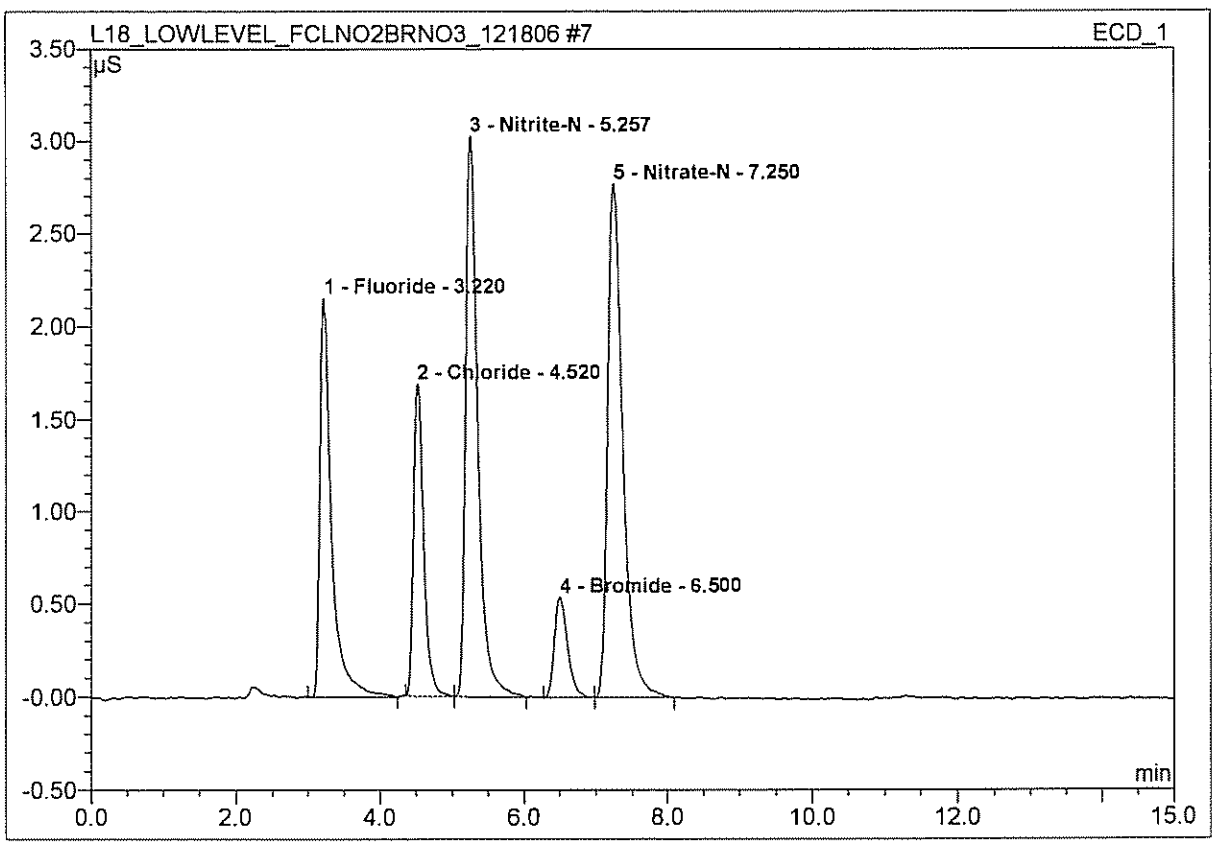
(DKW 12/18/06)

Created: 12/18/2006 10:07:19 AM by wheelerd
Last Update: 12/18/2006 4:41:08 PM by wheelerd

No.	Name	Sample ID	Inj. Vol.	Inj. Date/Time	Dil. Factor	*Multiplier [Liters]	Weight
1	CAL STD #1 ICWS-8915		50.0	10/18/2006 9:14:56 AM	1.0000		1.0000
2	CAL STD #2 ICWS-8916		50.0	10/18/2006 9:32:20 AM	1.0000		1.0000
3	CAL STD #3 ICWS-8917		50.0	10/18/2006 9:49:45 AM	1.0000		1.0000
4	CAL STD #4 ICWS-8918		50.0	10/18/2006 10:07:09 AM	1.0000		1.0000
5	CAL STD #5 ICWS-8919		50.0	10/18/2006 10:24:33 AM	1.0000		1.0000
6	CAL STD #6 ICWS-8920		50.0	10/18/2006 10:41:57 AM	1.0000		1.0000
7	ICV/LCS= ICWS-9056		50.0	12/18/2006 10:08:03 AM	1.0000		1.0000
8	ICV/LCSD= ICWS-9057		50.0	12/18/2006 10:25:28 AM	1.0000		1.0000
9	ICB/ METHOD BLANK		50.0	12/18/2006 10:42:51 AM	1.0000		1.0000
10	H6L110105-JK7JW-1/10		50.0	12/18/2006 11:24:20 AM	10.0000		1.0000
11	H6L110105-JK7JW-1/20		50.0	12/18/2006 12:04:01 PM	20.0000		1.0000
12	H6L110105-JK7JW-1/10-MS		50.0	12/18/2006 12:55:50 PM	10.0000		1.0000
13	H6L110105-JK7JW-1/10-MSD		50.0	12/18/2006 1:25:14 PM	10.0000		1.0000
14	H6L110105-JK7J0-1/10		50.0	12/18/2006 2:21:35 PM	10.0000		1.0000
15	H6L110105-JK7J2-1/10		50.0	12/18/2006 2:50:59 PM	10.0000		1.0000
16	CCV= ICWS-9058		50.0	12/18/2006 3:42:58 PM	1.0000		1.0000
17	CCB		50.0	12/18/2006 4:00:23 PM	1.0000		1.0000
18	SHUTDOWN		50.0	12/11/2006 6:12:53 PM	1.0000		1.0000

7 ICV/LCS= ICWS-9056

Sample Name:	**ICV/LCS= ICWS-9056**	*Injection Volume:*	**50.0**
Vial Number:	**1296**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 10:08**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.22	Fluoride	2.15196	0.402	19.55	0.7543	BMB
2	4.52	Chloride	1.68575	0.272	13.22	0.7584	BMB
3	5.26	Nitrite-N	3.02418	0.590	28.69	0.7749	BMB
4	6.50	Bromide	0.53885	0.114	5.54	0.7556	BM
5	7.25	Nitrate-N	2.77486	0.679	33.00	0.7714	MB

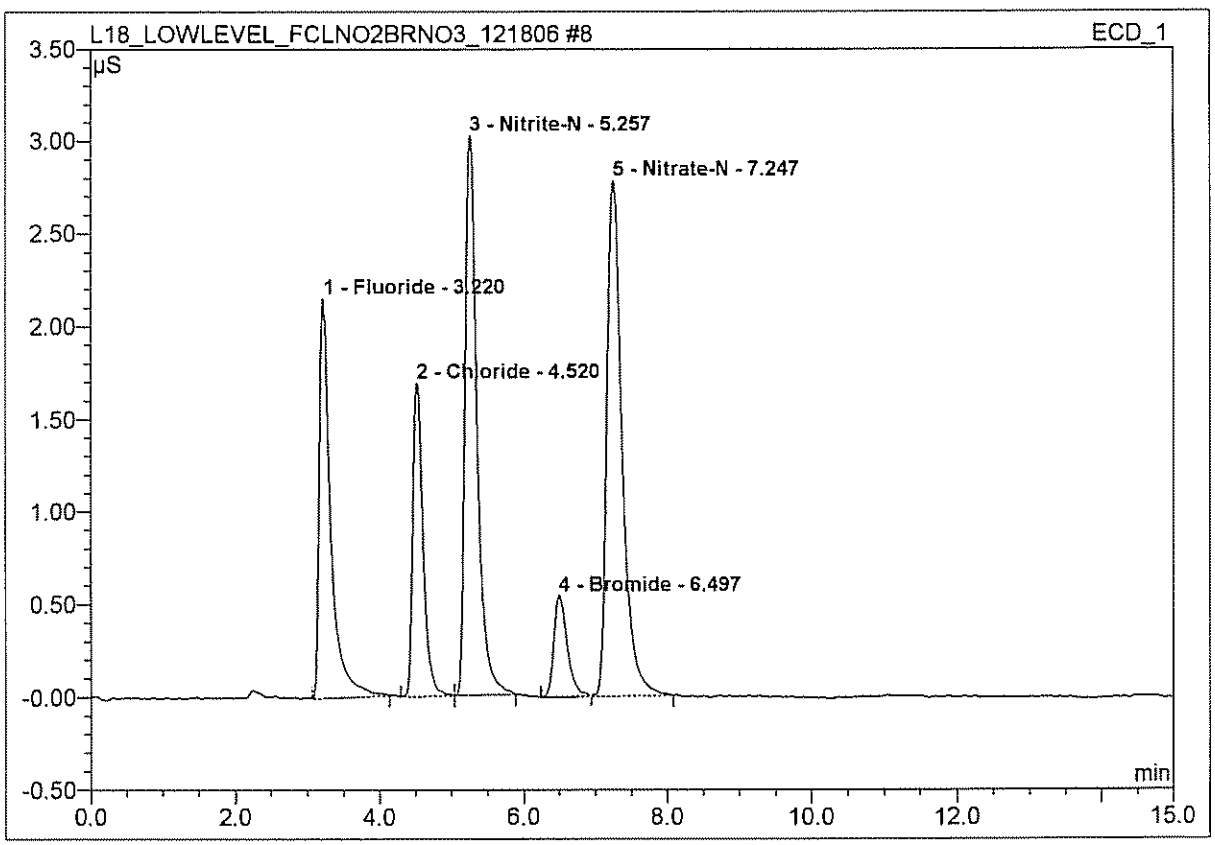
F- = JLV9M1AC

Cl- = JLWAA1AC

Br- = JLWCC1AC

8 ICV/LCSD= ICWS-9057

Sample Name:	**ICV/LCSD= ICWS-9057**	*Injection Volume:*	**50.0**
Vial Number:	**1297**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 10:25**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

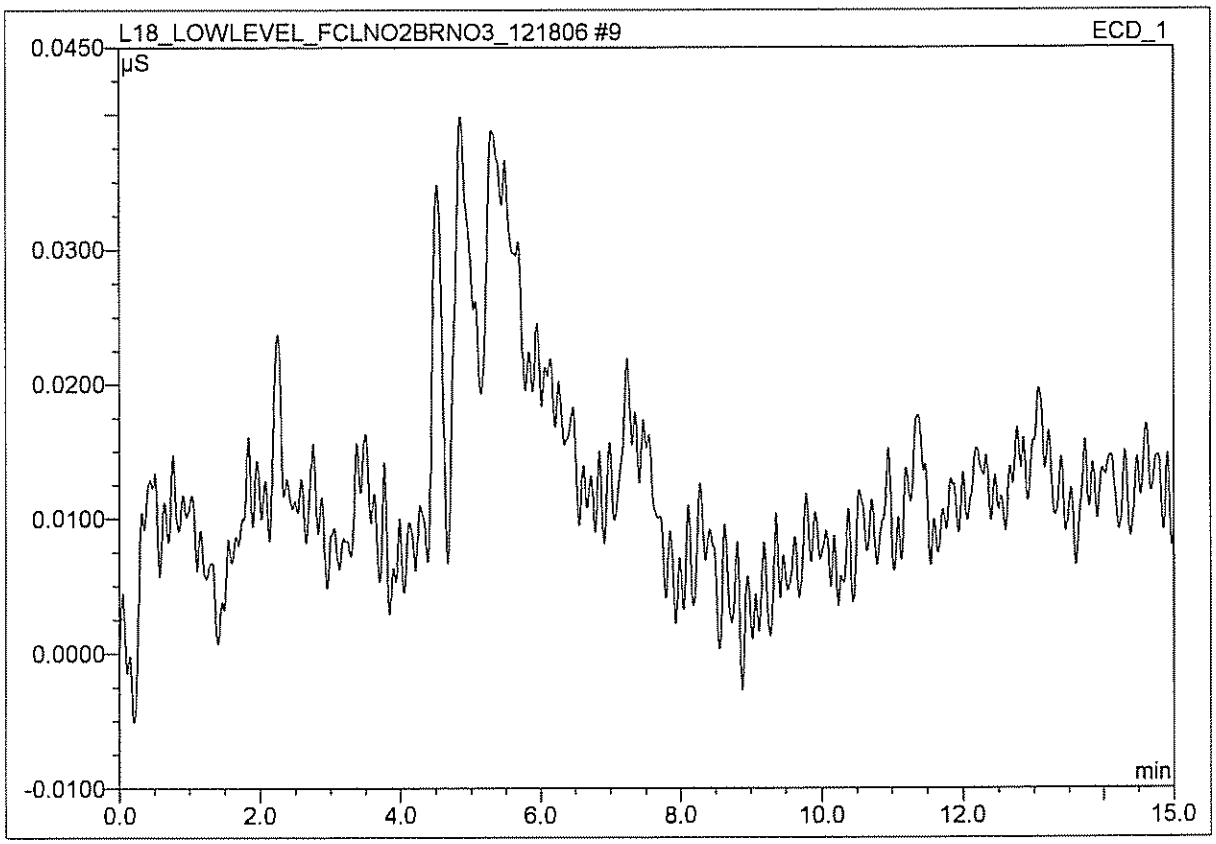


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.22	Fluoride	2.15346	0.399	19.43	0.7548	BMB
2	4.52	Chloride	1.68956	0.275	13.40	0.7601	BM
3	5.26	Nitrite-N	3.01778	0.579	28.25	0.7733	MB
4	6.50	Bromide	0.54226	0.115	5.60	0.7604	Ru
5	7.25	Nitrate-N	2.78137	0.684	33.33	0.7732	BMB

F- : JLV9M1AD
Cl- = JLWAA1AD
Br- = JLWCC1AD

9 ICB/ METHOD BLANK

Sample Name:	**ICB/ METHOD BLANK**	*Injection Volume:*	**50.0**
Vial Number:	**1298**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 10:42**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
						ND	

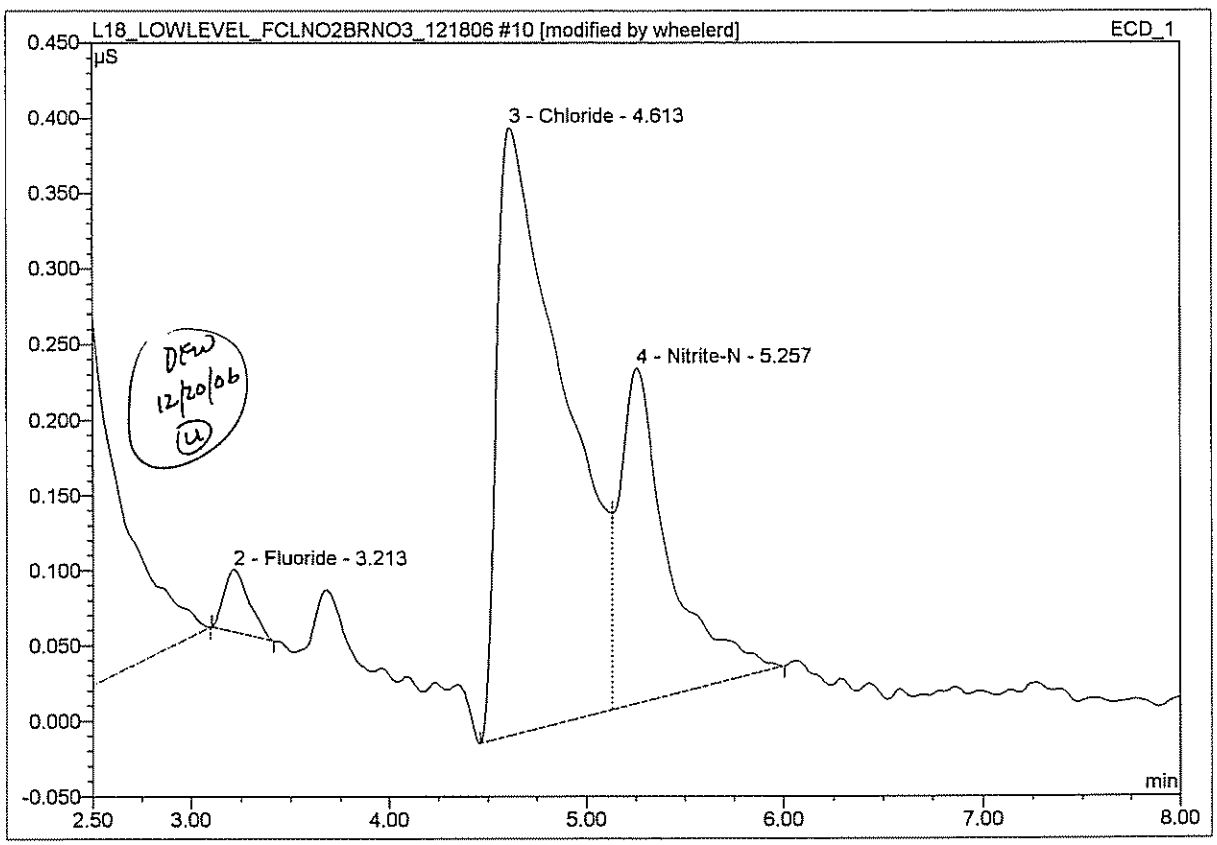
F- = JLV9m1AA

Cl = JLWAA1AA

Br- = JLWCC1AA

10 H6L110105-JK7JW-1/10

Sample Name:	**H6L110105-JK7JW-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**1294**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS_CI2 METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 11:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**27.00**	*Sample Amount:*	**1.0000**

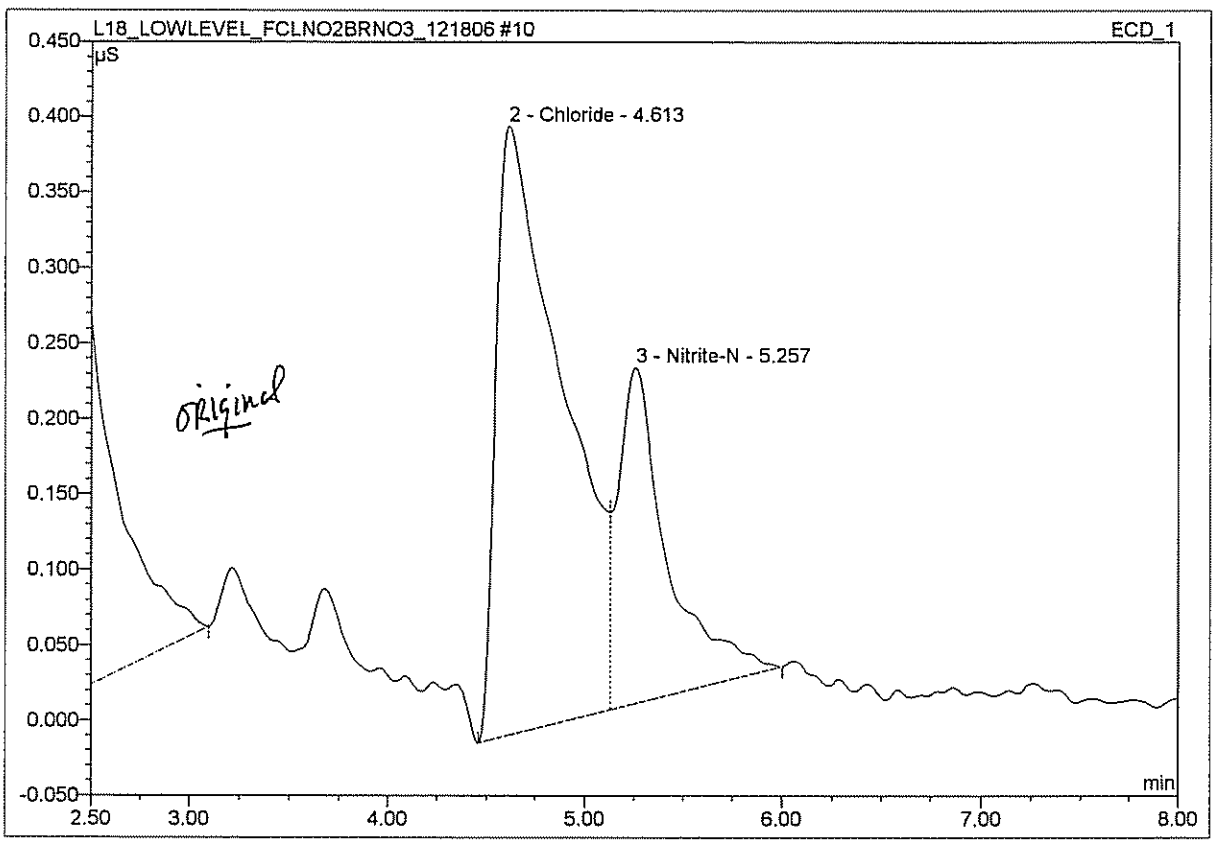


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	1.86348	0.365	0.39	n.a.	BMB
2	3.21	Fluoride	0.04144	0.006	0.01	0.1539	BMB*
3	4.61	Chloride	0.40372	0.157	0.17	1.8322	BM
4	5.26	Nitrite-N	0.22267	0.065	0.07	0.5846	MB
5	11.21	n.a.	69.83583	22.220	24.01	n.a.	BMB
6	20.05	n.a.	74.82854	69.717	75.35	n.a.	BMB

Br^- = ND

10 H6L110105-JK7JW-1/10

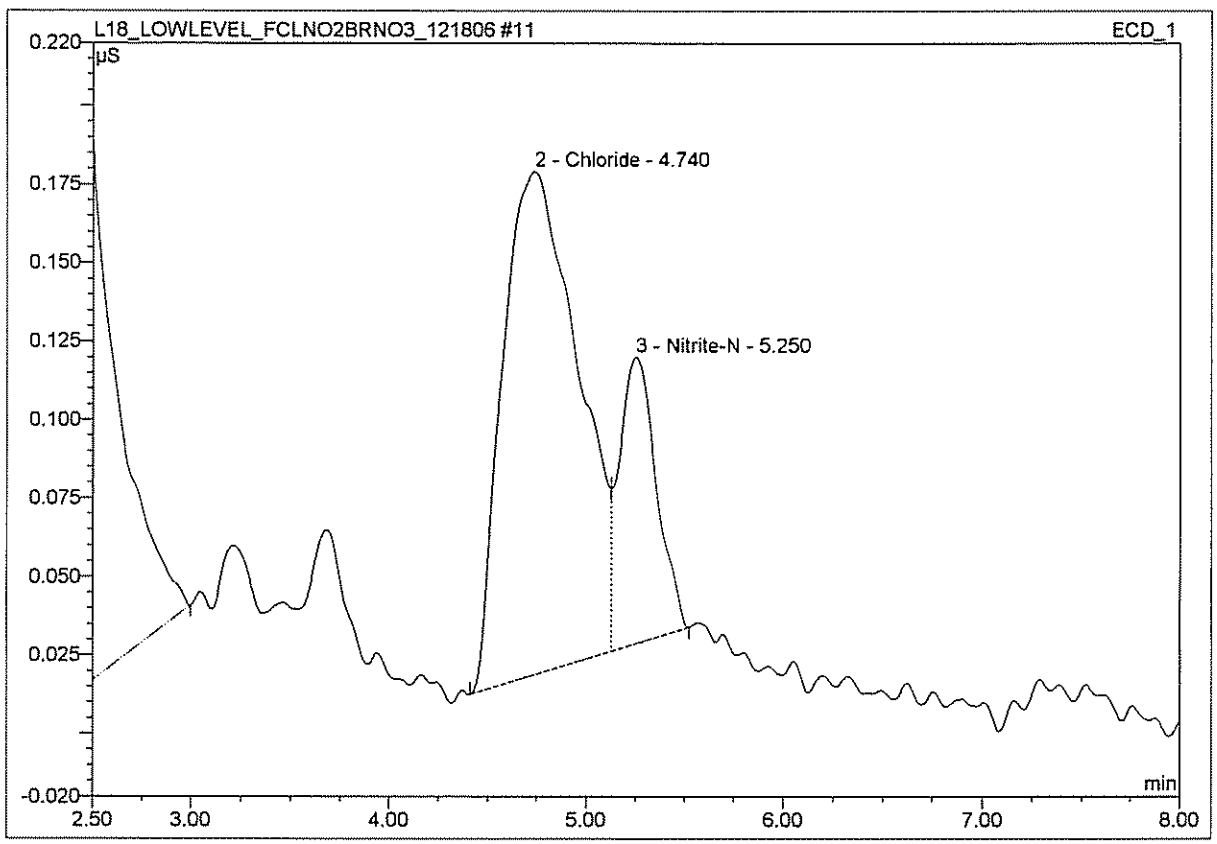
Sample Name:	**H6L110105-JK7JW-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**1294**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS_CI2 METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 11:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**27.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	1.86348	0.365	0.39	n.a.	BMB
2	4.61	Chloride	0.40372	0.157	0.17	1.8322	BM
3	5.26	Nitrite-N	0.22267	0.065	0.07	0.5846	MB
4	11.21	n.a.	69.83583	22.220	24.02	n.a.	BMB
5	20.05	n.a.	74.82854	69.717	75.35	n.a.	BMB

11 H6L110105-JK7JW-1/20

Sample Name:	**H6L110105-JK7JW-1/20**	*Injection Volume:*	**50.0**
Vial Number:	**1294**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS_CI2 METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/18/2006 12:04**	*Sample Weight:*	**1.0000**
Run Time (min):	**27.00**	*Sample Amount:*	**1.0000**

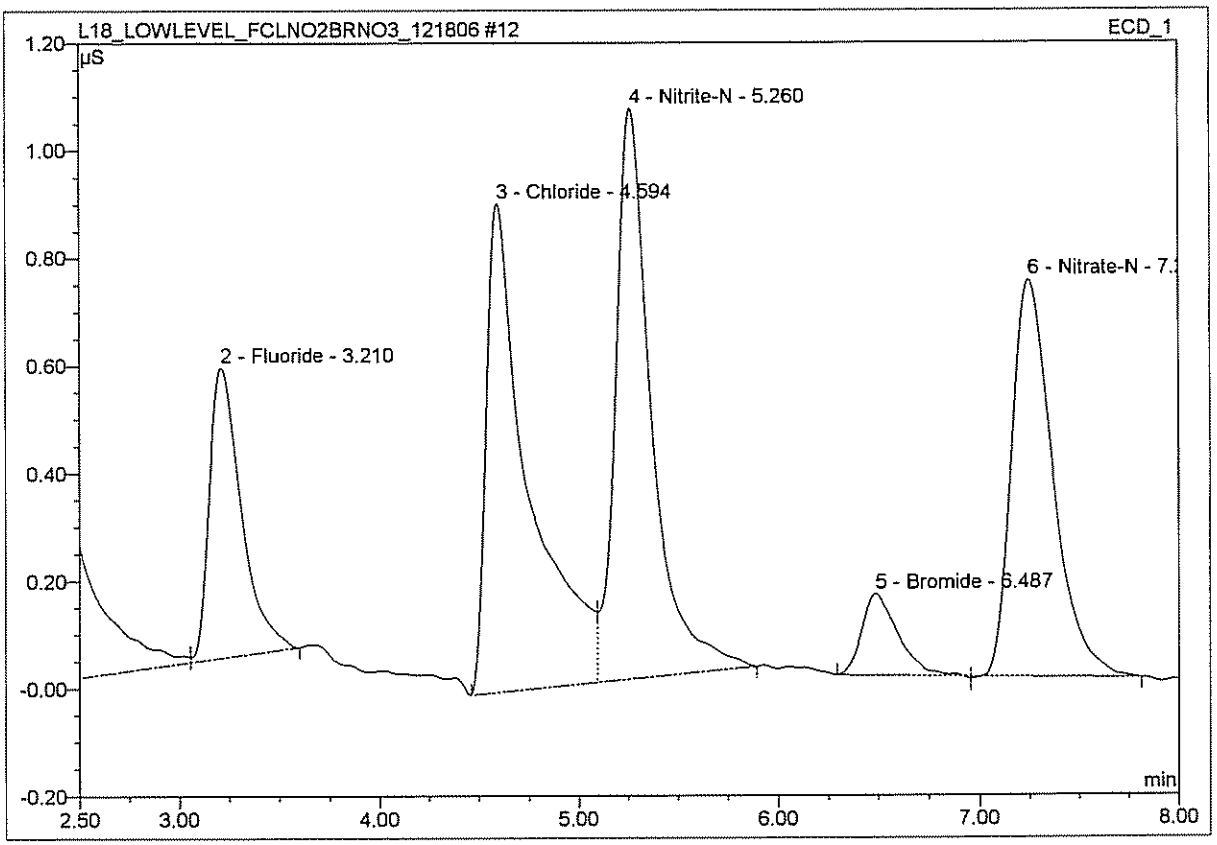


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	1.26942	0.250	0.32	n.a.	BMB
2	4.74	Chloride	0.16018	0.071	0.09	1.4563	BM
3	5.25	Nitrite-N	0.09131	0.020	0.03	0.4800	MB
4	11.24	n.a.	32.26087	10.131	12.85	n.a.	BMB
5	20.06	n.a.	73.77920	68.344	86.71	n.a.	BMB

(Not used — Report 1/10)

12 H6L110105-JK7JW-1/10-MS

Sample Name:	**H6L110105-JK7JW-1/10-MS**	*Injection Volume:*	**50.0**
Vial Number:	**1316**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS_CI2 METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 12:55**	*Sample Weight:*	**1.0000**
Run Time (min):	**27.00**	*Sample Amount:*	**1.0000**

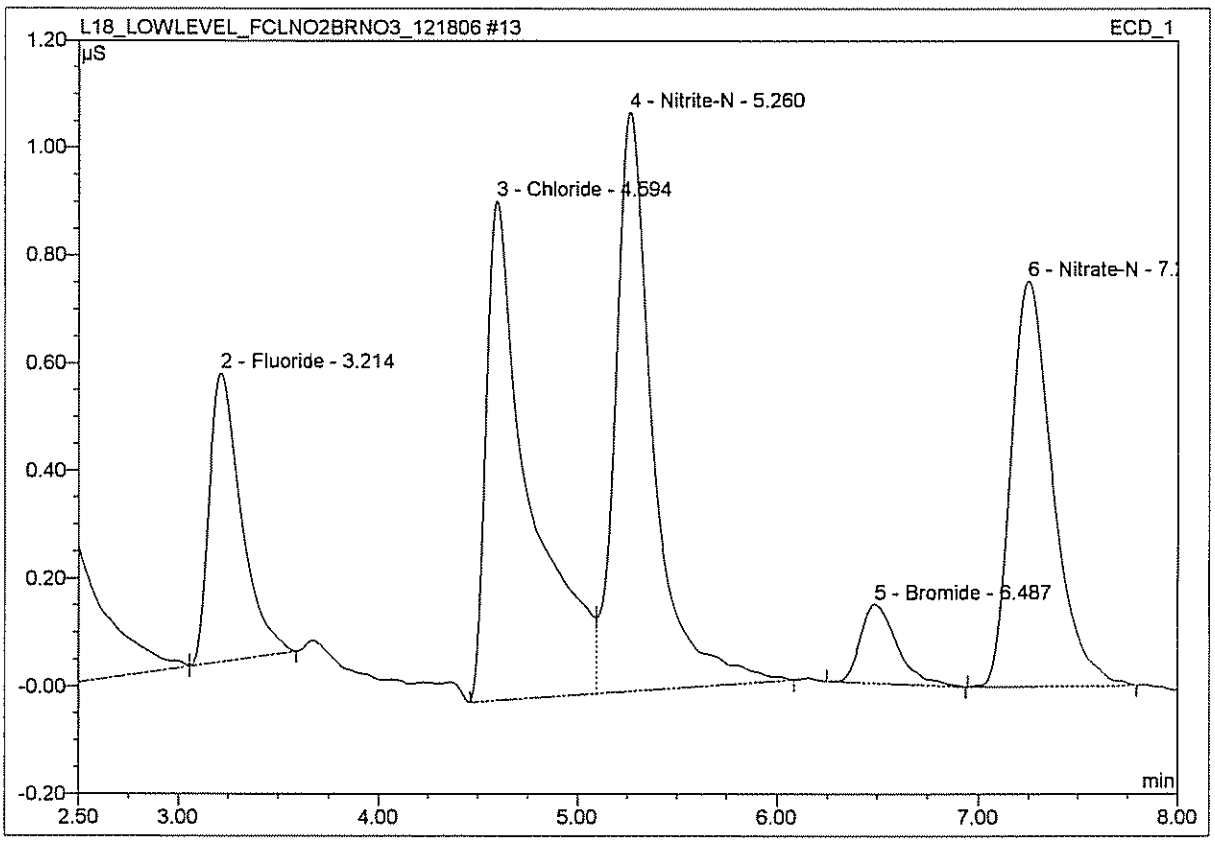


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	1.85981	0.362	0.39	n.a.	BM
2	3.21	Fluoride	0.53915	0.100	0.11	1.9737	MB
3	4.59	Chloride	0.90957	0.224	0.24	4.1136	BM
4	5.26	Nitrite-N	1.06034	0.222	0.24	2.7633	MB
5	6.49	Bromide	0.15083	0.031	0.03	2.1243	BM
6	7.25	Nitrate-N	0.73745	0.176	0.19	2.1095	MB
7	11.20	n.a.	70.20606	22.386	23.92	n.a.	BMB
8	20.03	n.a.	75.25857	70.079	74.89	n.a.	BMB

(Cl⁻) (4.1136 ppm − 1.8322 ppm = 2.2814 ppm / 2 ppm (Cl⁻ mg) = 114%)

13 H6L110105-JK7JW-1/10-MSD

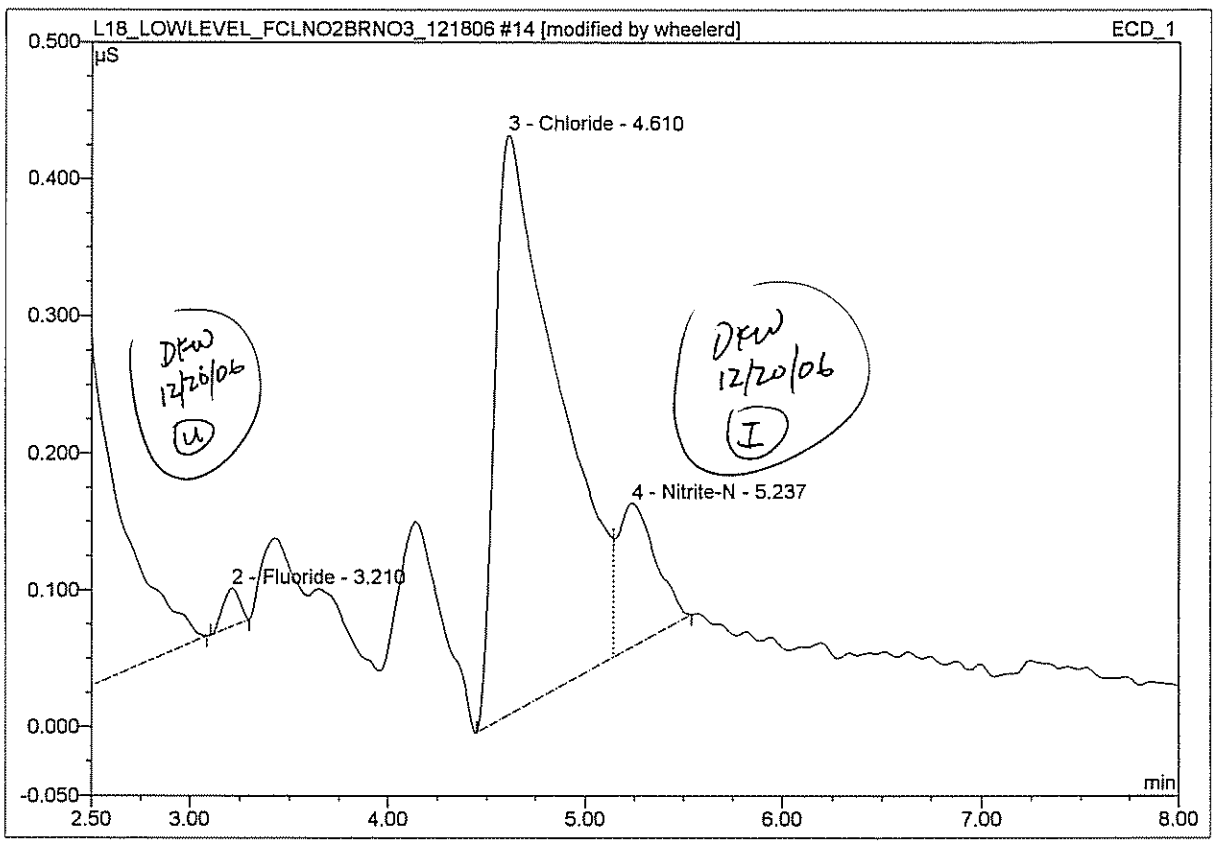
Sample Name:	**H6L110105-JK7JW-1/10-MSD**	*Injection Volume:*	**50.0**
Vial Number:	**1317**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS_CI2 METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 13:25**	*Sample Weight:*	**1.0000**
Run Time (min):	**27.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	1.87485	0.366	0.39	n.a.	BM
2	3.21	Fluoride	0.53591	0.099	0.11	1.9620	MB
3	4.59	Chloride	0.92603	0.232	0.25	4.1875	BM
4	5.26	Nitrite-N	1.07515	0.236	0.25	2.8015	MB
5	6.49	Bromide	0.14608	0.031	0.03	2.0576	BMB
6	7.25	Nitrate-N	0.75239	0.181	0.19	2.1518	BMB
7	11.20	n.a.	70.38196	22.422	23.82	n.a.	BMB
8	20.02	n.a.	75.60729	70.554	74.96	n.a.	BMB

14 H6L110105-JK7J0-1/10

Sample Name:	**H6L110105-JK7J0-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**1317**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS_CI2 METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 14:21**	*Sample Weight:*	**1.0000**
Run Time (min):	**27.00**	*Sample Amount:*	**1.0000**

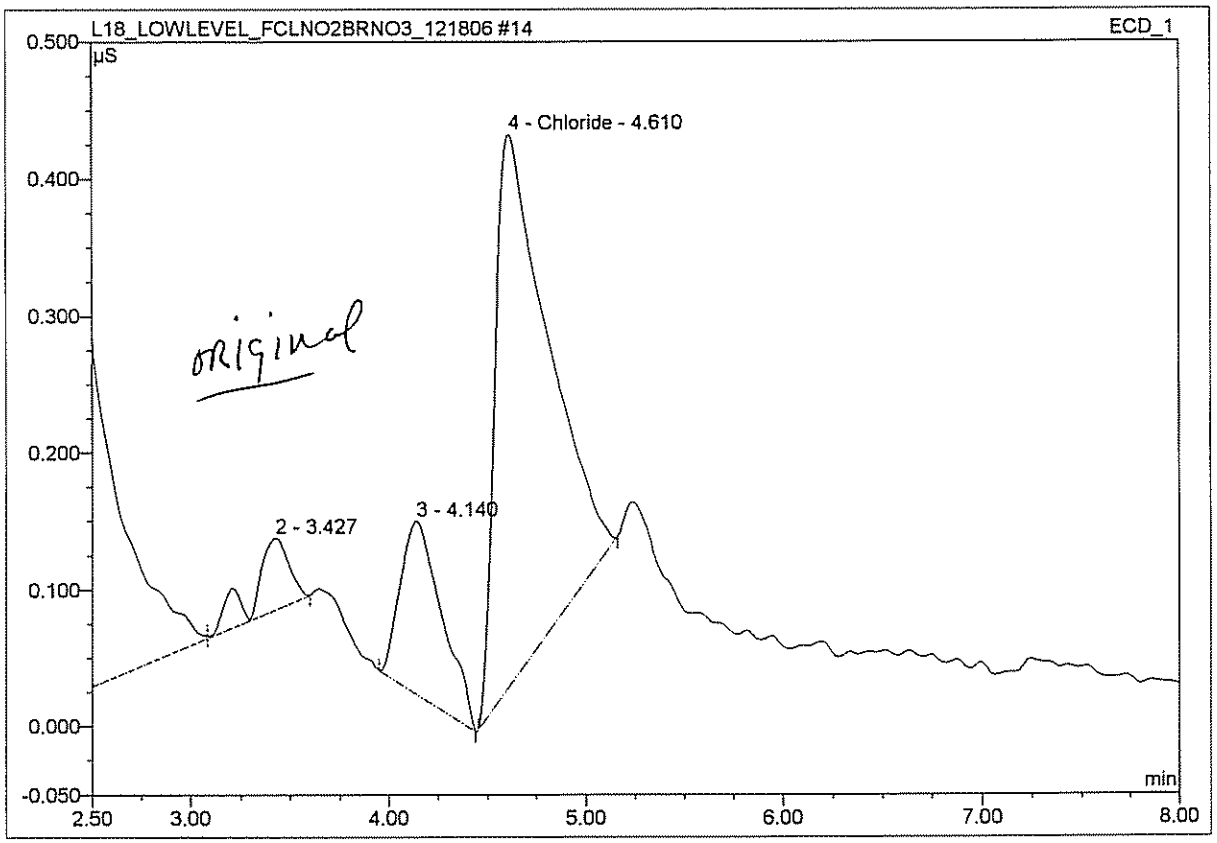


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	1.95991	0.383	0.39	n.a.	BMB*
2	3.21	Fluoride	0.02778	0.003	0.00	0.1032	BMB*
3	4.61	Chloride	0.42305	0.155	0.16	1.9197	BM *
4	5.24	Nitrite-N	0.10530	0.023	0.02	0.2767	MB*
5	11.17	n.a.	81.46681	26.162	26.90	n.a.	BMB
6	20.00	n.a.	75.82434	70.516	72.52	n.a.	BMB

Br- = ND

14 H6L110105-JK7J0-1/10

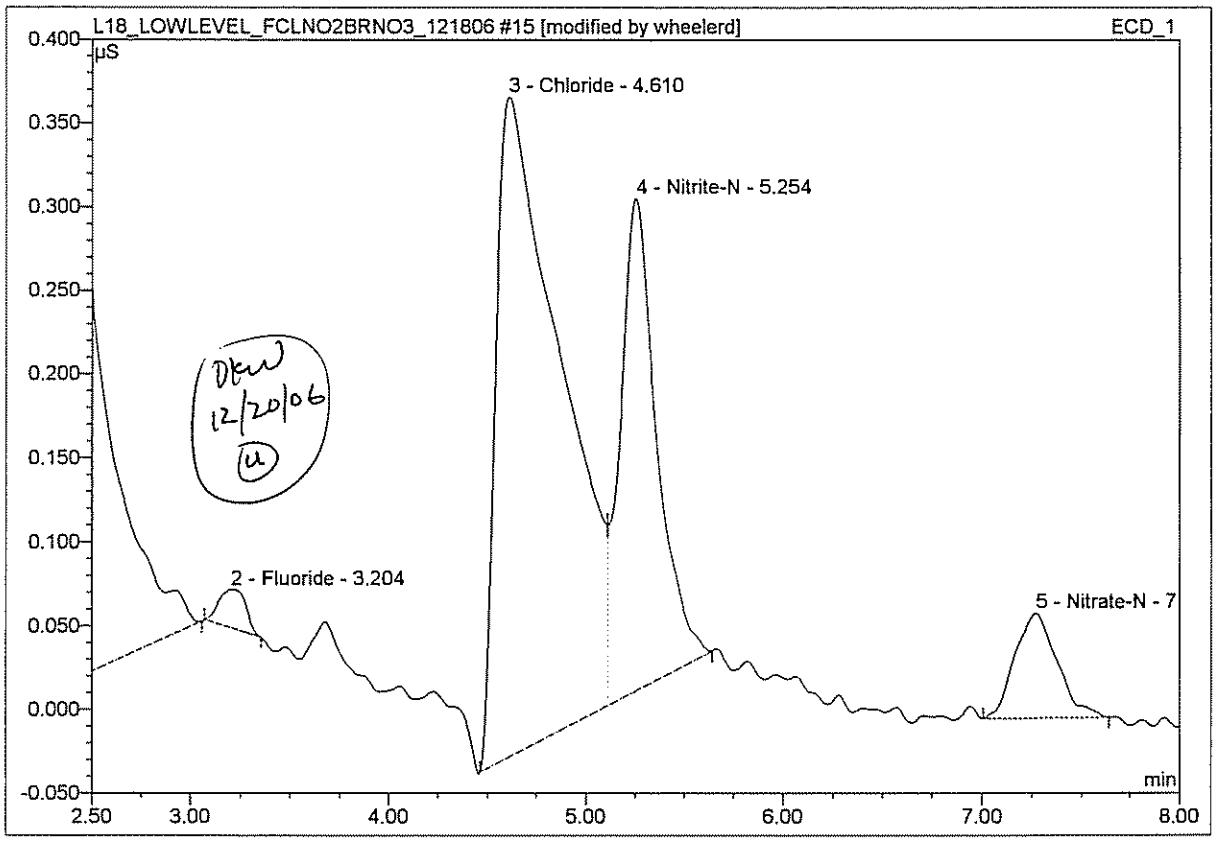
Sample Name:	**H6L110105-JK7J0-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**1317**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS_CI2 METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 14:21**	*Sample Weight:*	**1.0000**
Run Time (min):	**27.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	1.96014	0.384	0.39	n.a.	BM
2	3.43	n.a.	0.05222	0.011	0.01	n.a.	MB
3	4.14	n.a.	0.12638	0.031	0.03	n.a.	BMB
4	4.61	Chloride	0.40312	0.126	0.13	1.8295	BMB
5	11.17	n.a.	81.46681	26.162	26.91	n.a.	BMB
6	20.00	n.a.	75.82434	70.516	72.53	n.a.	BMB

15 H6L110105-JK7J2-1/10

Sample Name:	**H6L110105-JK7J2-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**1318**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 14:50**	*Sample Weight:*	**1.0000**
Run Time (min):	**27.01**	*Sample Amount:*	**1.0000**

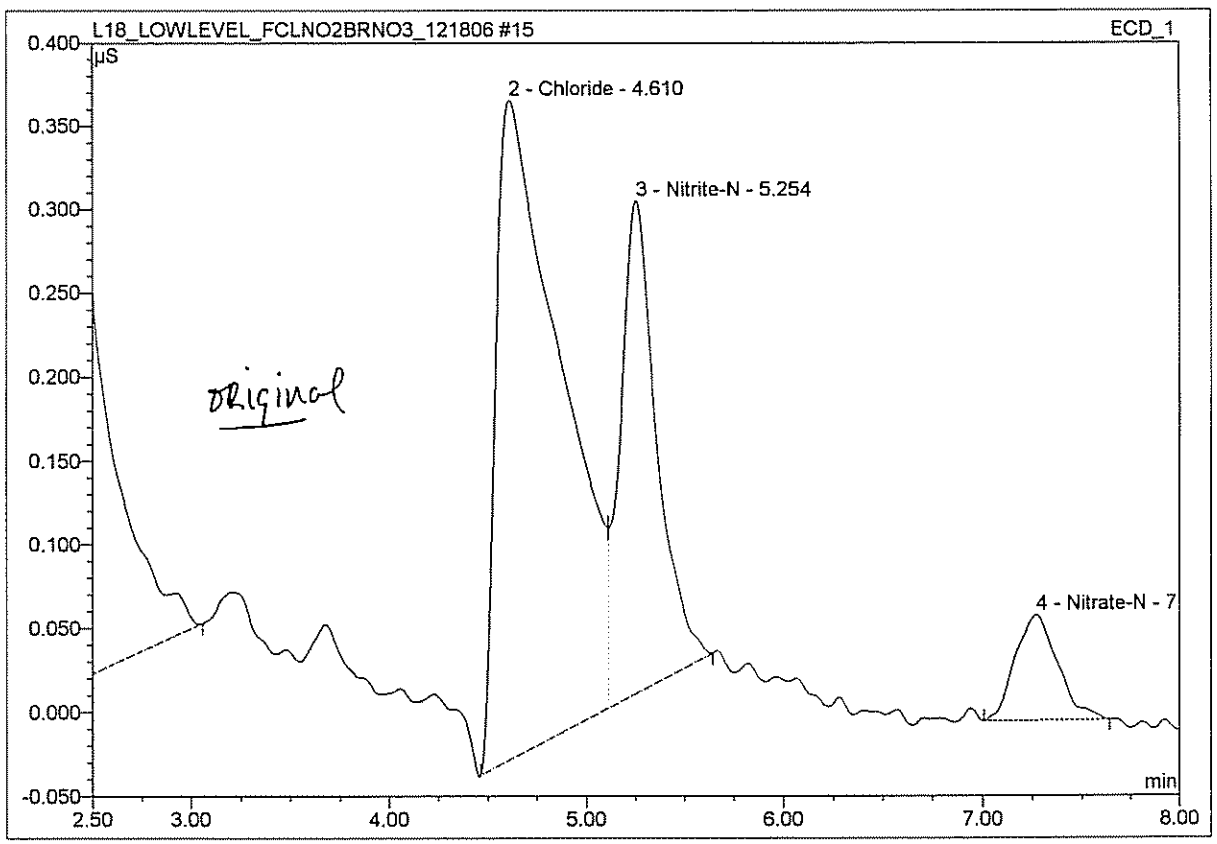


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	1.83224	0.353	0.38	n.a.	BMB
2	3.20	Fluoride	0.02288	0.004	0.00	0.0850	BMB*
3	4.61	Chloride	0.39417	0.149	0.16	1.7890	BM
4	5.25	Nitrite-N	0.29412	0.064	0.07	0.7717	MB
5	7.27	Nitrate-N	0.06279	0.016	0.02	0.1814	BMB
6	11.19	n.a.	70.42751	22.416	23.99	n.a.	BMB
7	20.00	n.a.	75.72053	70.444	75.39	n.a.	BMB

Br⁻ = ND

15 H6L110105-JK7J2-1/10

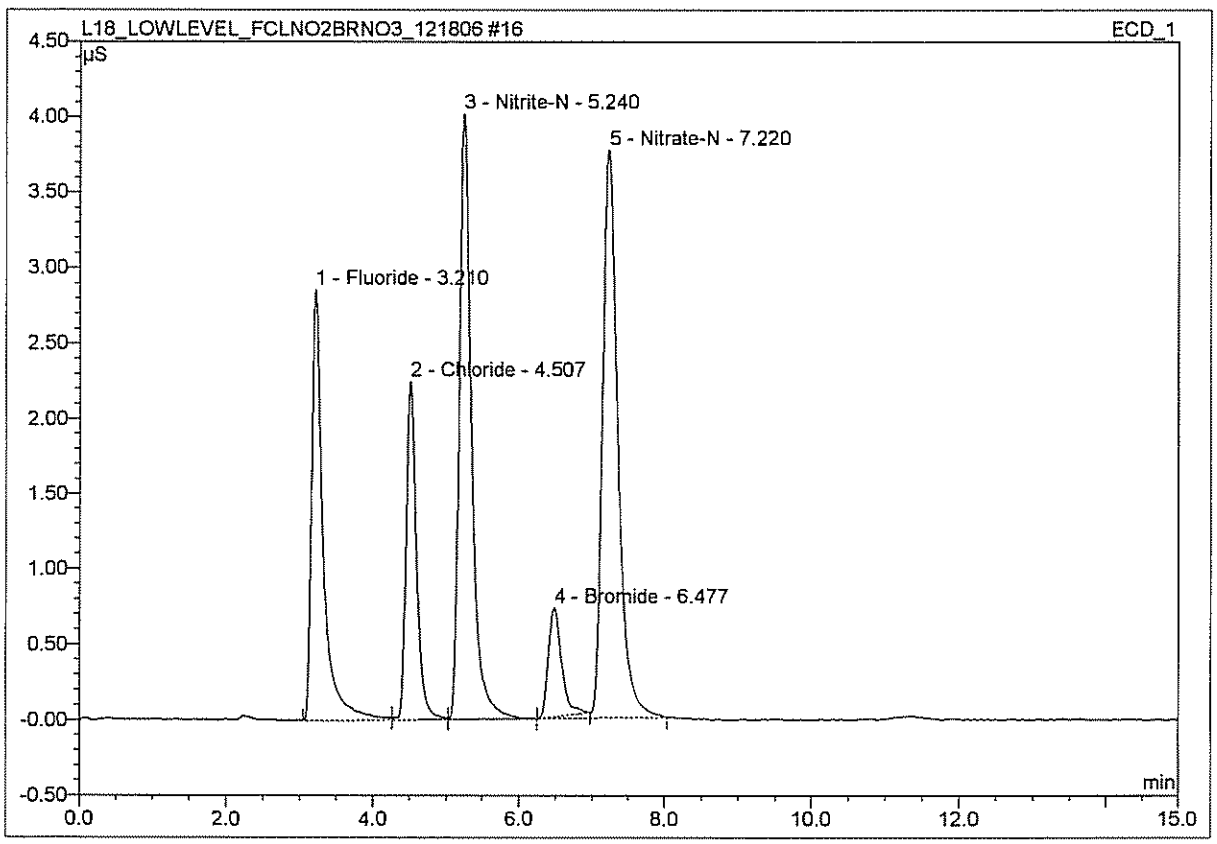
Sample Name:	**H6L110105-JK7J2-1/10**	*Injection Volume:*	**50.0**
Vial Number:	**1318**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS_CI2 METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**10.0000**
Recording Time:	**12/18/2006 14:50**	*Sample Weight:*	**1.0000**
Run Time (min):	**27.01**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	1.83224	0.353	0.38	n.a.	BMB
2	4.61	Chloride	0.39417	0.149	0.16	1.7890	BM
3	5.25	Nitrite-N	0.29412	0.064	0.07	0.7717	MB
4	7.27	Nitrate-N	0.06279	0.016	0.02	0.1814	BMB
5	11.19	n.a.	70.42751	22.416	23.99	n.a.	BMB
6	20.00	n.a.	75.72053	70.444	75.39	n.a.	BMB

16 CCV= ICWS-9058

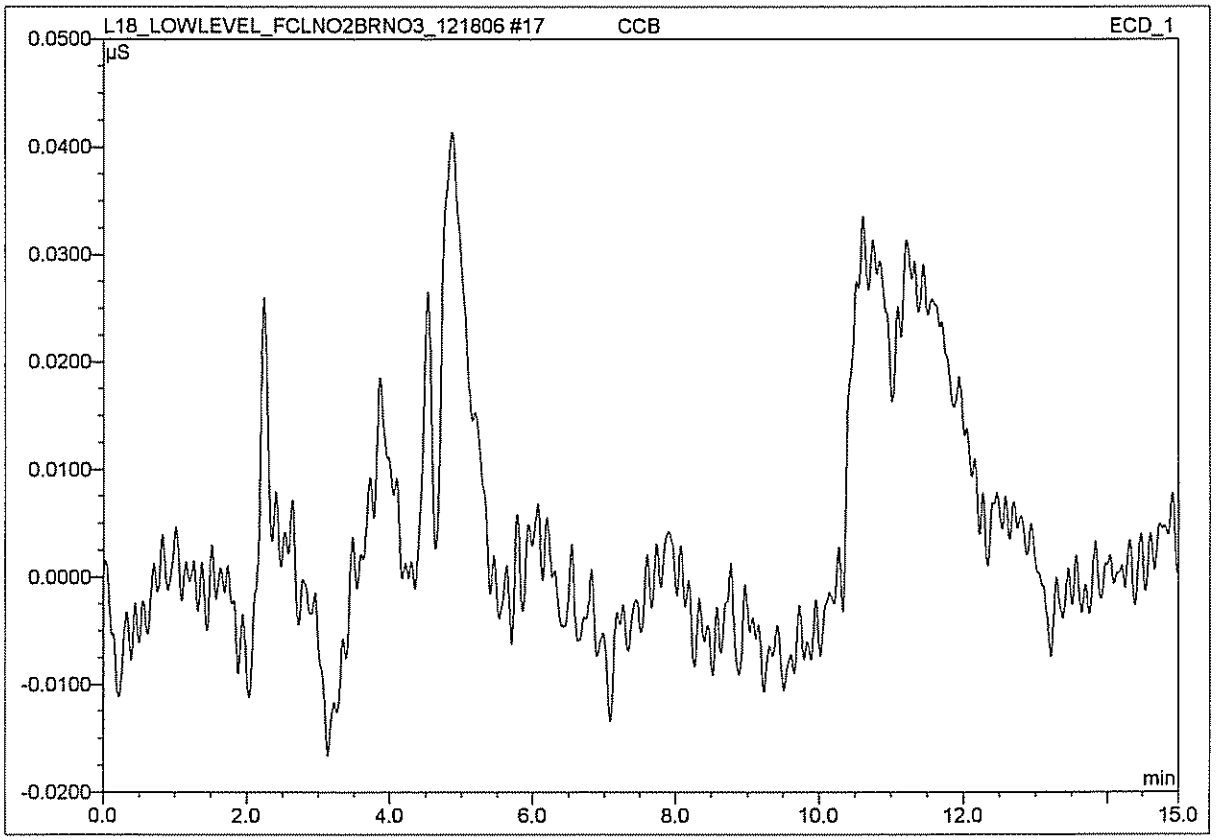
Sample Name:	**CCV= ICWS-9058**	*Injection Volume:*	**50.0**
Vial Number:	**1370**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 15:42**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.21	Fluoride	2.86013	0.531	19.13	0.9852	BM
2	4.51	Chloride	2.24631	0.369	13.32	1.0068	M
3	5.24	Nitrite-N	4.01998	0.788	28.41	1.0217	M
4	6.48	Bromide	0.72019	0.152	5.49	1.0078	Ru
5	7.22	Nitrate-N	3.76823	0.934	33.65	1.0339	MB

17 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**1371**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/18/2006 16:00**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

STL Knoxville Anions in Air Data Review / Narrative Checklist for Methods 9056/9057/26A, SOP KNOX-WC-0005, Rev. 8

Lot #:	H6L110105 (FH), H6L110106	Analysis Date:	12/28/06	File ID:	L28_LowLevel_FClNO3BrNO3_1228/06	ICAL File ID:	J18_LowLevel_FClNO3BrNO3 ~~1018/06~~ 101806

Review Items	NA	Yes	No	If No, why is data reportable?	2nd ✓
1. Were PM checklists (L40), Lot Summary and any applicable QAS reviewed?		✓			✓
2. ICV within 90-110%R?		✓			✓
3. ICB/CCB < 1/2 RL?		✓		☐ **[ccb1] No analyte > MDL in associated samples.**	✓
4. CCVs/CCBs run after every 10 samples, and at end of sequence?		✓			✓
5. Is %D ≤10% for each CCV?		✓			✓
6. If CCV failed, was it rerun only once?	✓				N/A
7. LCS/LCSD analytes within 90-110%R? *If no, list LCS ID:*		✓		☐ **[lcs3] LCS recovery >upper control limit & sample results <RL.**	✓
8. Method blank < 1/2 RL? *If no, list blank ID:*		✓		☐ **[mb3] No analyte > RL in associated samples.** ☐ [mb7] Sample results > 10x higher than blank.	✓
9. Matrix spikes run at required frequency?		✓			✓
10. Matrix spikes within 75-125% recovery? *If no, list MS ID:* _____		✓		☐ [air ms1] MS %R slightly outside limits for 1 sample. ☐ [air ms2] MS %R slightly outside limits for >1 sample. ☐ Air train reagent blank – spike result not reported.	✓
11. Were MS run #'s assigned to all matrix spikes except reagent blanks?		✓			✓
12. Sample analyses done within holding time (HT)? *If no, list samples:*		✓		☐ [ht1] HT expired upon receipt. ☐ *[ht2] Analysis requested after HT expired.*	✓
13. Were results processed using correct ICAL?		✓			✓
14. Are positive results within the calibration range?		✓			✓
15. Is integration acceptable for all samples, QC samples and standards?		✓			✓
16. For manual integrated standards and QC samples, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system.	✓
17. Calculations checked for error? (Document manual calculation checks.)		✓			✓
18. Were spreadsheets checked for transcription errors?		✓			✓
19. Final report/F6 correct? (Verify results, RLs, units, qualifiers, DFs, dates, spikes.)		✓			✓
20. Are all nonconformances documented and discussed in narrative?	✓			List NCM #:	N/A
21. Appropriate air train autotext selected for narrative?		✓		☐ [air1] Cl^- reported as HCl and Cl_2. ☐ [air2] Cl^- reported as HCl only. ☐ [air3] Cl^-, F^- reported as HCl, Cl_2, HF. ☑ [air4] Cl^-, F^-, Br^- reported as HCl, Cl_2, HF, HBr, Br_2. ☐ [air5] Cl^-, F^-, NO_2^-, NO_3^- reported as HCl, Cl_2, HF, HNO_2, HNO_3. ☐ [air6] Cl^-, F^-, Br^-, I^- reported as HCl, Cl_2, HF, HBr, Br_2, I^-. ☐ [air7] Cl^-, F^-, NO_2^-, NO_3^- reported as Cl^-, F^-, NO_2^-, NO_3^-.	air4
22. Sample pH adjustment included in narrative?	✓			☐ [air pH] Sample pH adjusted prior to analysis.	N/A
23. Audit sample results included in narrative?	✓			☐ [audit2] Audit results in mg/L.	N/A

1st Level Reviewer: [signature]	Date: 12/29/06	2nd Level Reviewer: [signature]	Date: 12/29/06
JL9AA (LCS)			
Height = 2.19733 (0.7501) + 0.033578 (0.7501)² = 1.667 ✓		JK7J7(MS) HCl: 7.932 µg/ml × 425 ml × (1.0079 + 35.453) / 35.453 = 34669 µg	

Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 6363147
Prep Date: 12/28/2006 0000
Comp Date: 12/28/2006 0000

Analyte: Hydrogen Chloride
CAS #: 7647-01-0
QuantIMS #: 2702

Analyst Initials: DFW
Analyst LIMS Code: 072000
Instr. ID: 1500

Reviewed by: RMW
Date: 12/29/06
MW Factor: 1.028429188

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H6L110105	3		4L	0.1	0.042	JK7JX1AA	465	40	0.4018	ND	1,912.8783	803.4089	19,128.78	122806	1701
H6L110105	3	S	4L	0.1	0.042	JK7JX1AE	465	40	8.7252	4172.5614	1,912.8783	803.4089	19,128.78	122806	2013
H6L110105	3	D	4L	0.1	0.042	JK7JX1AF	465	40	7.8986	3777.2651	1,912.8783	803.4089	19,128.78	122806	2030
H6L110105	5		4L	0.1	0.042	JK7J11AA	600	40	0.3128	ND	2,468.2301	1,036.6566	24,682.30	122806	1736
H6L110106	2		4L	0.1	0.042	JK7J71AA	425	40	0.2973	ND	1,748.3296	734.2984	17,483.30	122806	1515
H6L110106	2	S	4L	0.1	0.042	JK7J71AJ	425	40	7.9320	3466.9376	1,748.3296	734.2984	17,483.30	122806	1534
H6L110106	2	D	4L	0.1	0.042	JK7J71AK	425	40	7.8852	3446.4822	1,748.3296	734.2984	17,483.30	122806	1552
H6L110106	6		4L	0.1	0.042	JK7KG1AA	400	40	0.2077	ND	1,645.4867	691.1044	16,454.87	122806	1811
H6L110106	10		4L	0.1	0.042	JK7KT1AA	363	40	0.6837	ND	1,493.28	627.18	14,932.79	122806	1846
H6L290000	147	B	4L	0.1	0.042	JL9AA1AA	100	1	0.0000	ND	10.28	4.32	102.84	122806	1358
H6L290000	147	C	4L	0.1	0.042	JL9AA1AC	100	1	0.7501	77.1425	10.28	4.32	102.84	122806	1324
H6L290000	147	L	4L	0.1	0.042	JL9AA1AD	100	1	0.7563	77.7801	10.28	4.32	102.84	122806	1341

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-9087	100.00	0.750	100.0	JL9AA1AC	0.75	102.84	77.13
LCSD	ICWI-9087	100.00	0.750	100.0	JL9AA1AD	0.75	102.84	77.13
MS (1)	ICWI-9087	100.00	0.020	10.0	JK7JX1AE	0.20	19,128.78	3,825.76
MSD (1)	ICWI-9087	100.00	0.020	10.0	JK7JX1AF	0.20	19,128.78	3,825.76
MS (2)	ICWI-9087	100.00	0.020	10.0	JK7J71AJ	0.20	17,483.30	3,496.66
MSD (2)	ICWI-9087	100.00	0.020	10.0	JK7J71AK	0.20	17,483.30	3,496.66
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
Dionex IC Runlog Cover Page

Analyst:	DFW	Date:	12/28/06	Sequence ID:	L28_LowLevel_FClNO2BrNO3_122806

Instrument:		Method:	
	☐ DX-600		☐ KNOX-WC-0003, SW-846 0061/7199
	☑ ICS-1500		☐ KNOX-WC-0005, ☐ SW-846 9056 ☐ EPA 300.0 ☐ SW-846 9057-Mod ☑ EPA 26A-Mod
	☐ DX-320		☐ KNOX-WC-0014, EPA 314.0

Preventive Maintenance	Instrument Conditions		
Daily:	Flow Rate =	1.00	mL/min
☑ Check pump and gas pressure	Pressure =	1840.	psi
☑ Check all lines for crimping, leaks and discoloration	Conductance =	24.9	µS
As Needed:	Suppressor Current =	43	mA
☐ Change column and guard column	Eluent Generator =	N/A	mM KOH
☐ Change column and/or guard column bed support			
☐ Clean conductivity cell			
☐ De-gas pump head when flow is erratic			
☐ Check/replace eluant end line filter			

MS/MSD Spike Information

WO #	Compound	Spike ID	Parent Conc.	Spike Added (mL)	Final Volume (mL)	Final Conc.
DFW 12/28/06 JK7J7	Chloride	ICWI-9087	100. PPM	0.02	10.	0.2 ppm
JK7JX	"	"	"	0.02	10	"

DFW 12/28/06

Comments: HCl Batch 6363147

☐ Sodium Thiosulfate added to NaOH impinger samples.

Sequence: L28_LOWLEVEL_FCLNO2BRNO3_122806
Operator: wheelerd

Printed: 12/29/2006 8:55:10 AM

(DEW 12/29/06)

Title:
Datasource: ICS_1500_net
Location: ICS1500
Timebase: ICS1500
#Samples: 34

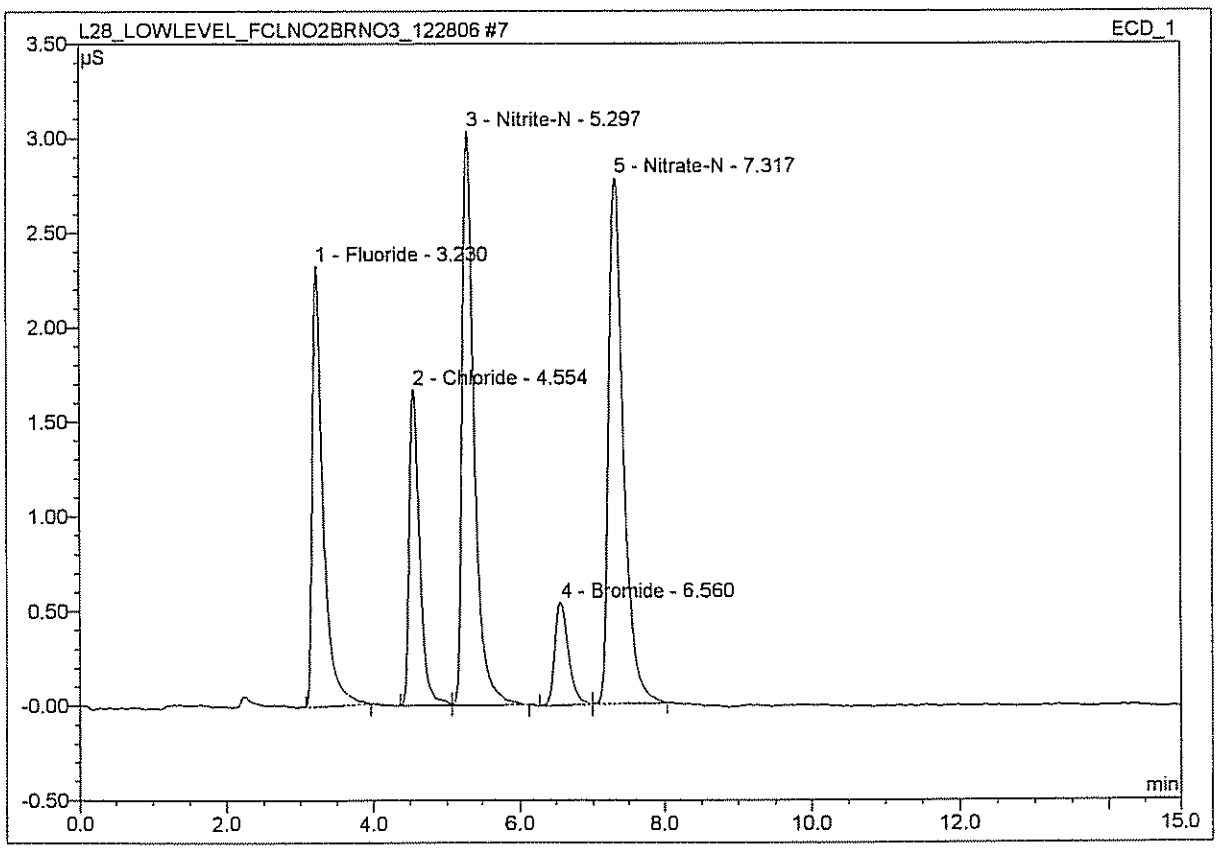
Created: 12/28/2006 10:49:27 AM by wheelerd
Last Update: 12/28/2006 4:28:05 PM by wheelerd

No.	Name	Sample ID	Inj. Vol.	Inj. Date/Time	Dil. Factor	*Multiplier [Liters]	Weight
1	CAL STD #1 ICWS-8915		50.0	10/18/2006 9:14:56 AM	1.0000		1.0000
2	CAL STD #2 ICWS-8916		50.0	10/18/2006 9:32:20 AM	1.0000		1.0000
3	CAL STD #3 ICWS-8917		50.0	10/18/2006 9:49:45 AM	1.0000		1.0000
4	CAL STD #4 ICWS-8918		50.0	10/18/2006 10:07:09 AM	1.0000		1.0000
5	CAL STD #5 ICWS-8919		50.0	10/18/2006 10:24:33 AM	1.0000		1.0000
6	CAL STD #6 ICWS-8920		50.0	10/18/2006 10:41:57 AM	1.0000		1.0000
7	ICV/LCS= ICWS-9088		50.0	12/28/2006 1:24:09 PM	1.0000		1.0000
8	ICV/LCSD= ICWS-9089		50.0	12/28/2006 1:41:33 PM	1.0000		1.0000
9	ICB/ METHOD BLANK		50.0	12/28/2006 1:58:57 PM	1.0000		1.0000
10	H6L110106-JK7J7-1/20		50.0	12/28/2006 2:16:22 PM	20.0000		1.0000
11	H6L110106-JK7J7-1/20-MS@0.2ppm Cl		50.0	12/28/2006 2:40:20 PM	20.0000		1.0000
12	H6L110106-JK7J7-1/20-MSD@0.2ppm Cl		50.0	12/28/2006 2:57:44 PM	20.0000		1.0000
13	H6L110106-JK7J7-1/40		50.0	12/28/2006 3:15:08 PM	40.0000		1.0000
14	H6L110106-JK7J7-1/40-MS@0.2ppm Cl		50.0	12/28/2006 3:34:42 PM	40.0000		1.0000
15	H6L110106-JK7J7-1/40-MSD@0.2ppm Cl		50.0	12/28/2006 3:52:06 PM	40.0000		1.0000
16	CCV= ICWS-9090		50.0	12/28/2006 4:09:30 PM	1.0000		1.0000
17	CCB		50.0	12/28/2006 4:26:54 PM	1.0000		1.0000
18	H6L110105-JK7JX-1/20		50.0	12/28/2006 4:44:18 PM	20.0000		1.0000
19	H6L110105-JK7JX-1/40		50.0	12/28/2006 5:01:43 PM	40.0000		1.0000
20	H6L110105-JK7J1-1/20		50.0	12/28/2006 5:19:07 PM	20.0000		1.0000
21	H6L110105-JK7J1-1/40		50.0	12/28/2006 5:36:31 PM	40.0000		1.0000
22	H6L110106-JK7KG-1/20		50.0	12/28/2006 5:53:56 PM	20.0000		1.0000
23	H6L110106-JK7KG-1/40		50.0	12/28/2006 6:11:20 PM	40.0000		1.0000
24	H6L110106-JK7KT-1/20		50.0	12/28/2006 6:28:44 PM	20.0000		1.0000
25	H6L110106-JK7KT-1/40		50.0	12/28/2006 6:46:08 PM	40.0000		1.0000
26	CCV= ICWS-9090		50.0	12/28/2006 7:03:32 PM	1.0000		1.0000
27	CCB		50.0	12/28/2006 7:20:56 PM	1.0000		1.0000
28	H6L110105-JK7JX-1/20-MS@0.2ppm Cl		50.0	12/28/2006 7:38:20 PM	20.0000		1.0000
29	H6L110105-JK7JX-1/20-MSD@0.2ppm Cl		50.0	12/28/2006 7:55:44 PM	20.0000		1.0000
30	H6L110105-JK7JX-1/40-MS@0.2ppm Cl		50.0	12/28/2006 8:13:09 PM	40.0000		1.0000
31	H6L110105-JK7JX-1/40-MSD@0.2ppm Cl		50.0	12/28/2006 8:30:33 PM	40.0000		1.0000
32	CCV= ICWS-9090		50.0	12/28/2006 8:47:58 PM	1.0000		1.0000
33	CCB		50.0	12/28/2006 9:05:22 PM	1.0000		1.0000
34	SHUTDOWN		50.0	12/28/2006 9:22:46 PM	1.0000		1.0000

Operator:wheelerd Timebase:ICS1500 Sequence:L28_LOWLEVEL_FCLNO2BRNO3_122806 Page 1-1
12/28/2006 2:40 PM

7 ICV/LCS= ICWS-9088

Sample Name:	**ICV/LCS= ICWS-9088**	*Injection Volume:*	**50.0**
Vial Number:	**1296**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 13:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



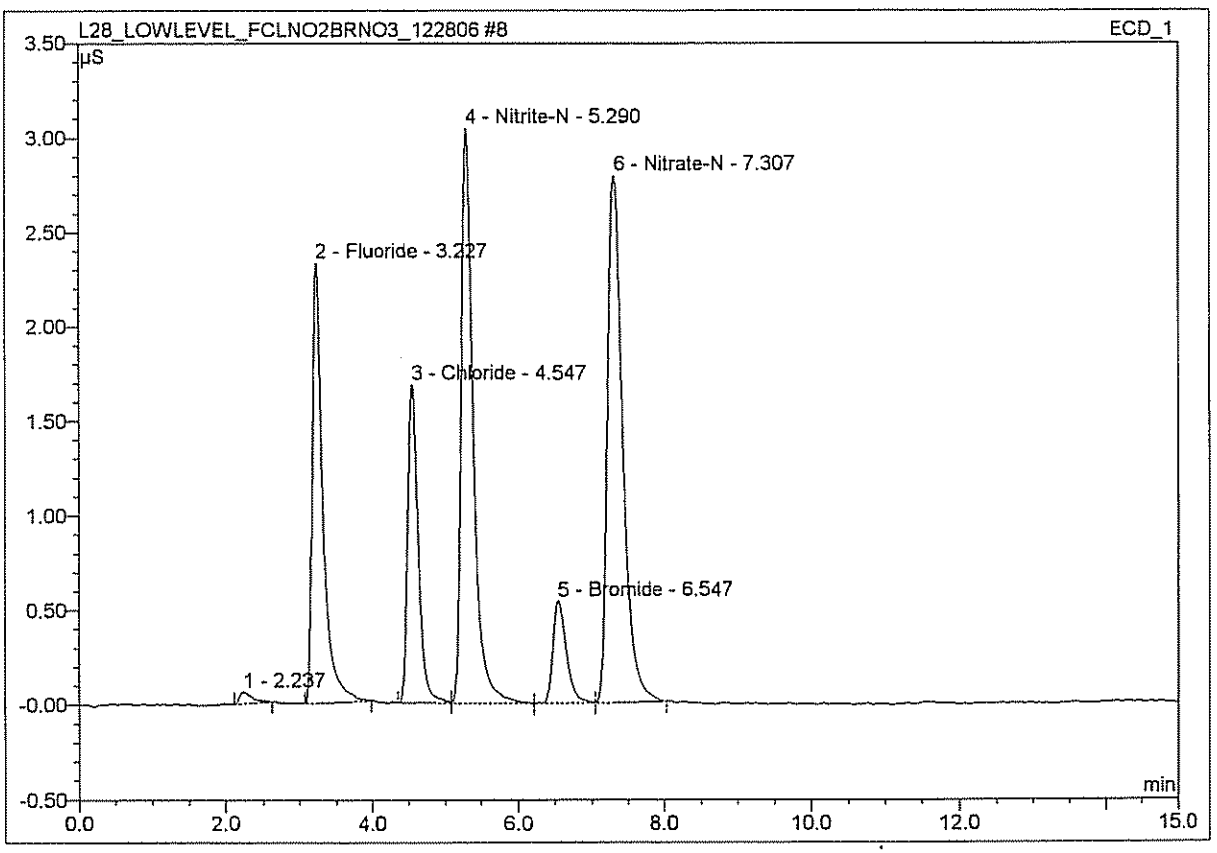
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	2.32322	0.397	19.53	0.8109	BMB
2	4.55	Chloride	1.66709	0.273	13.44	0.7501	BM
3	5.30	Nitrite-N	3.02897	0.586	28.80	0.7761	MB
4	6.56	Bromide	0.54320	0.115	5.64	0.7617	BMb
5	7.32	Nitrate-N	2.77714	0.663	32.59	0.7720	bMB

HCl JL9AA-1AC

Operator:wheelerd Timebase:ICS1500 Sequence:L28_LOWLEVEL_FCLNO2BRNO3_122806 Page 1-1
12/28/2006 2:40 PM

8 ICV/LCSD= ICWS-9089

Sample Name:	**ICV/LCSD= ICWS-9089**	*Injection Volume:*	**50.0**
Vial Number:	**1297**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 13:41**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



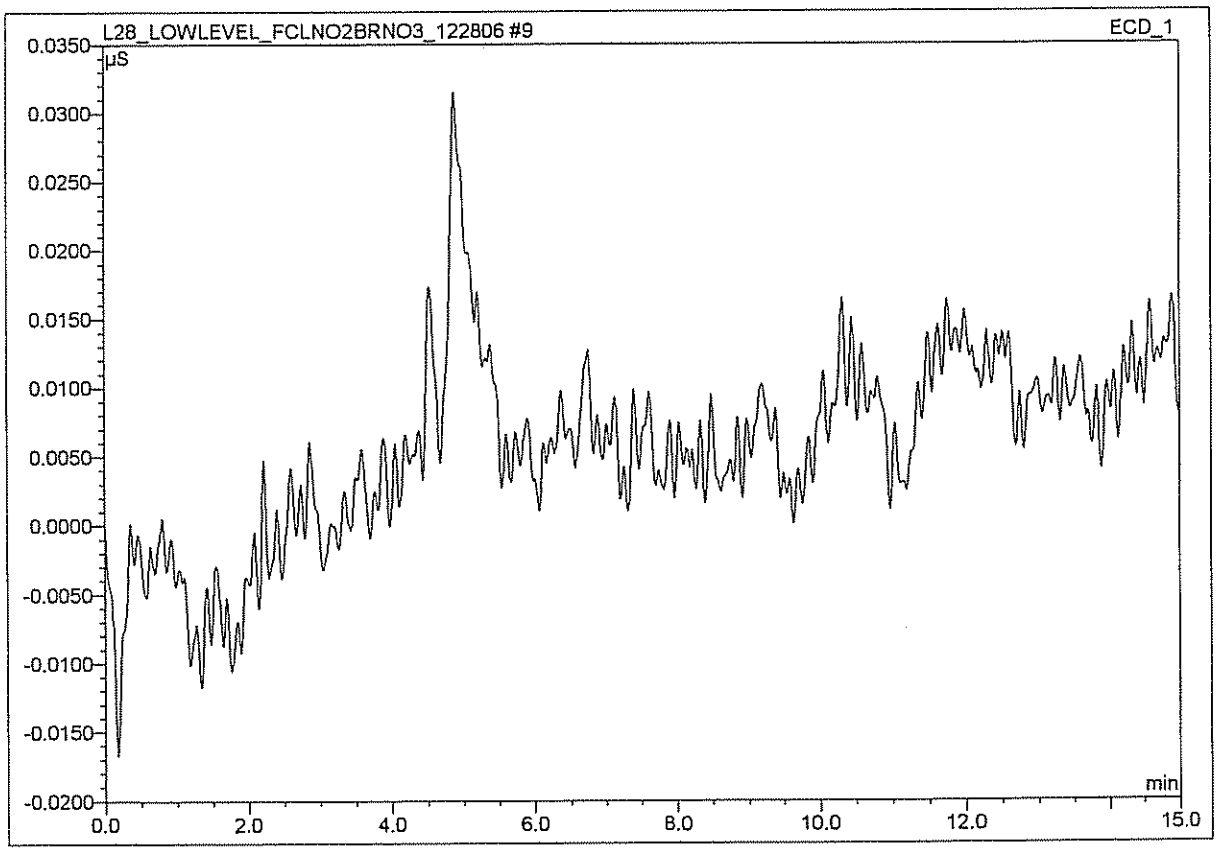
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	0.06095	0.013	0.61	n.a.	BMB
2	3.23	Fluoride	2.32775	0.399	19.45	0.8124	BMB
3	4.55	Chloride	1.68114	0.274	13.35	0.7563	BM
4	5.29	Nitrite-N	3.03772	0.587	28.59	0.7783	M
5	6.55	Bromide	0.53922	0.114	5.54	0.7561	MB
6	7.31	Nitrate-N	2.78963	0.666	32.46	0.7754	BMB

HCl JL9AA-1A/1D
RW 12/29/06

Operator:wheelerd Timebase:ICS1500 Sequence:L28_LOWLEVEL_FCLNO2BRNO3_122806 Page 1-1
12/28/2006 2:40 PM

9 ICB/ METHOD BLANK

Sample Name:	**ICB/ METHOD BLANK**	*Injection Volume:*	**50.0**
Vial Number:	**1298**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 13:58**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



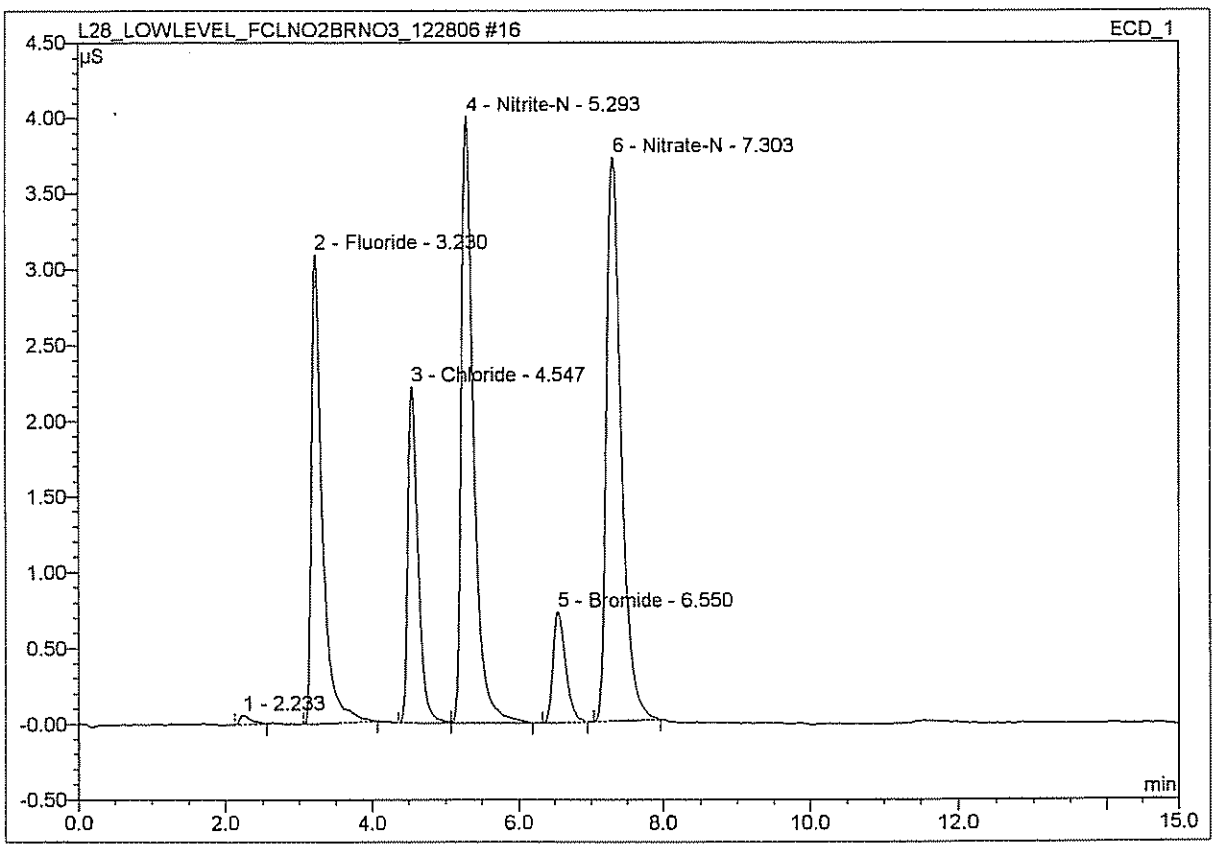
No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

HCl JL9AA-1AA

16 CCV= ICWS-9090

Sample Name:	**CCV= ICWS-9090**	*Injection Volume:*	**50.0**
Vial Number:	**1370**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 16:09**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

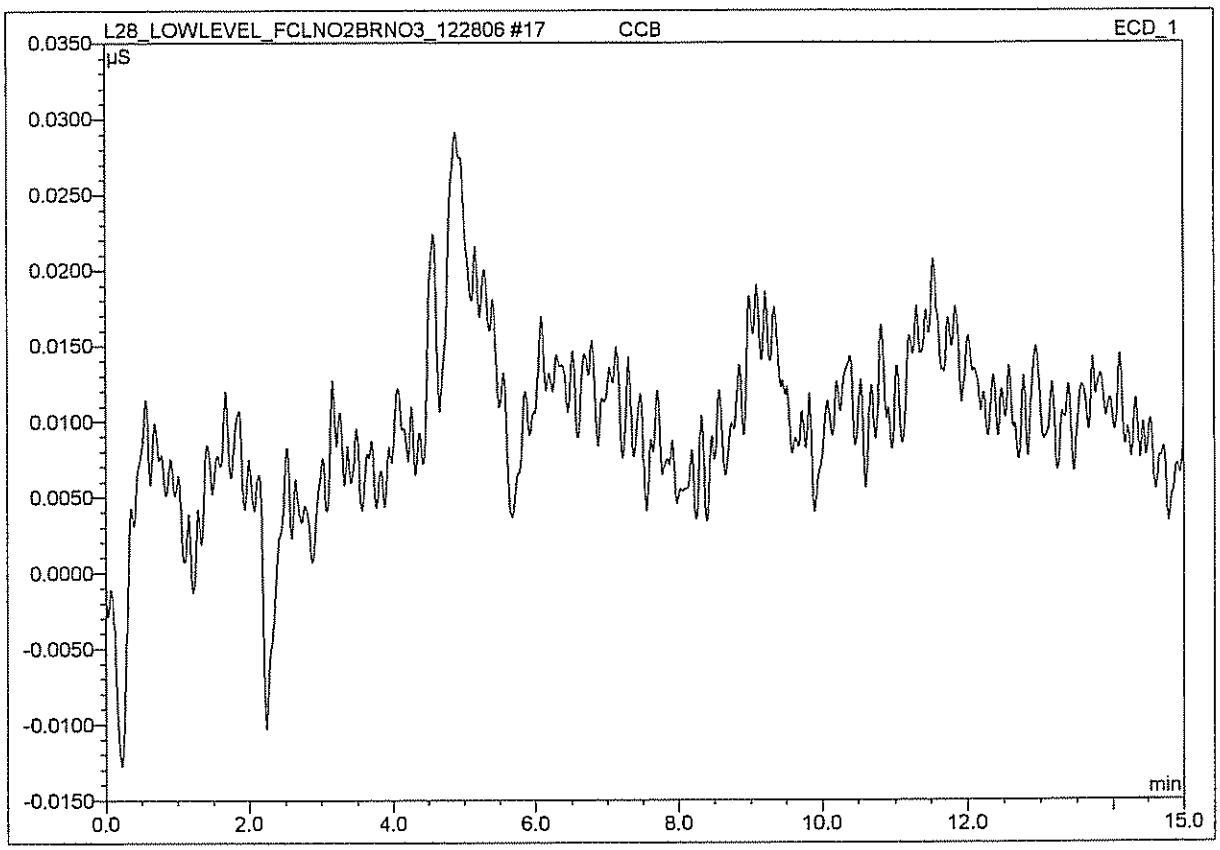


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.23	n.a.	0.06059	0.011	0.42	n.a.	BMB
2	3.23	Fluoride	3.09242	0.528	19.53	1.0594	BMB
3	4.55	Chloride	2.21582	0.356	13.19	0.9933	BM
4	5.29	Nitrite-N	4.00209	0.777	28.76	1.0173	MB
5	6.55	Bromide	0.72968	0.151	5.60	1.0210	BMB
6	7.30	Nitrate-N	3.71828	0.878	32.50	1.0209	BMB

Operator:wheelerd Timebase:ICS1500 Sequence:L28_LOWLEVEL_FCLNO2BRNO3_122806 Page 1-1
12/29/2006 8:49 AM

17 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**1371**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 16:26**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

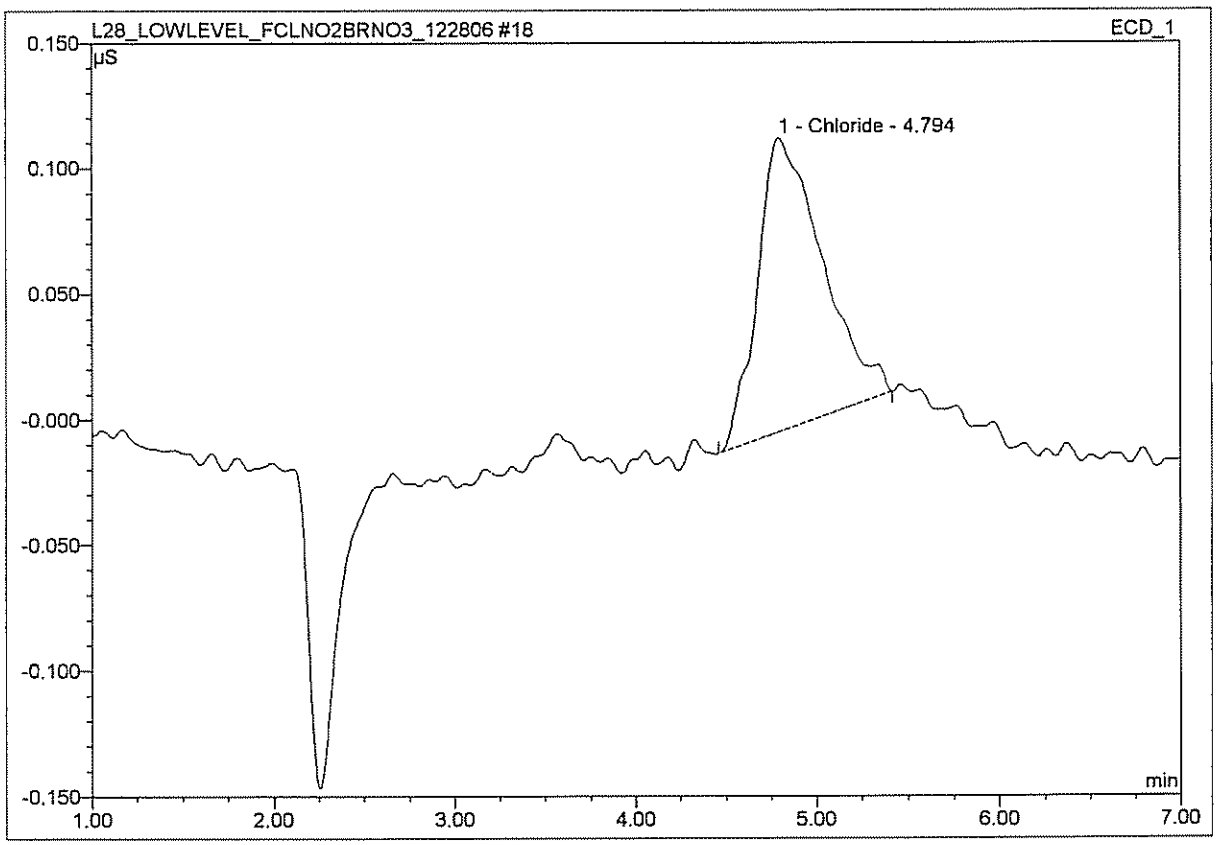


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

18 H6L110105-JK7JX-1/20

Sample Name:	**H6L110105-JK7JX-1/20**	*Injection Volume:*	**50.0**
Vial Number:	**1393**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/28/2006 16:44**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

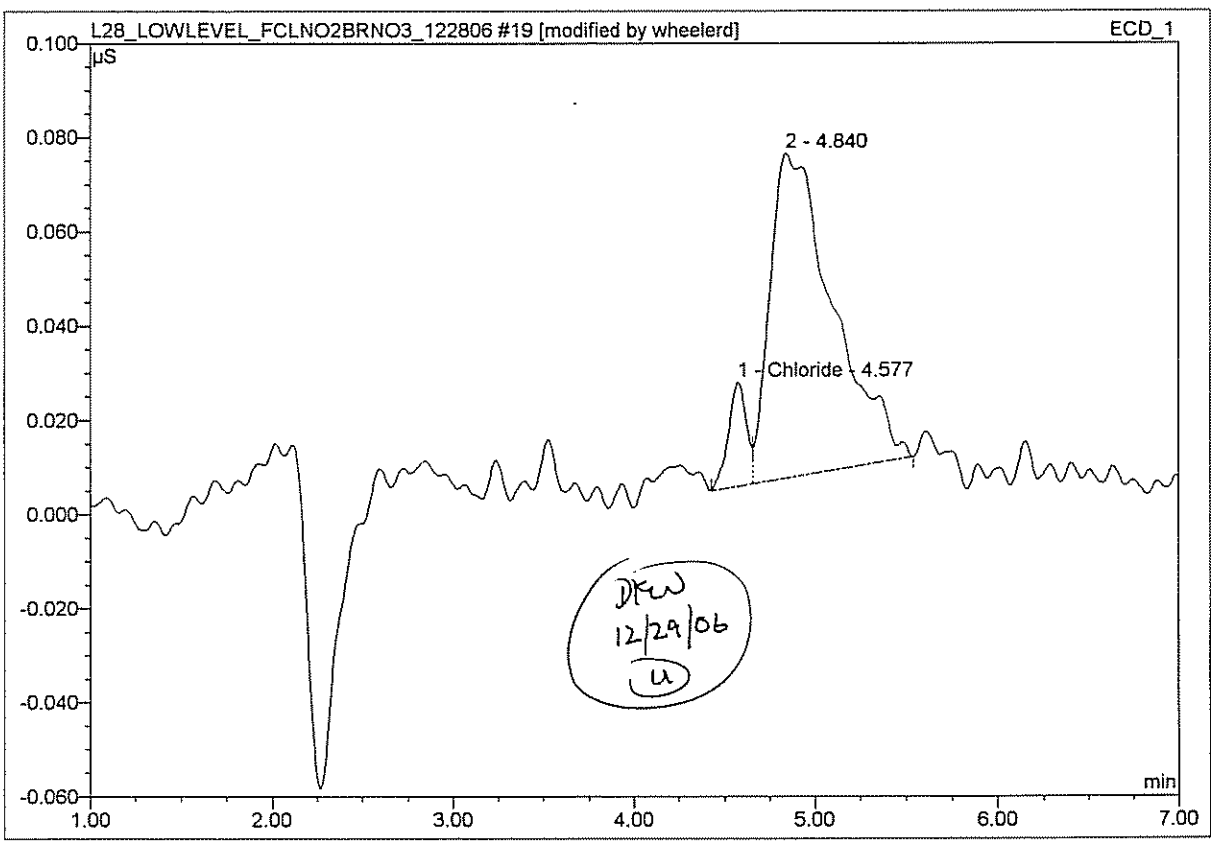


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.79	Chloride	0.11696	0.048	0.13	1.0637	BMB
2	7.33	Nitrate-N	0.06450	0.014	0.04	0.3727	BMB
3	10.34	n.a.	0.08770	0.024	0.06	n.a.	BMB
4	11.43	n.a.	##########	37.681	99.77	n.a.	BMB

Peak not split. See 1/40.

19 H6L110105-JK7JX-1/40

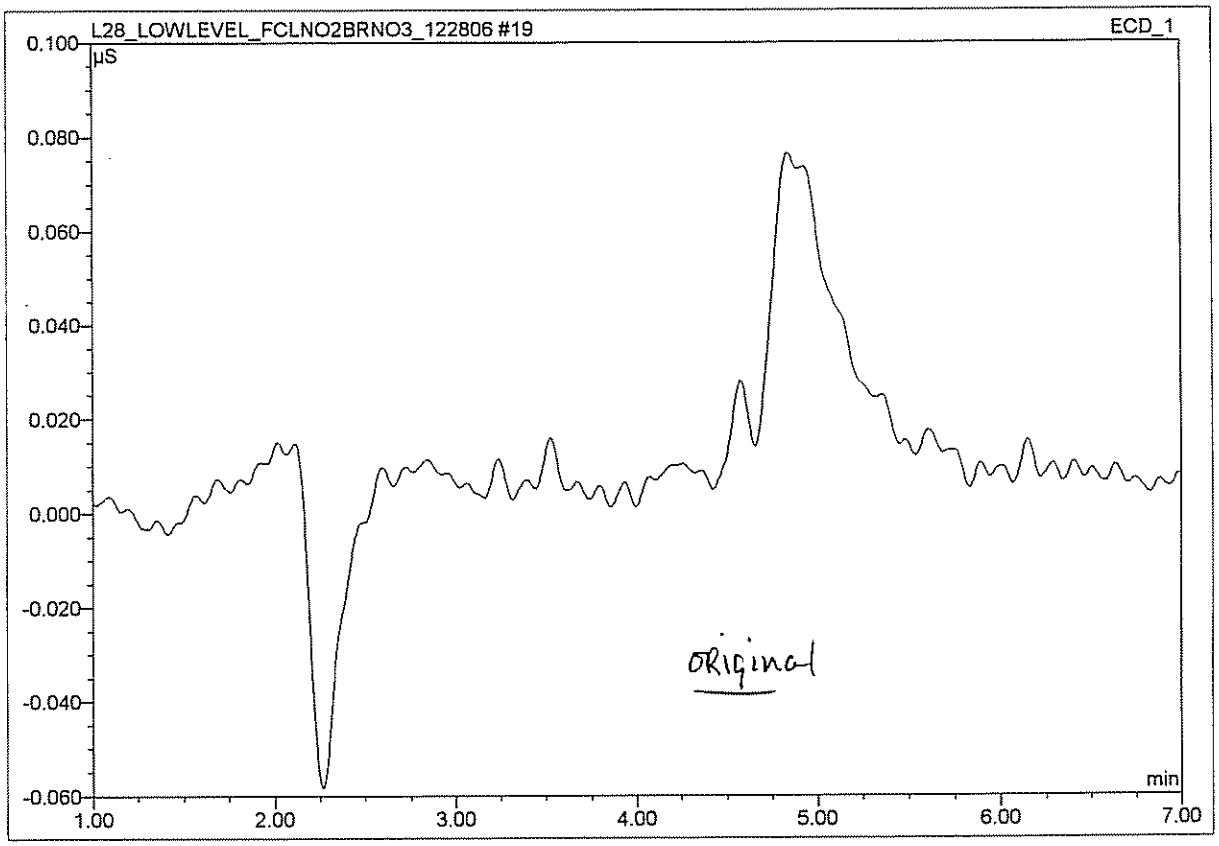
Sample Name:	**H6L110105-JK7JX-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1394**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 17:01**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.58	Chloride	0.02208	0.003	0.01	0.4018	BM *
2	4.84	n.a.	0.06881	0.028	0.16	n.a.	MB*
3	11.47	n.a.	55.60983	17.227	99.82	n.a.	BMB

19 H6L110105-JK7JX-1/40

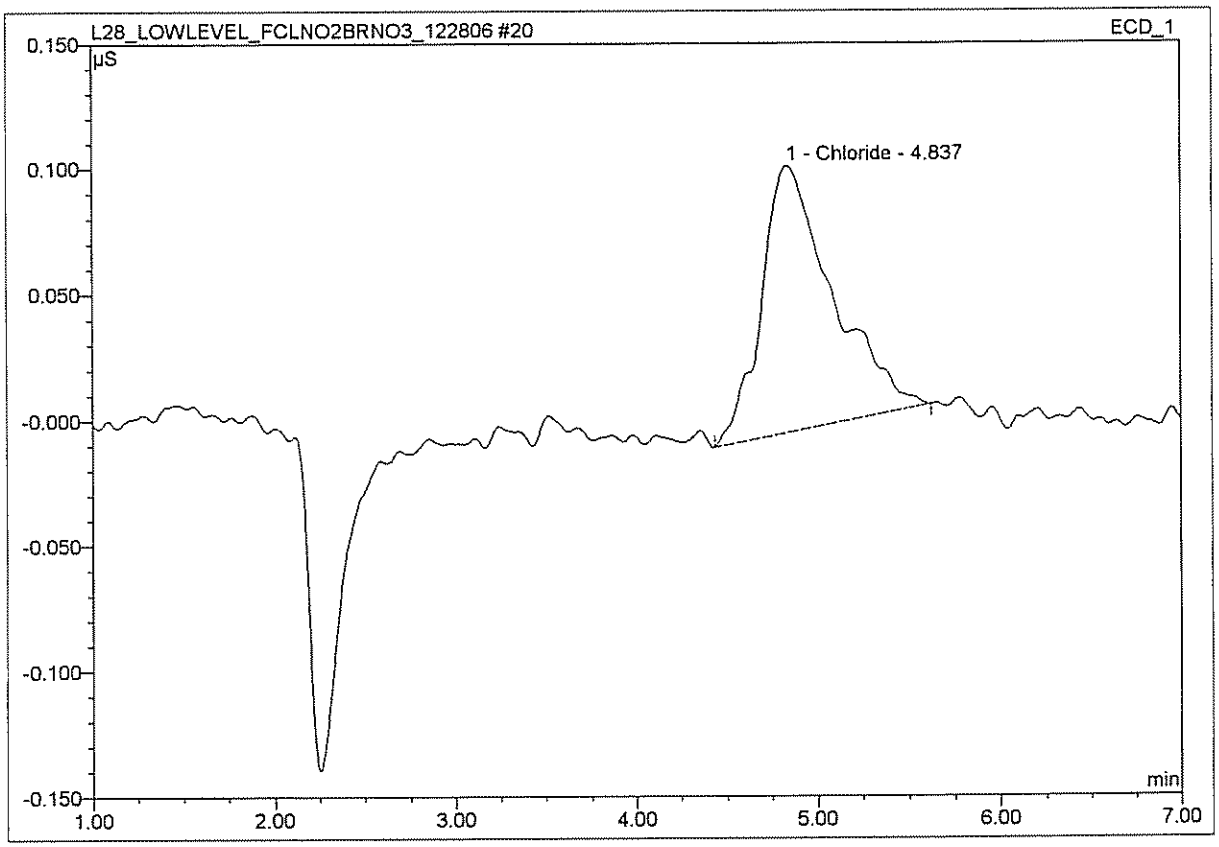
Sample Name:	**H6L110105-JK7JX-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1394**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 17:01**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	11.47	n.a.	55.60983	17.227	100.00	n.a.	BMB

20 H6L110105-JK7J1-1/20

Sample Name:	**H6L110105-JK7J1-1/20**	*Injection Volume:*	**50.0**
Vial Number:	**1395**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/28/2006 17:19**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

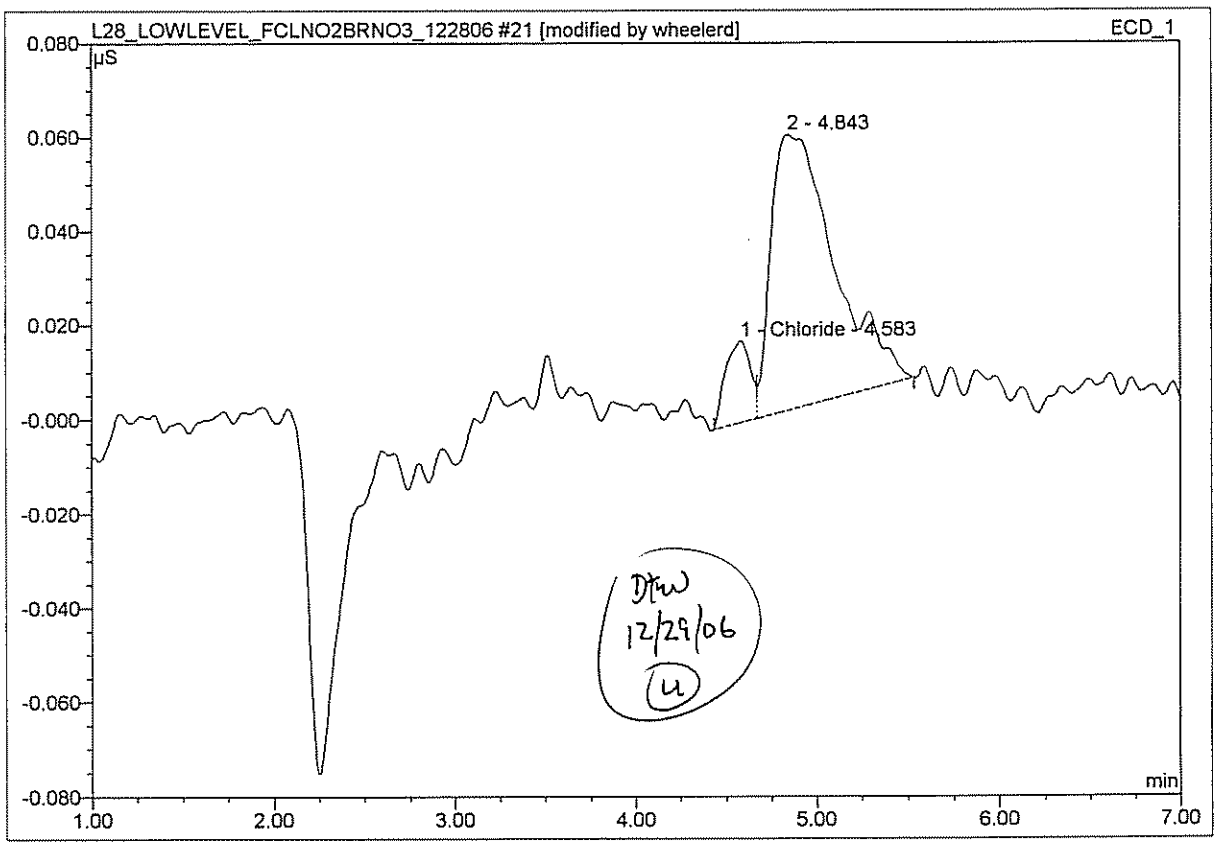


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.84	Chloride	0.10600	0.048	0.16	0.9641	BMB
2	7.35	Nitrate-N	0.06416	0.015	0.05	0.3708	BMB
3	11.44	n.a.	91.75063	29.118	99.78	n.a.	BMB

Peak not split. See 1/40

21 H6L110105-JK7J1-1/40

Sample Name:	**H6L110105-JK7J1-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1396**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 17:36**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

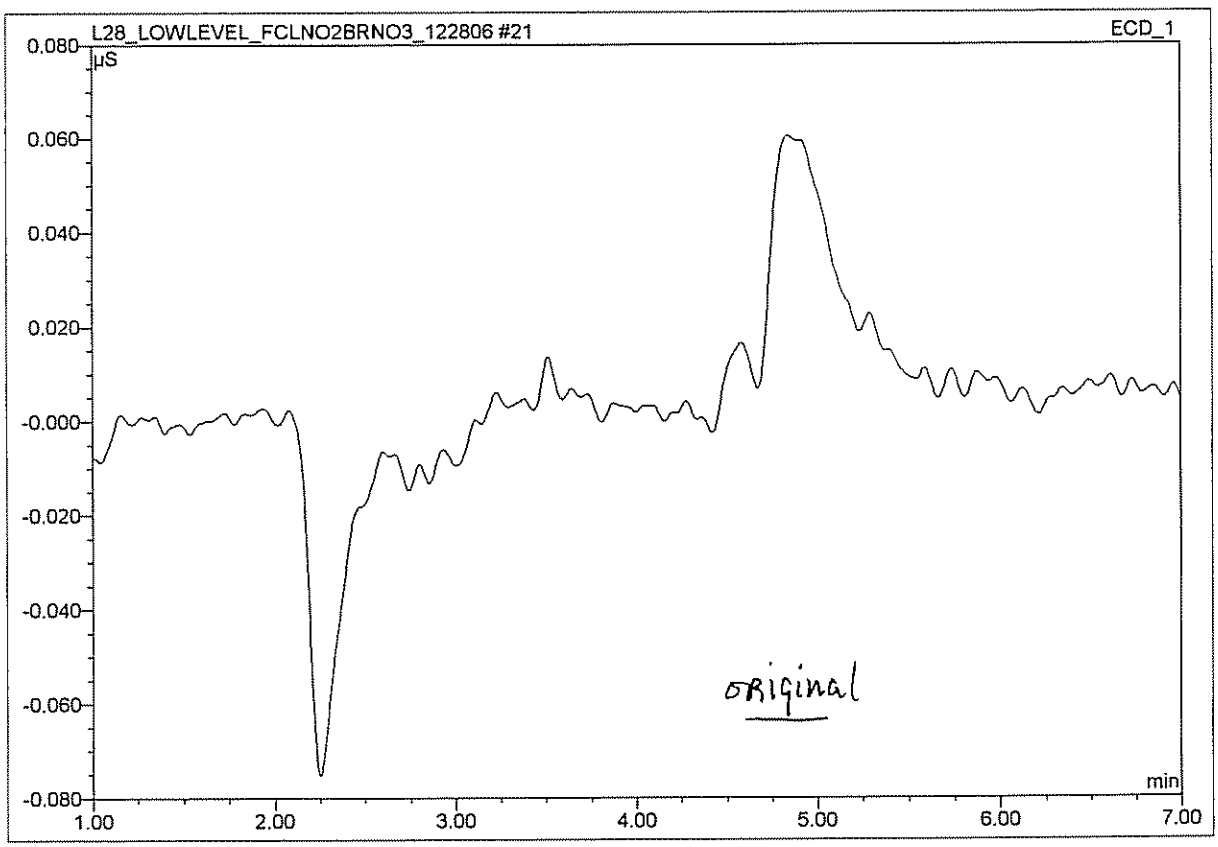


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	4.58	Chloride	0.01719	0.003	0.02	0.3128	BM *
2	4.84	n.a.	0.05852	0.023	0.18	n.a.	MB*
3	11.49	n.a.	43.00368	13.267	99.80	n.a.	BMB

<MDL

21 H6L110105-JK7J1-1/40

Sample Name:	**H6L110105-JK7J1-1/40**	*Injection Volume:*	**50.0**
Vial Number:	**1396**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 17:36**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

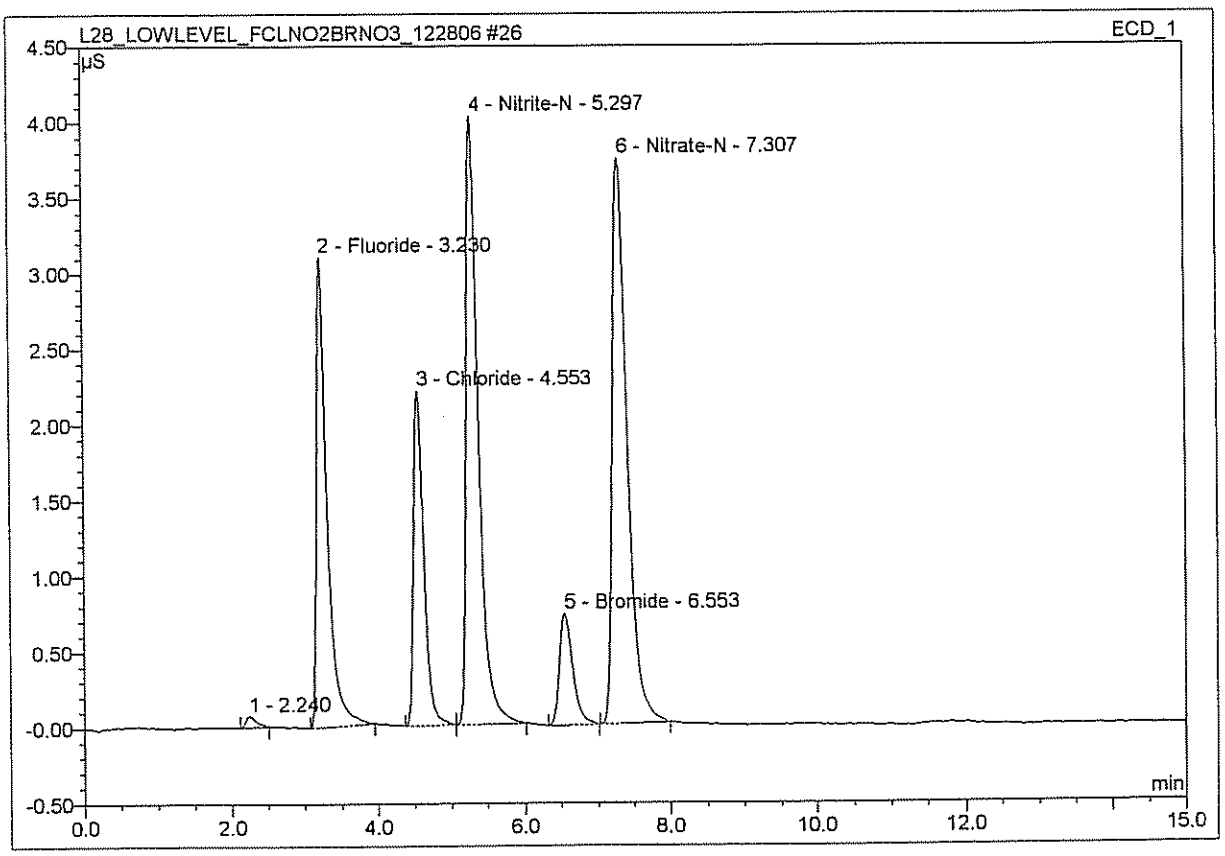


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	11.49	n.a.	43.00368	13.267	100.00	n.a.	BMB

Operator:wheelerd Timebase:ICS1500 Sequence:L28_LOWLEVEL_FCLNO2BRNO3_122806 Page 1-1
12/29/2006 8:49 AM

26 CCV= ICWS-9090

Sample Name:	**CCV= ICWS-9090**	*Injection Volume:*	**50.0**
Vial Number:	**1401**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 19:03**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

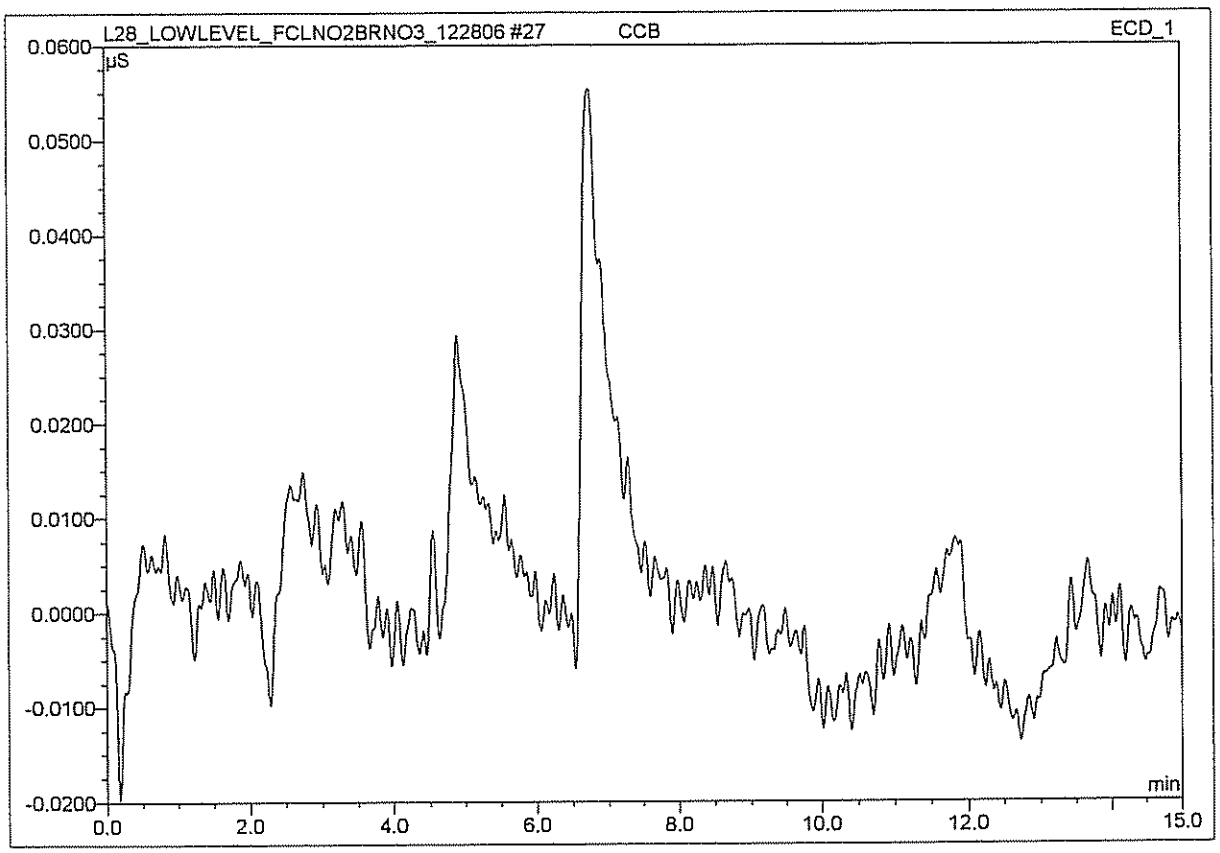


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	0.07266	0.013	0.48	n.a.	BMB
2	3.23	Fluoride	3.10205	0.520	19.26	1.0624	BMB
3	4.55	Chloride	2.21173	0.358	13.26	0.9915	BM
4	5.30	Nitrite-N	4.02336	0.768	28.45	1.0225	MB
5	6.55	Bromide	0.73552	0.155	5.74	1.0291	BMB
6	7.31	Nitrate-N	3.73776	0.886	32.82	1.0260	BMB

Operator:wheelerd Timebase:ICS1500 Sequence:L28_LOWLEVEL_FCLNO2BRNO3_122806 Page 1-1
12/29/2006 8:49 AM

27 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**1402**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 19:20**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**

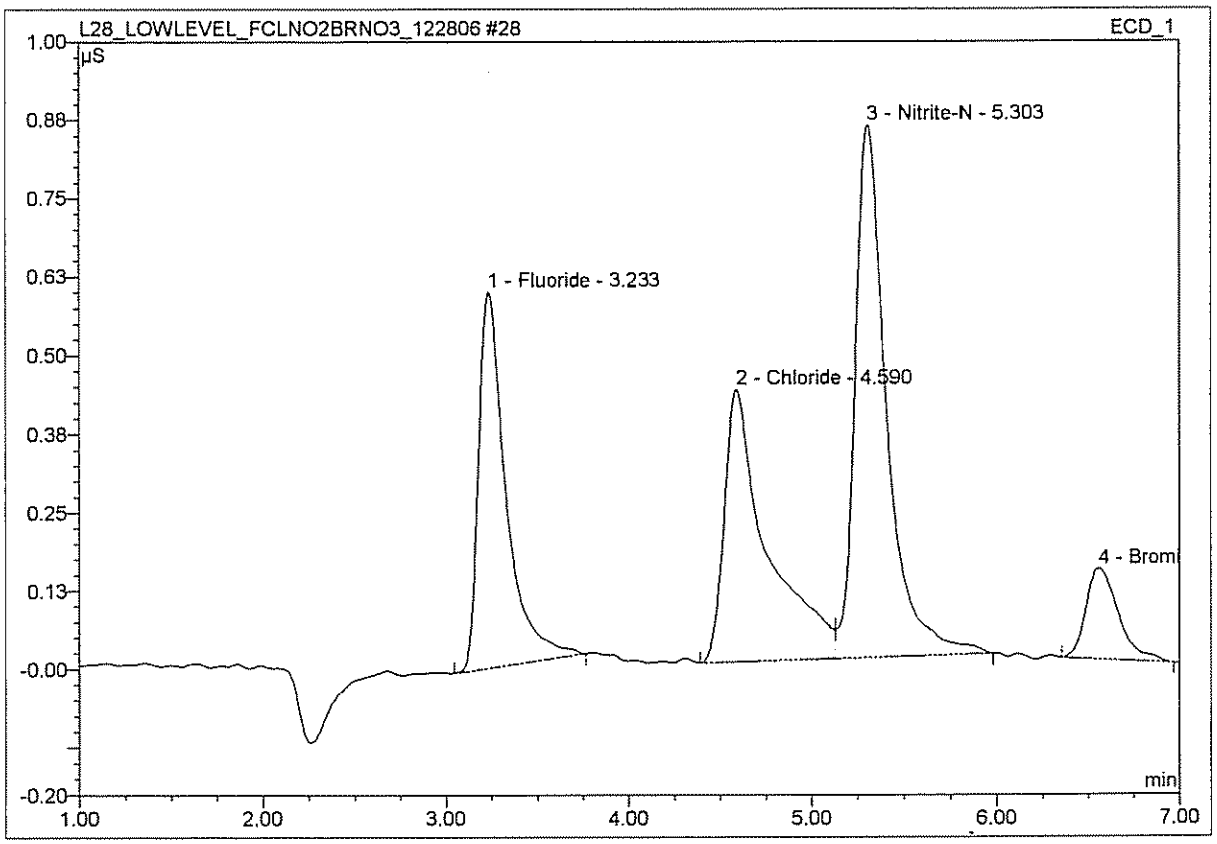


No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

28 H6L110105-JK7JX-1/20-MS@0.2ppm Cl

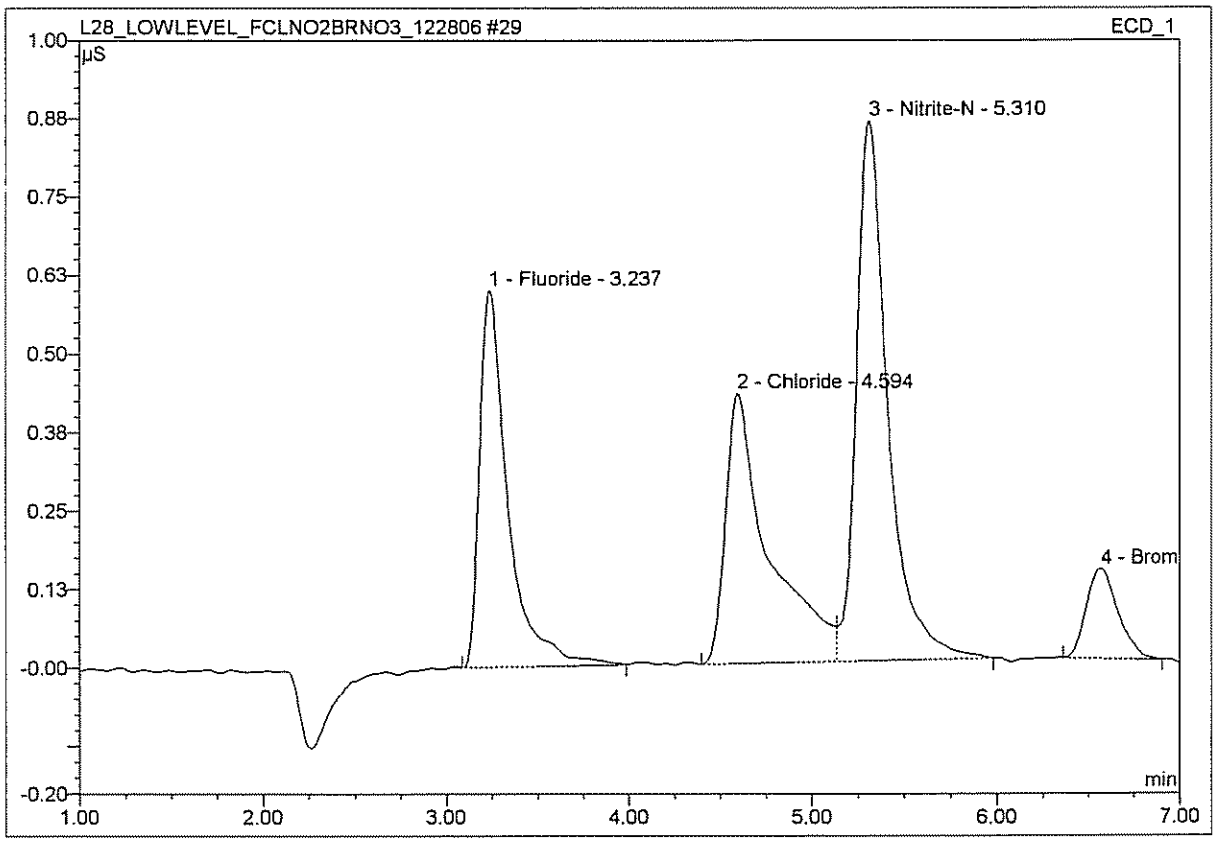
Sample Name:	**H6L110105-JK7JX-1/20-MS@0.2ppm Cl**	*Injection Volume:*	**50.0**
Vial Number:	**1403**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/28/2006 19:38**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.59844	0.105	0.27	4.3741	BMB
2	4.59	Chloride	0.43381	0.118	0.31	3.9367	BM
3	5.30	Nitrite-N	0.84863	0.169	0.44	4.4313	MB
4	6.56	Bromide	0.14527	0.030	0.08	4.0922	BMB
5	7.33	Nitrate-N	0.80123	0.191	0.50	4.5796	BMB
6	10.33	n.a.	0.08327	0.025	0.06	n.a.	BMB
7	11.43	n.a.	##########	37.595	98.33	n.a.	BMB

29 H6L110105-JK7JX-1/20-MSD@0.2ppm Cl

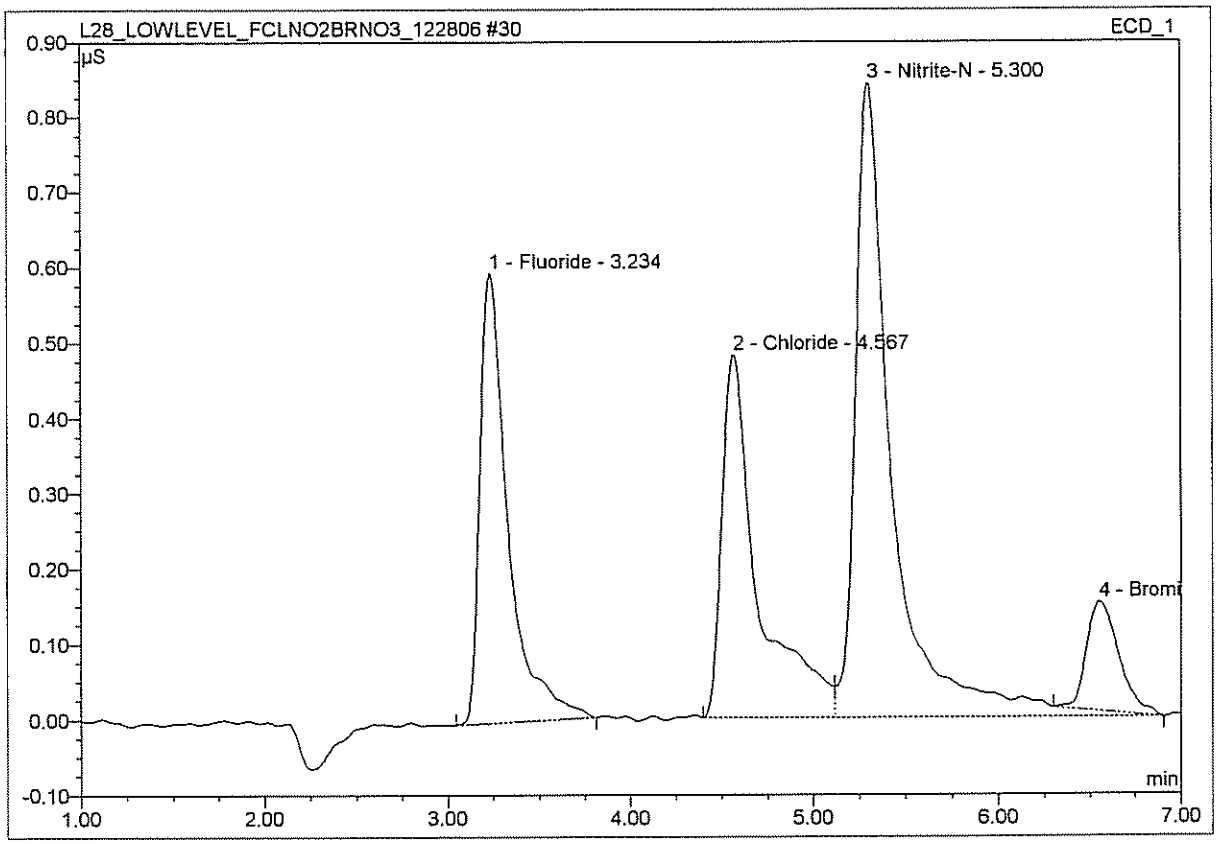
Sample Name:	**H6L110105-JK7JX-1/20-MSD@0.2ppm Cl**	*Injection Volume:*	**50.0**
Vial Number:	**1404**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**20.0000**
Recording Time:	**12/28/2006 19:55**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.24	Fluoride	0.59858	0.107	0.28	4.3750	BMB
2	4.59	Chloride	0.42985	0.118	0.31	3.9008	BM
3	5.31	Nitrite-N	0.86030	0.171	0.45	4.4918	MB
4	6.56	Bromide	0.14284	0.028	0.07	4.0240	BMB
5	7.33	Nitrate-N	0.79967	0.191	0.50	4.5709	BMB
6	10.34	n.a.	0.08231	0.024	0.06	n.a.	BMB
7	11.44	n.a.	#########	37.550	98.33	n.a.	BMB

30 H6L110105-JK7JX-1/40-MS@0.2ppm Cl

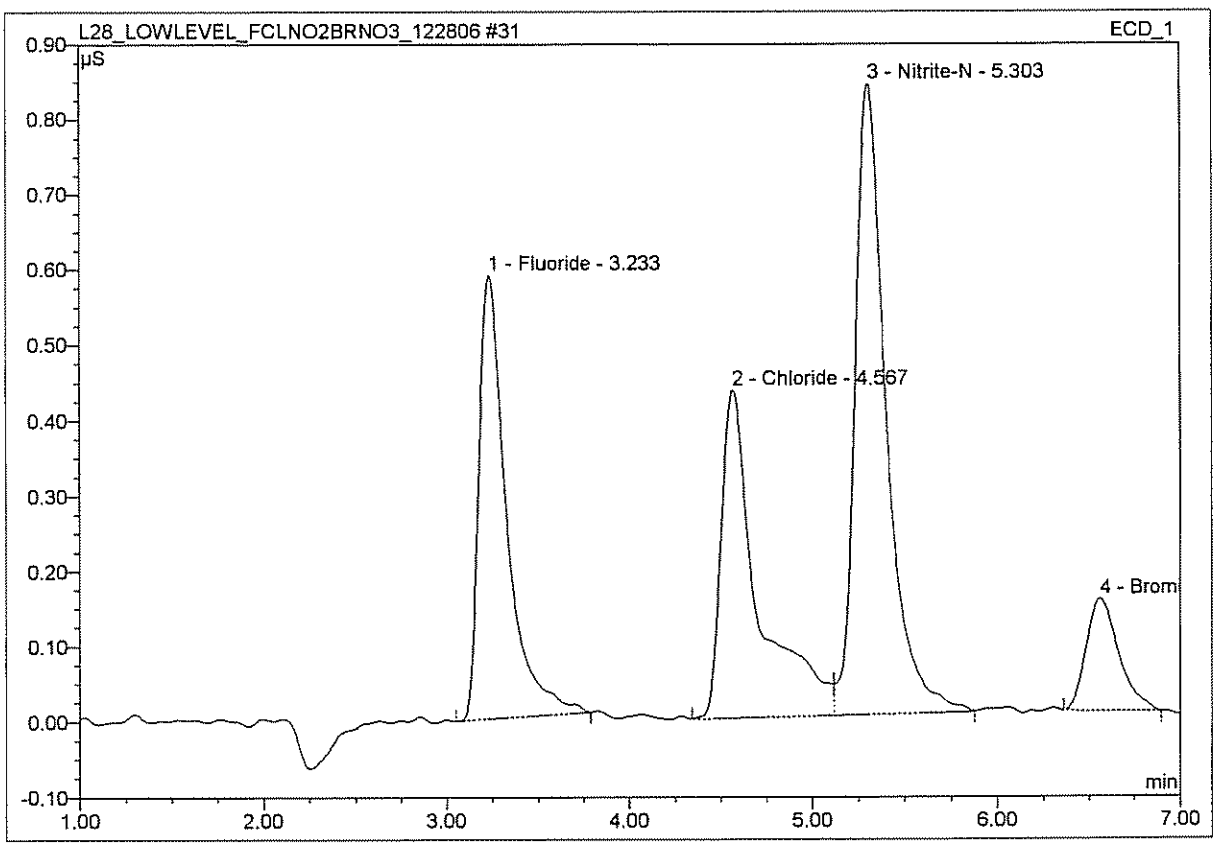
Sample Name:	**H6L110105-JK7JX-1/40-MS@0.2ppm Cl**	*Injection Volume:*	**50.0**
Vial Number:	**1405**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 20:13**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.59636	0.107	0.60	8.7182	BMB
2	4.57	Chloride	0.48090	0.110	0.62	8.7252	BM
3	5.30	Nitrite-N	0.84211	0.196	1.10	8.7951	MB
4	6.55	Bromide	0.14384	0.030	0.17	8.1041	Rd
5	7.32	Nitrate-N	0.76578	0.183	1.03	8.7586	BMB
6	11.48	n.a.	55.30554	17.095	96.47	n.a.	BMB

31 H6L110105-JK7JX-1/40-MSD@0.2ppm Cl

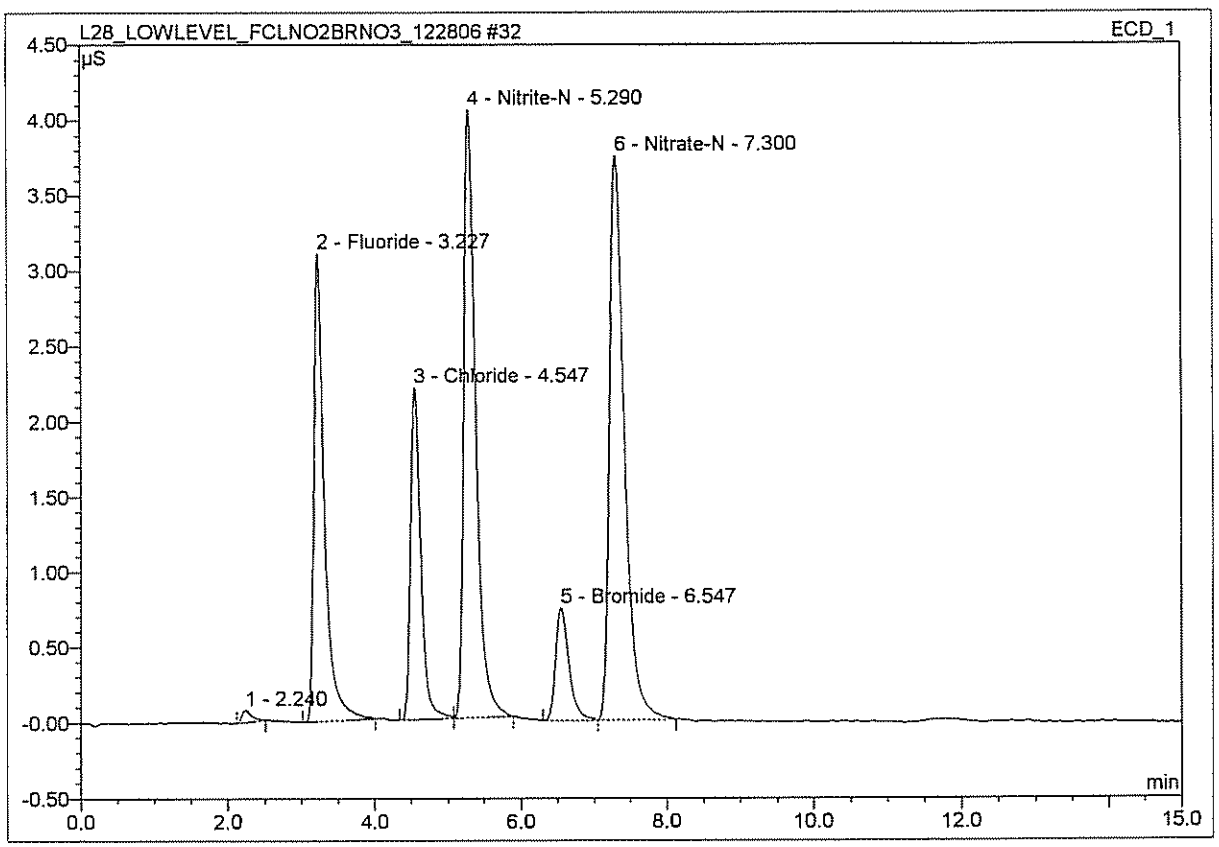
Sample Name:	**H6L110105-JK7JX-1/40-MSD@0.2ppm Cl**	*Injection Volume:*	**50.0**
Vial Number:	**1406**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**40.0000**
Recording Time:	**12/28/2006 20:30**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	3.23	Fluoride	0.58874	0.103	0.58	8.6087	BMB
2	4.57	Chloride	0.43521	0.102	0.58	7.8986	BM
3	5.30	Nitrite-N	0.83691	0.163	0.92	8.7411	MB
4	6.56	Bromide	0.14881	0.031	0.17	8.3841	BMB
5	7.33	Nitrate-N	0.76523	0.185	1.04	8.7524	BMB
6	11.48	n.a.	55.36865	17.161	96.70	n.a.	BMB

32 CCV= ICWS-9090

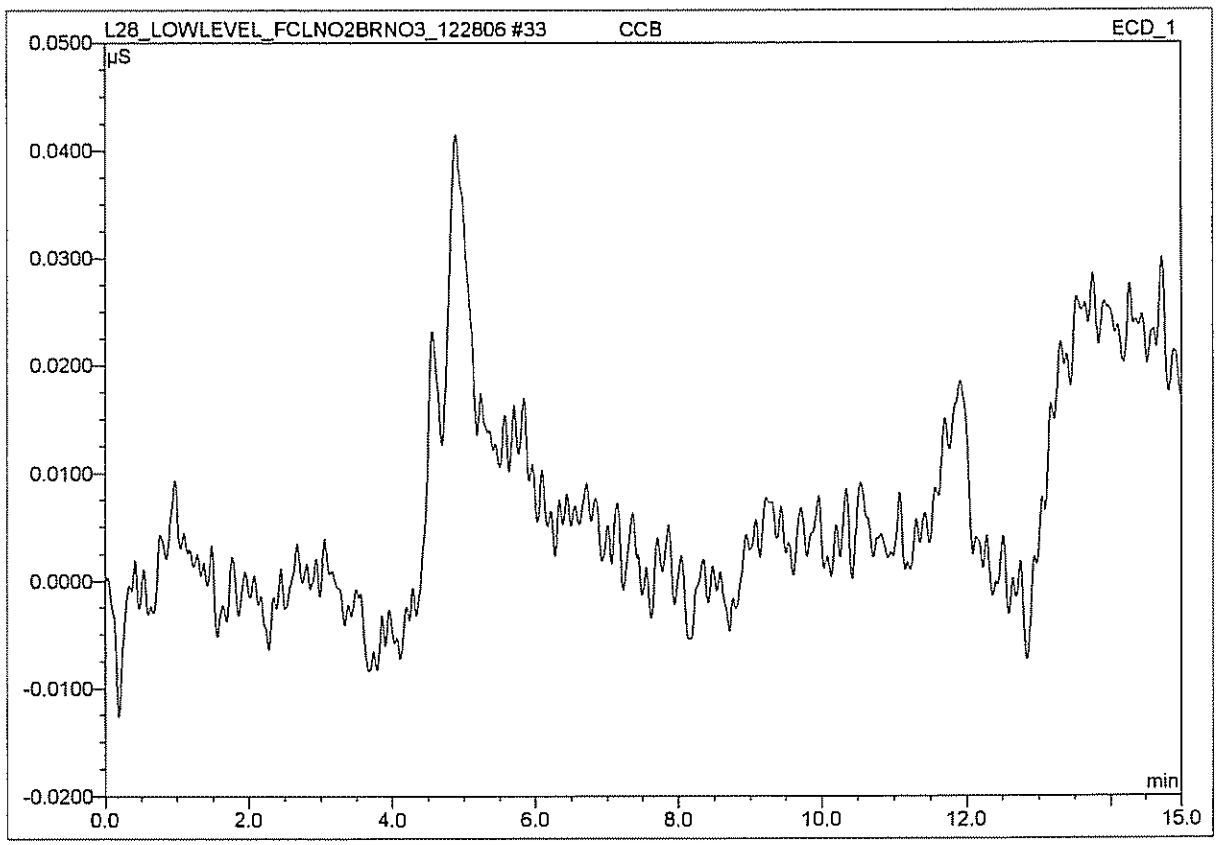
Sample Name:	**CCV= ICWS-9090**	*Injection Volume:*	**50.0**
Vial Number:	**1407**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 20:47**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type
1	2.24	n.a.	0.07895	0.012	0.46	n.a.	BMB
2	3.23	Fluoride	3.10738	0.524	19.32	1.0641	BMB
3	4.55	Chloride	2.20398	0.361	13.32	0.9881	BM
4	5.29	Nitrite-N	4.04019	0.762	28.10	1.0266	MB
5	6.55	Bromide	0.74338	0.158	5.82	1.0400	Ru
6	7.30	Nitrate-N	3.74585	0.894	32.97	1.0281	BMB

33 CCB

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**1408**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**AS14A ANIONS METHOD**	*Bandwidth:*	**n.a.**
Quantif. Method:	**AS4A-SC ANION METHOD**	*Dilution Factor:*	**1.0000**
Recording Time:	**12/28/2006 21:05**	*Sample Weight:*	**1.0000**
Run Time (min):	**15.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time (min.)	Peak Name	Height (uS)	Area µS*min	Rel.Area (%)	Amount (mg/L)	Peak Type

ND

STL Knoxville
Source Air Analysis Sample Information

Analyst	Date	Lot #	Work Order #	FH or BH	Impinger Volume (mL)	Impinger pH as received	Impinger pH after adjustment	Amount added to adjust pH
DFW	12/18/06	H6L110105	JK7JR	FH	480.	2	—	—
			JK7JX		465.	2		
			JK7J1		600.	2		
		H6L110106	JK7J7	FH	425.	2		
			JK7KG		400.	2		
			JK7KT		363.	2		
			JK7KØ	(RB)	(260) 100.	2		
			JK7K4	(DI H2O BLK)	100.	~5		
		H6L110105	JK7JW	BH	240.	9	—	—
			JK7JØ		250.	9	—	—
			JK7J2		270.	9	—	—
		H6L110106	JK7KA	BH	295.	2→	~9.5	Ø.825mL (80mL) (*)
			JK7KN		280.	2→	"	1.1 " (") (*)
			JK7KW		270.	2→	"	1.2 " (") (*)
			JK7K2	(RB)	(280) 100	12	—	—
			DFW	12/19/06				

Comments: (*) Adjustments made w/ ICR-NAOH-1010 (1N NaOH)

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/18/06 Chemist: DFW Expiration Date: 12/19/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9056	F-	ICWI-	8838	12/25/06	100. PPM	0.750	100.	0.75 PPM
2. (ICV/LCS)	Cl-							
3.	NO2N-							
4.	BR-							
5.	NO3N-							
6. ICWS-9057	F-							
7. (ICV/LCSD)	Cl-							
8.	NO2N-							
9.	BR-							
10.	NO3N-							
DFW 12/18/06 11. ICWS- ~~ICVS~~ 9058	F-	ICWI-	8837			1.		1. ppm
12. (CCV)	Cl-							
13.	NO2N-							
14.	BR-							
15	NO3N-							

Reviewed By: _____

WC031R3.DOC, 8/28/03

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/28/06 Chemist: DKW Expiration Date: 3/28/07

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-9086	F-	17125	ERA	12/31/07	1000. PPM	5.	50.	100. mg/L (ppm)
2. (Intermediate	Cl-	36065	|	6/30/07	|	|	|	|
3. Calib Source)	NO2N-	17075	|	7/31/07	|	|	|	|
4.	Br-	27025	|	2/28/07	|	|	|	|
5.	NO3N-	17026	|	2/28/08	|	|	|	|
6. ICWI-9087	F-	1-38F-2	SPEX	8/15/07	|	5.	50.	100. mg/L (ppm)
7. (Intermediate	Cl-	1-5CL-2	|	3/15/07	|	|	|	|
8. 2nd Source)	NO2N-	1-13NO2N-2	|	9/15/07	|	|	|	|
9.	Br-	1-1BR-2	|	4/30/07	|	|	|	|
10.	NO3N-	1-27NO3N-2	|	5/15/07	|	|	|	|
11.								
12.			DKW	12/28/07				
13.								
14.								

Reviewed By: _____

WC031R3.DOC, 8/28/03

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 12/28/06 Chemist: DKW Expiration Date: 12/28/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9088	F-	ICWI-	9087	3/28/07	100. PPM	0.750	100.	0.75 ppm
2. (ICV/LCS)	Cl-							
3.	NO2N-							
4.	Br-							
5.	NO3N-							
6. ICWS-9089	F-							
7. (ICV/LCSD)	Cl-							
8.	NO2N-							
9.	Br-							
10.	NO3N-							
11. ICWS-9090	F-	ICWI-	9086			1.		1. ppm
12. (CCV)	Cl-							
13.	NO2N							
14.	Br.							
15.	NO3N-							

Reviewed By: _____

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 9/25/06 Chemist: DKW Expiration Date: 12/25/06

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-8837	F-	17125	ERA	12/31/07	1000 ppm	5.	50	100. mg/L (ppm)
2. (Intermed. calib. source)	Cl-	36065		6/30/07				
3.	NO2N	17075		7/31/07				
4.	BR-	27025		2/28/07				
5.	NO3N-	17026		2/28/08				
6. ICWI-8838	F-	1-38F-2	SPEX	8/15/07	1000 ppm	5.	50	100. ppm (mg/L)
7. (Intermed 2nd Source)	Cl-	1-5CL-2		3/15/07				
8.	NO2N-	1-13NO2N-2		9/15/07				
9.	BR-	1-1BR-2		4/30/07				
10.	NO3N-	1-27NO3N-2		5/15/07				
11.								
12.								
13.								
14.								

Reviewed By: _____

Sample Receipt Documentation

AIR SAMPLING ASSOCIATES, INC.

HGL110105

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 3	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Tony Waomund	
Run No.: 1	Test Method: 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Hydrogen Halide	Halogens		
Cont. 1	11-30-06	1924	—	1	Filter No. A092	X				
Cont. 2	11-30-06	1926	—	1	ACE F.W.	X				
Cont. 3	11-30-06	1928	0.1N H_2SO_4	1	Imp. 1, 2 + Hot Line		X			
Cont. 4	11-30-06	1924	0.1N NaOH	1	Imp. 3, 4			X		
Rec'd temp. Ambient		MFH 12/6/06								
9 coolers Rec'd Fedex# 6967694592 03		6967745 6945 9188 9225								
No custody seals.		9199 9214								
MFH 12-6-06		9144 9133								
		9177 9166								

Special Instructions: Cont. Nos. 1 & 2 retained by ASAI. HF & HBr are primary analytes for the 26A analysis.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	11-30-06	1928	1. Relinquished By: Bill Mullins	12/3/06	0900
2. Received By: Billy J. Mullins, Jr	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [signature]	12/4/06	0820	[signature]	12/5/06	1400

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

Rec'd By: Matthew F. Howard 12-6-06, 09:15

HGL 110105

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 2 of 3	
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Hydrogen Halide	Halogens		
Cont. 1	12-1-06	1812	—	1	Filter No. A112	X				
Cont. 2	12-1-06	1815	—	1	ACE F.W.	X				
Cont. 3	12-1-06	1823	0.1N H_2SO_4	1	Imps 1 & 2 + Hot Line		X			
Cont. 4	12-1-06	1819	0.1N NaOH	1	Imps 3 & 4			X		

Special Instructions: Cont. Nos 1 & 2 retained by ASAI. HF & HBr are primary analytes for the 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI, ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1823	1. Relinquished By: Bill Mullins	12/3/06	0900
2. Received By: Billy J. Mullins, Jr.	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roybance	12/3/06	1330	3. Relinquished By: Alan D. Roybance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

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Rec'd By: Matthew J. Howard, 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

HGL110105

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 3 of 3
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund
Run No.: 3	Test Method: 26A	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Hydrogen Halid	Halogens		
Cont. 1	12-2-06	2219	—	1	Filter No. A113	X				
Cont. 2	12-2-06	2232	—	1	ACE FW	X				
Cont. 3	12-2-06	2235	0.1N H_2SO_4	1	Imps 1, 2 + Hot Line		X			
Cont. 4	12-2-06	2226	0.1N NaOH	1	Imps 3, 4			X		

Special Instructions: Cont. Nos. 1 & 2 retained by ASAI. HF & HBr are primary analytes for the 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-2-06	2235	1. Relinquished By: Bill Mullins	12/3/06	0900
2. Received By: Billy J. Mullins, Jr.	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

Rec'd BY: Matthew F. Howard 12/6/06, 09:15

STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: Air Sampling Associates **Project:** _____ **Lot Number:** HLLN1D1D5

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	NA.
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?	✓			☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?			✓	If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: _____ PM Instructions: _____

Sample Receiving Associate: Matthew T Howard Date: 12-6-06

QA026R18.doc, 1/30/06

Appendix H:

EPA Test Methods 5, 17 (Particulate Matter), and ASTM D6784-02

(Ontario Hydro) Mercury Speciation Test Method Analytical Data

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 06-057

Date Analysis Completed: 12-15-06

Project Name: ADA-ES

Unit Tested: SDA Inlet

Project Location: Hardin, MT

Run Number:	1	2	3
Particulate Matter on Filter (mg):	7,409.2	9,115.7	9,593.7
Particulate Matter in Front Wash (mg):	3,232.6	2,925.7	730.5
Total Particulate Matter in "Front-Half" – MF (mg):	10,641.8	12,041.4	10,324.2
Particulate Matter in "Back-Half" (mg):	—	—	—
Total Particulate Matter in Sample – MT (mg):	—	—	—

STL Knoxville
Analyst

Bill [illegible] Date: 1-17-06
Data Checked By

Version No. 1 5/30/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 17

Stack Filters

Project No. 06-057
Project Name ADA-ES

Location Hardin, MT
Unit Tested SDA Inlet

Desiccator Time In					
Desiccator Time Out					

Run No. 1		Filter No. 53		Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 10.1444
Initial Filter Weight (g) 2.7352
Total Particulate (mg) 7,409.2

Run No. 2		Filter No. 54		Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 12.6952
Initial Filter Weight (g) 3.5795
Total Particulate (mg) 9,115.7

Run No. 3		Filter No. 55		Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 12.4725
Initial Filter Weight (g) 2.8788
Total Particulate (mg) 9,593.7

STL Knoxville
Analyst

AIR SAMPLING ASSOCIATES, INC.

Thimble Tare Weight Log
EPA Method 17

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
45		2.7941	2.7944				2.7944
	9/29/06	10/2/06	10/3/06				
	1200	1635	1100				
46		2.7987	2.7990				2.7990
		10/2/06	10/3/06				
		1636	1101				
47		2.5514	2.5514				2.5514
		10/2/06	10/3/06				
		1637	1102				
48		2.7781	2.7785				2.7785
		10/2/06	10/3/06				
		1638	1103				
49		2.7795	2.7799				2.7799
		10/2/06	10/3/06				
		1639	1104				
50		2.6485	2.6487				2.6487
		10/2/06	10/3/06				
		1640	1105				
51		2.8600	2.8605				2.8605
		10/2/06	10/3/06				
		1641	1106				
52		2.8470	2.8474				2.8474
		10/2/06	10/3/06				
		1642	1107				
53		2.7349	2.7352				2.7352
		10/2/06	10/3/06				
		1643	1108				
54		3.5794	3.5795				3.5795
	11/20/06	11/21/06	11/22/06				
	1360	1350	0745				
55		2.8785	2.8788				2.8788
		11/21/06	11/22/06				
		1351	0746				
56		2.4725	2.4724				2.4724
		11/21/06	11/22/06				
		1352	0747				
57		2.9916	2.9911				2.9911
		11/21/06	11/22/06				
		1353	0748				
58		3.4660	3.4656				3.4656
		11/21/06	11/22/06				
		1354	0749				
59		3.1165	3.1160				3.1160
		11/21/06	11/22/06				
		1355	0750				

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 17

Front Wash

Project No. 06-057 Location Hardin, MT
Project Name ADA-ES Unit Tested SDA Inlet

Desiccator Time In					
Desiccator Time Out					

Run No. 1		Volume (ml)	209	Sample I.D.	
Final Weight (g)	69.8884				
Initial Weight (g)	66.6558				
Particulate Weight (g)	3.2326				

Particulate Average (mg) 3,2326
Less Acetone Blank (mg) —
Total Particulate (mg) 3,232.6

Run No. 2		Volume (ml)	152	Sample I.D.	
Final Weight (g)	68.8045				
Initial Weight (g)	65.8788				
Particulate Weight (g)					

Particulate Average (mg) 2,925.7
Less Acetone Blank (mg) —
Total Particulate (mg) 2,925.7

Run No. 3		Volume (ml)	87	Sample I.D.	
Final Weight (g)	67.9099				
Initial Weight (g)	67.1794				
Particulate Weight (g)					

Particulate Average (mg) 730.5
Less Acetone Blank (mg) —
Total Particulate (mg) 730.5

Acetone Blank		Volume (ml)		Sample I.D.	
Final Weight (g)					
Initial Weight (g)					
Particulate Weight (g)					

Average (mg) _____
* mg/l _____

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

STL Knoxville Date: 10-15-06
Analyst

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 06-057

Date Analysis Completed: 12/15/06

Project Name: ADA-ES

Unit Tested: Stack

Project Location: Hardin, MT

Run Number:	1	2	3
Particulate Matter on Filter (mg):	22.5	19.4	26.3
Particulate Matter in Front Wash (mg):	16.3	13.9	12.1
Total Particulate Matter in "Front-Half" – MF (mg):	38.8	33.3	38.4
Particulate Matter in "Back-Half" (mg):	—	—	—
Total Particulate Matter in Sample – MT (mg):	—	—	—

STL Knoxville
Analyst

Date: 1-17-07
Data Checked By

Version No. 1 5/30/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 5

Stack Filters

Project No. 06-057
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In					
Desiccator Time Out					

Run No. 1		Filter No. A117		Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 0.3869
Initial Filter Weight (g) 0.3644
Total Particulate (mg) 22.5

Run No. 2		Filter No. A118		Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 0.3829
Initial Filter Weight (g) 0.3635
Total Particulate (mg) 19.4

Run No. 3		Filter No. A119		Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 0.3918
Initial Filter Weight (g) 0.3655
Total Particulate (mg) 26.3

STL Knoxville
Analyst

AIR SAMPLING ASSOCIATES, INC.

Filter Weight Log
EPA Method 5

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
A105		0.3801	0.3801				0.3801
	10/2/06	10/12/06	10/13/06				
	0800	1000	0826				
A106	10/2/06	0.3827	0.3825				0.3825
	0800	10/12/06	10/13/06				
		1001	0827				
A107		0.3808	0.3810				0.3810
	10/2/06	10/12/06	10/13/06				
	0800	1002	0828				
A108		0.3843	0.3845				0.3845
	10/2/06	10/12/06	10/13/06				
	0800	1003	0829				
A109		0.3872	0.3873				0.3873
	10/2/06	10/12/06	10/13/06				
	0800	1004	0830				
A110		0.3885	0.3886				0.3886
	10/2/06	10/12/06	10/13/06				
	0800	1005	0831				
A112		0.3833	0.3832				0.3832
	10/2/06	10/12/06	10/13/06				
	0800	1006	0832				
A113		0.3781	0.3778				0.3778
	10/2/06	10/12/06	10/13/06				
	0800	1007	0833				
A114		0.3814	0.3812				0.3812
	10/2/06	10/12/06	10/13/06				
	0800	1008	0834				
A115		0.3701	0.3700				0.3700
	10/2/06	10/12/06	10/13/06				
	0800	1009	0835				
A116		0.3678	0.3679				0.3679
	10/2/06	10/12/06	10/13/06				
	0800	1010	0836				
A117		0.3644	0.3644				0.3644
	10/2/06	10/12/06	10/13/06				
	0800	1011	0837				
A118		0.3636	0.3635				0.3635
	10/2/06	11/20/06	11/21/06				
	0800	1245	0807				
A119		0.3655	0.3655				0.3655
	10/2/06	11/20/06	11/21/06				
	0800	1246	0808				
A120		0.3616	0.3615				0.3615
	10/2/06	11/20/06	11/21/06				
	0800	1247	0809				

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 5

Front Wash

Project No. 06-057
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In					
Desiccator Time Out					

Run No. 1		Volume (ml) 56		Sample I.D.	
Final Weight (g)	68.1454				
Initial Weight (g)	68.1291				
Particulate Weight (g)					

Particulate Average (mg) 16.3
Less Acetone Blank (mg) —
Total Particulate (mg) 16.3

Run No. 2		Volume (ml) 87		Sample I.D.	
Final Weight (g)	66.2084				
Initial Weight (g)	66.1945				
Particulate Weight (g)					

Particulate Average (mg) 13.9
Less Acetone Blank (mg) —
Total Particulate (mg) 13.9

Run No. 3		Volume (ml) 43		Sample I.D.	
Final Weight (g)	67.5197				
Initial Weight (g)	67.5076				
Particulate Weight (g)					

Particulate Average (mg) 12.1
Less Acetone Blank (mg) —
Total Particulate (mg) 12.1

Acetone Blank		Volume (ml)		Sample I.D.	
Final Weight (g)					
Initial Weight (g)					
Particulate Weight (g)					

Average (mg) _____
* mg/l _____

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

STL Knoxville Date: 12-15-06
Analyst

Return to Navigator

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SEVERN TRENT STL

STL Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921

Tel: 865 291 3000 Fax: 865 584 4315
www.stl-inc.com

ANALYTICAL REPORT

PROJECT NO. 06-057

Hardin, Montana

Lot #: H6L070246

Bill Hefley

Air Sampling Associates, Inc.
407-2B Holford's Prairie Road
Lewisville, TX 75056

SEVERN TRENT LABORATORIES, INC.

Terry Wasmund
Project Manager

January 8, 2007

ANALYTICAL METHODS SUMMARY

H6L070246

PARAMETER	ANALYTICAL METHOD
Mercury (Ontario Hydro)	ASTM D6784-02
Particulate Emissions	CFR60A 5

References:

ASTM Annual Book Of ASTM Standards.

CFR60A "Test Methods", 40 CFR, Part 60, Appendix A, July 1, 1993.

SAMPLE SUMMARY

H6L070246

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
JK1V2	001	HARDIN STACK RUN 1 FILTER A117	12/01/06	13:58
JK1V7	002	HARDIN STACK RUN 1 ACETONE	12/01/06	14:45
JK1WA	003	HARDIN STACK RUN 1 FH	12/01/06	14:50
JK1WE	004	HARDIN STACK RUN 1 KCL	12/01/06	14:20
JK1WF	005	HARDIN STACK RUN 1 HNO3/H2O2	12/01/06	14:25
JK1WG	006	HARDIN STACK RUN 1 KMNO4/H2SO4	12/01/06	14:36
JK1W8	007	HARDIN STACK RUN 2 FILTER A118	12/02/06	13:05
JK1XA	008	HARDIN STACK RUN 2 ACETONE	12/02/06	13:16
JK1XD	009	HARDIN STACK RUN 2 FH	12/02/06	13:17
JK1XE	010	HARDIN STACK RUN 2 KCL	12/02/06	13:45
JK1XR	011	HARDIN STACK RUN 2 HNO3/H2O2	12/02/06	13:25
JK1XT	012	HARDIN STACK RUN 2 KMNO4/H2SO4	12/02/06	13:38
JK1X1	013	HARDIN STACK RUN 3 FILTER A119	12/02/06	21:14
JK1X4	014	HARDIN STACK RUN 3 ACETONE	12/02/06	21:24
JK1X5	015	HARDIN STACK RUN 3 FH	12/02/06	21:29
JK1X8	016	HARDIN STACK RUN 3 KCL	12/02/06	21:11
JK10A	017	HARDIN STACK RUN 3 HNO3/H2O2	12/02/06	20:51
JK10E	018	HARDIN STACK RUN 3 KMNO4/H2SO4	12/02/06	20:04
JK10X	019	HARDIN SDA INLET DUCT RUN 1 FILTER (THIMBLE 53)	12/01/06	12:53
JK101	020	HARDIN SDA INLET DUCT RUN 1 ACETONE	12/01/06	13:03
JK105	021	HARDIN SDA INLET DUCT RUN 1 FH	12/01/06	13:07
JK106	022	HARDIN SDA INLET DUCT RUN 1 KCL	12/01/06	12:48
JK107	023	HARDIN SDA INLET DUCT RUN 1 HNO3/H2O2	12/01/06	13:10
JK11A	024	HARDIN SDA INLET DUCT RUN 1 KMNO4/H2SO4	12/01/06	13:23
JK11C	025	HARDIN SDA INLET DUCT RUN 2 FILTER (THIMBLE 54)	12/02/06	12:28
JK11D	026	HARDIN SDA INLET DUCT RUN 2 ACETONE	12/02/06	12:35
JK11F	027	HARDIN SDA INLET DUCT RUN 2 FH	12/02/06	12:36
JK11K	028	HARDIN SDA INLET DUCT RUN 2 KCL	12/02/06	12:10
JK11L	029	HARDIN SDA INLET DUCT RUN 2 HNO3/H2O2	12/02/06	11:51
JK11Q	030	HARDIN SDA INLET DUCT RUN 2 KMNO4/H2SO4	12/02/06	12:03
JK11X	031	HARDIN SDA INLET DUCT RUN 3 FILTER (THIMBLE 55)	12/02/06	20:36
JK111	032	HARDIN SDA INLET DUCT RUN 3 ACETONE	12/02/06	20:38
JK112	033	HARDIN SDA INLET DUCT RUN 3 FH	12/02/06	20:40
JK113	034	HARDIN SDA INLET DUCT RUN 3 KCL	12/02/06	20:18
JK114	035	HARDIN SDA INLET DUCT RUN 3 HNO3/H2O2	12/02/06	20:04
JK117	036	HARDIN SDA INLET DUCT RUN 3 KMNO4/H2SO4	12/02/06	20:29

(Continued on next page)

SAMPLE SUMMARY

H6L070246

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
JK12A	037	HARDIN SDA INLET+STACK RB 0.1N HNO3	12/01/06	09:14
JK12F	038	HARDIN SDA INLET+STACK RB KCL	12/01/06	09:17
JK12G	039	HARDIN SDA INLET+STACK RB HNO3/H2O2	12/01/06	09:20
JK12H	040	HARDIN SDA INLET+STACK RB KMNO4/H2SO4/HYD	12/01/06	09:22

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

QC DATA ASSOCIATION SUMMARY

H6L070246

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	AIR	CFR60A 5		6346334	
002	AIR	CFR60A 5		6346334	
003	AIR	ASTM D6784-02		7002025	
004	AIR	ASTM D6784-02		7002028	7002013
005	AIR	ASTM D6784-02		7002026	7002012
006	AIR	ASTM D6784-02		7002028	7002015
007	AIR	CFR60A 5		6346334	
008	AIR	CFR60A 5		6346334	
009	AIR	ASTM D6784-02		7002025	
010	AIR	ASTM D6784-02		7002028	
011	AIR	ASTM D6784-02		7002026	
012	AIR	ASTM D6784-02		7002028	
013	AIR	CFR60A 5		6346334	
014	AIR	CFR60A 5		6346334	
015	AIR	ASTM D6784-02		7002025	
016	AIR	ASTM D6784-02		7002028	
017	AIR	ASTM D6784-02		7002026	
018	AIR	ASTM D6784-02		7002028	
019	AIR	CFR60A 5		6346334	
020	AIR	CFR60A 5		6346334	
021	AIR	ASTM D6784-02		7002025	

(Continued on next page)

QC DATA ASSOCIATION SUMMARY

H6L070246

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
022	AIR	ASTM D6784-02		7002028	
023	AIR	ASTM D6784-02		7002026	
024	AIR	ASTM D6784-02		7002028	
025	AIR	CFR60A 5		6346334	
026	AIR	CFR60A 5		6346334	
027	AIR	ASTM D6784-02		7002025	
028	AIR	ASTM D6784-02		7002028	
029	AIR	ASTM D6784-02		7002026	
030	AIR	ASTM D6784-02		7002028	
031	AIR	CFR60A 5		6346334	
032	AIR	CFR60A 5		6346334	
033	AIR	ASTM D6784-02		7002025	
034	AIR	ASTM D6784-02		7002028	
035	AIR	ASTM D6784-02		7002026	
036	AIR	ASTM D6784-02		7002028	
037	AIR	ASTM D6784-02		7002025	
038	AIR	ASTM D6784-02		7002028	
039	AIR	ASTM D6784-02		7002026	
040	AIR	ASTM D6784-02		7002028	

PROJECT NARRATIVE
H6L070246

The results reported herein are applicable to the samples submitted for analysis only.

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The original chain of custody documentation is included with this report.

Sample Receipt

Custody seals were not present upon sample receipt at STL Knoxville.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Metals

These stack gas samples were prepared and analyzed using STL Knoxville standard operating procedure KNOX-IP-0006 which is based on ASTM Method D6784-02, "Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)" with modifications from EPA Method 29. SW-846 Method 7470A, as incorporated in STL Knoxville standard operating procedure KNOX-MT-0009, was used to perform the final instrument analysis.

Acid digestion was performed on the front half particulate filter and the acetone and nitric acid probe rinse fractions separately using HNO_3, HCl and HF. After digestion, the HF was sequestered using H_3BO_3 followed by another heating cycle. These digestates were adjusted to final volume, combined and a portion was digested for CVAA analysis in order to determine the particle-bound mercury. Results were calculated using the following equation:

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$$Hg,\ ug = (Hg,\ ug/L) * (Micr.\ Digestate\ Volume, L) * \left(\frac{Final\ Volume\ Hg\ Digestate\ (mL)}{Volume\ Micr.\ Digestate\ Used\ (mL)} \right) * Bench\ Dilution$$

Thimbles were received instead of filters for three of the front half samples. Each thimble, probe rinse and acetone particulate were combined and digested on a hot plate using HNO_3, HCL and 0.1 N HNO_3. After digestion the samples were filtered and brought to a final volume of 100 mL. A portion was digested for CVAA analysis in order to determine the particle-bound mercury. Results were calculated using the following equation:

$$Hg,\ ug = (Hg,\ ug/L) * (Micr.\ Digestate\ Volume, L) * \left(\frac{Final\ Volume\ Hg\ Digestate\ (mL)}{Volume\ Micr.\ Digestate\ Used\ (mL)} \right) * Bench\ Dilution$$

Please note that the dilution factor reported on the sample result form for the front half samples is actually a combination of preparation factors and bench dilution factors.

For the 5%HNO_3/10%H_2O_2 impinger samples, a 10 milliliter portion of the sample as received was processed for mercury. The KCl and 4% $KMnO_4$/10%H_2SO_4 impinger samples were treated with hydroxylamine hydrochloride, followed by removal of a 25 mL portion of sample for mercury processing. Results were calculated using the equation listed below. For the KCl and 4% $KMnO_4$/10%H_2SO_4 impinger samples, the sample volume includes the volume of hydroxylamine hydrochloride added to the sample.

$$Hg,\ ug = (Hg, ug/L) * (Sample\ Volume, L) * \left(\frac{FinalVolume\ Hg\ Digestate\ (mL)}{Volume\ Sample\ Digested\ (mL)} \right) * Bench\ Dilution$$

Please note that the dilution factor reported on the sample result form for the back half impingers is actually the combination of preparation factors (not just a dilution factor) required by the method to convert the Hg reporting limits and method detection limits in concentration units from ug/L to a total ug unit:

$$DilutionFactor = (Volume, L) * \left(\frac{FinalVolume\ Hg\ Digestate\ (mL)}{Volume\ Sample\ Digested\ (mL)} \right) * Bench\ Dilution$$

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PROJECT NARRATIVE
H6L070246

For the 5%HNO_3/10%H_2O_2 impinger samples, a 10 milliliter portion of the sample as received was processed for mercury. The KCl and 4% $KMnO_4$/10%H_2SO_4 impinger samples were treated with hydroxylamine hydrochloride, followed by removal of a 25 mL portion of sample for mercury processing. Results were calculated using the equation listed below. For the KCl and 4% $KMnO_4$/10%H_2SO_4 impinger samples, the sample volume includes the volume of hydroxylamine hydrochloride added to the sample.

$$Hg,\ ug = (Hg, ug/L) * (Sample\ Volume, L) * \left(\frac{Final Volume\ Hg\ Digestate\ (mL)}{Volume\ Sample\ Digested\ (mL)} \right) * Bench\ Dilution$$

Please note that the dilution factor reported on the sample result form is actually the combination of preparation factors (not just a dilution factor) required by the method to convert the Hg reporting limits and method detection limits in concentration units from ug/L to a total ug unit:

$$Dilution Factor = (Volume, L) * \left(\frac{Final Volume\ Hg\ Digestate\ (mL)}{Volume\ Sample\ Digested\ (mL)} \right) * Bench\ Dilution$$

The matrix spike recoveries for sample Hardin Stack Run 1 KMN04/H2S04 were outside control limits for mercury because the native analyte concentration in the sample was at least four times greater than the spike level. The laboratory control samples showed acceptable results indicating that the analysis was in control.

Wet Chemistry

The measurement of the mass of particulate matter trapped by the particulate filter and probe rinse derived from an M-5 sampling train was performed using SOP number KNOX-WC-0006 (based on EPA Methods 0050 and 5). Microfiber filters, Petri dishes, and 150 mL beakers are carefully inspected and tare weighed to constant weight. After sample collection, the filters are dried, and then carefully weighed to constant weight to determine the mass of particulate matter trapped on the filters. The acetone probe rinse solution is evaporated to dryness, and then weighed to constant weight to determine the

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PROJECT NARRATIVE
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total particulate mass collected in the rinse. The total particulate mass collected by an M-5 train is the sum of the particulate filter and the acetone probe rinse residue weights.

Filter thimbles and disks that were not prepared by STL Knoxville were submitted for analysis. The reported weight is the gross weight, which includes the total weight of the filter and the entrained particulate material. Unfortunately, the laboratory information system will not report sufficient digits to obtain a precise net particulate weight when the tare weight is subtracted from the gross weight. The actual raw data is tabulated below for the user's convenience.

Lot-Sample Number	Work Order Number	Client ID	Gross Weight Average (mg)
H6L070246-001	JK1V21AA	HARDIN STACK RUN 1 FILTER	382.9
H6L070246-007	JK1W81AA	HARDIN STACK RUN 2 FILTER	382.9
H6L070246-013	JK1X11AA	HARDIN STACK RUN 3 FILTER	391.8
H6L070246-019	JK10X1AA	HARDIN SDA INLET DUCT RUN 1 FILTER	10144.4
H6L070246-025	JK11C1AA	HARDIN SDA INLET DUCT RUN 2 FILTER	12695.2
H6L070246-031	JK1111AA	HARDIN SDA INLET DUCT RUN 3 FILTER	12472.5

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Sample Data Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 FH

TOTAL Metals

Lot-Sample #...: H6L070246-003 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	0.038	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK1WA1AA
		Dilution Factor: 0.1		Analysis Time..: 11:21	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-004 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	0.11 B	0.13	ug	ASTM D6784-02	01/04/07	JK1WE1AA
		Dilution Factor: 1.32		Analysis Time..: 10:51	MDL.....: 0.079	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-005 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.041 B	0.060	ug	ASTM D6784-02	01/03-01/05/07	JK1WF1AA
		Dilution Factor: 0.6		Analysis Time..: 11:46	MDL.....: 0.036	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-006 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	6.8	0.078	ug	ASTM D6784-02	01/04/07	JK1WG1AA
		Dilution Factor: 0.78		Analysis Time..: 11:00	MDL.....: 0.047	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 FH

TOTAL Metals

Lot-Sample #...: H6L070246-009 **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK1XD1AA
		Dilution Factor: 0.1		Analysis Time..: 11:25	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-010 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	ND	0.15	ug	ASTM D6784-02	01/04/07	JK1XE1AA
		Dilution Factor: 1.47		Analysis Time..: 11:06	MDL.....: 0.088	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-011 **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	ND	0.075	ug	ASTM D6784-02	01/03-01/05/07	JK1XR1AA
		Dilution Factor: 0.75		Analysis Time..: 11:51	MDL.....: 0.045	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-012 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	12.1	0.46	ug	ASTM D6784-02	01/04/07	JK1XT1AA
		Dilution Factor: 4.6		Analysis Time..: 11:55	MDL.....: 0.28	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 FH

TOTAL Metals

Lot-Sample #...: H6L070246-015 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	0.0090 B	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK1X51AA
		Dilution Factor: 0.1		Analysis Time..: 11:27	MDL.....: 0.0060	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-016 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	0.080 B	0.12	ug	ASTM D6784-02	01/04/07	JK1X81AA
		Dilution Factor: 1.25		Analysis Time..: 11:11	MDL.....: 0.075	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-017 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.064	0.063	ug	ASTM D6784-02	01/03-01/05/07	JK10A1AA
		Dilution Factor: 0.63		Analysis Time..: 11:53	MDL.....: 0.038	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-018 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	6.4	0.089	ug	ASTM D6784-02	01/04/07	JK10E1AA
		Dilution Factor: 0.89		Analysis Time..: 11:13	MDL.....: 0.053	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 FH

TOTAL Metals

Lot-Sample #...: H6L070246-021 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	0.61	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK1051AA
		Dilution Factor: 0.1		Analysis Time..: 11:29	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-022 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	1.6	0.11	ug	ASTM D6784-02	01/04/07	JK1061AA
		Dilution Factor: 1.11		Analysis Time..: 11:15	MDL.....: 0.067	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-023 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.064 B	0.065	ug	ASTM D6784-02	01/03-01/05/07	JK1071AA
		Dilution Factor: 0.65		Analysis Time..: 11:55	MDL.....: 0.039	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-024 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	3.6	0.089	ug	ASTM D6784-02	01/04/07	JK11A1AA
		Dilution Factor: 0.89		Analysis Time..: 11:17	MDL.....: 0.053	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 FH

TOTAL Metals

Lot-Sample #...: H6L070246-027 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	1.5	0.050	ug	ASTM D6784-02	01/02-01/05/07	JK11F1AA
		Dilution Factor: 0.5		Analysis Time..: 12:08	MDL.....: 0.030	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-028 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	1.7	0.12	ug	ASTM D6784-02	01/04/07	JK11K1AA
		Dilution Factor: 1.15		Analysis Time..: 11:19	MDL.....: 0.069	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-029 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.10	0.063	ug	ASTM D6784-02	01/03-01/05/07	JK11L1AA
		Dilution Factor: 0.63		Analysis Time..: 11:57	MDL.....: 0.038	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-030 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	4.6	0.092	ug	ASTM D6784-02	01/04/07	JK11Q1AA
		Dilution Factor: 0.92		Analysis Time..: 11:25	MDL.....: 0.055	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 FH

TOTAL Metals

Lot-Sample #...: H6L070246-033 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	0.64	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK1121AA
		Dilution Factor: 0.1		Analysis Time..: 11:33	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-034 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	3.3	0.081	ug	ASTM D6784-02	01/04/07	JK1131AA
		Dilution Factor: 0.81		Analysis Time..: 11:27	MDL.....: 0.049	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-035 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.058 B	0.068	ug	ASTM D6784-02	01/03-01/05/07	JK1141AA
		Dilution Factor: 0.68		Analysis Time..: 12:03	MDL.....: 0.041	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-036 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	0.79	0.11	ug	ASTM D6784-02	01/04/07	JK1171AA
		Dilution Factor: 1.11		Analysis Time..: 11:29	MDL.....: 0.067	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB 0.1N HNO3

TOTAL Metals

Lot-Sample #...: H6L070246-037 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK12A1AA
		Dilution Factor: 0.1		Analysis Time..: 11:39	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB KCL

TOTAL Metals

Lot-Sample #...: H6L070246-038 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	ND	0.010	ug	ASTM D6784-02	01/04/07	JK12F1AA
		Dilution Factor: 0.1		Analysis Time..: 11:31	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-039 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.034	0.024	ug	ASTM D6784-02	01/03-01/05/07	JK12G1AA
		Dilution Factor: 0.24		Analysis Time..: 12:06	MDL.....: 0.014	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB KMNO4/H2SO4/HYD

TOTAL Metals

Lot-Sample #...: H6L070246-040 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	ND	0.011	ug	ASTM D6784-02	01/04/07	JK12H1AA
		Dilution Factor: 0.11		Analysis Time..: 11:33	MDL.....: 0.0066	

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: H7A020000-025 **Prep Batch #...:** 7002025						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JL97P1AA
		Dilution Factor: 0.1				
		Analysis Time..: 11:15				
MB Lot-Sample #: H7A020000-026 **Prep Batch #...:** 7002026						
Mercury	ND	0.025	ug	ASTM D6784-02	01/03-01/05/07	JL97R1AA
		Dilution Factor: 0.25				
		Analysis Time..: 11:41				
MB Lot-Sample #: H7A020000-028 **Prep Batch #...:** 7002028						
Mercury	ND	0.010	ug	ASTM D6784-02	01/04/07	JL97W1AA
		Dilution Factor: 0.1				
		Analysis Time..: 10:46				
Mercury	ND	0.010	ug	ASTM D6784-02	01/04/07	JL97W1AC
		Dilution Factor: 0.1				
		Analysis Time..: 10:46				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: H6L070246 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #
Mercury	97	(80 - 120)			ASTM D6784-02	01/02-01/05/07	7002025
	95	(80 - 120)	2.7	(0-20)	ASTM D6784-02	01/02-01/05/07	7002025

Dilution Factor: 0.1 Analysis Time..: 11:17

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: H6L070246 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Mercury	0.500	0.487	ug	97		ASTM D6784-02	01/02-01/05/07	7002025
	0.500	0.474	ug	95	2.7	ASTM D6784-02	01/02-01/05/07	7002025

Dilution Factor: 0.1 Analysis Time..: 11:17

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: H7A020000-026 **Prep Batch #...:** 7002026					
Mercury	80	(80 - 120)	ASTM D6784-02	01/03-01/05/07	JL97R1AC
		Dilution Factor: 0.25	Analysis Time..: 11:44		
LCS Lot-Sample#: H7A020000-028 **Prep Batch #...:** 7002028					
Mercury	97	(80 - 120)	ASTM D6784-02	01/04/07	JL97W1AD
		Dilution Factor: 0.1	Analysis Time..: 10:48		
Mercury	97	(80 - 120)	ASTM D6784-02	01/04/07	JL97W1AE
		Dilution Factor: 0.1	Analysis Time..: 10:48		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: H7A020000-026 **Prep Batch #...:** 7002026							
Mercury	1.25	1.00	ug	80	ASTM D6784-02	01/03-01/05/07	JL97R1AC
			Dilution Factor: 0.25		Analysis Time..: 11:44		
LCS Lot-Sample#: H7A020000-028 **Prep Batch #...:** 7002028							
Mercury	0.500	0.483	ug	97	ASTM D6784-02	01/04/07	JL97W1AD
			Dilution Factor: 0.1		Analysis Time..: 10:48		
Mercury	0.500	0.483	ug	97	ASTM D6784-02	01/04/07	JL97W1AE
			Dilution Factor: 0.1		Analysis Time..: 10:48		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-005 **Prep Batch #...:** 7002026							
Mercury	88	(80 - 120)			ASTM D6784-02	01/03-01/05/07	JK1WF1AC
	91	(80 - 120)	2.8	(0-20)	ASTM D6784-02	01/03-01/05/07	JK1WF1AD

Dilution Factor: 0.6
Analysis Time..: 11:47

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-005 **Prep Batch #...:** 7002026									
Mercury									
	0.041	0.600	0.569	ug	88		ASTM D6784-02	01/03-01/05/07	JK1WF1AC
	0.041	0.600	0.586	ug	91	2.8	ASTM D6784-02	01/03-01/05/07	JK1WF1AD

Dilution Factor: 0.6
Analysis Time..: 11:47

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-004 **Prep Batch #...:** 7002028							
Mercury	99	(80 - 120)			ASTM D6784-02	01/04/07	JK1WE1AC
	104	(80 - 120)	4.6	(0-20)	ASTM D6784-02	01/04/07	JK1WE1AD
		Dilution Factor: 1.32					
		Analysis Time..: 10:53					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-004 **Prep Batch #...:** 7002028									
Mercury									
	0.11	1.32	1.41	ug	99		ASTM D6784-02	01/04/07	JK1WE1AC
	0.11	1.32	1.48	ug	104	4.6	ASTM D6784-02	01/04/07	JK1WE1AD

Dilution Factor: 1.32
Analysis Time..: 10:53

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-006 **Prep Batch #...:** 7002028							
Mercury	NC,MSB	(80 - 120)			ASTM D6784-02	01/04/07	JK1WG1AC
	NC,MSB	(80 - 120)		(0-20)	ASTM D6784-02	01/04/07	JK1WG1AD
		Dilution Factor: 0.78					
		Analysis Time..: 11:02					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated because the sample amount was greater than four times the spike amount.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-006 **Prep Batch #...:** 7002028									
Mercury									
	6.8	0.780	7.88	ug			ASTM D6784-02	01/04/07	JK1WG1AC
			Qualifiers: NC,MSB						
	6.8	0.780	8.11	ug			ASTM D6784-02	01/04/07	JK1WG1AD
			Qualifiers: NC,MSB						
			Dilution Factor: 0.78						
			Analysis Time..: 11:02						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated because the sample amount was greater than four times the spike amount.

STL Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: H010507. PRN

Element	PDS JK1WAA	Original Sample JK1WA	Spike Added	Percent Recovery
Hg	1.36	0.34	1.0	102

Sample Data Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 FILTER A117

General Chemistry

Lot-Sample #...: H6L070246-001 **Work Order #...:** JK1V2 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**387**	**0.50**	**mg**	**CFR60A 5**	**12/12-12/14/06**	**6346334**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-002 Work Order #...: JK1V7 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	16.3	0.50	mg	CFR60A 5	12/12-12/14/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 FILTER A118

General Chemistry

Lot-Sample #...: H6L070246-007 **Work Order #...:** JK1W8 **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**383**	**0.50**	**mg**	**CFR60A 5**	**12/12-12/13/06**	**6346334**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-008 Work Order #...: JK1XA Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	13.9	0.50	mg	CFR60A 5	12/12-12/15/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 FILTER A119

General Chemistry

Lot-Sample #...: H6L070246-013 **Work Order #...:** JK1X1 **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**392**	**0.50**	**mg**	**CFR60A 5**	**12/12-12/14/06**	**6346334**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-014 **Work Order #...:** JK1X4 **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**12.1**	**0.50**	**mg**	**CFR60A 5**	**12/12-12/14/06**	**6346334**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 FILTER (THIMBLE 53)

General Chemistry

Lot-Sample #...: H6L070246-019 Work Order #...: JK10X Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	10100	0.50	mg	CFR60A 5	12/12-12/15/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-020 Work Order #...: JK101 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	3250	0.50	mg	CFR60A 5	12/12-12/14/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 FILTER (THIMBLE 54)

General Chemistry

Lot-Sample #...: H6L070246-025 Work Order #...: JK11C Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	12700	0.50	mg	CFR60A 5	12/12-12/15/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-026 Work Order #...: JK11D Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	2930	0.50	mg	CFR60A 5	12/12-12/14/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 FILTER (THIMBLE 55)

General Chemistry

Lot-Sample #...: H6L070246-031 Work Order #...: JK11X Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	12500	0.50	mg	CFR60A 5	12/12-12/15/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-032 Work Order #...: JK111 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	730	0.50	mg	CFR60A 5	12/12-12/14/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Sample Receipt Documentation

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 7
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Waomund
Run No.: 1	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg
Cont. 1 (Sample filter)	12-1-06	1358	—	1	Filter No. A117	X	X		
Cont. 2 (0.1N HNO_3 FW)	12-1-06	1450	—	1			X		
Cont. 2A (ACE FW)	12-1-06	1445	—	1		X	X		
Cont. 3 (Imps 1,2,3 + Rinse)	12-1-06	1420	1 Mol/l KCl	1				X	
Cont. 4 (Imp 4 + Rinse)	12-1-06	1425	5% HNO_3 – 10% H_2O_2	1					X
Cont. 5 (Imps 5,6,7 + Rinse)	12-1-06	1436	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1ml dichromate				X
					Rec'd temp. Ambient, NO Custody Seals ~~intact~~ MFH 12-6-06				
					9 containers Fedex #'s: 6967 6945 9203 9199 9214 9144 9133 9177 9166		6967 "	6945 "	9188 9225

Special Instructions: MFH 12-6-06

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☐ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1450	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Raybance	12/3/06	1330	3. Relinquished By: Alan D. Raybance	12/4/06	0820
Comments: [signature]	12/4/06	0820	[signature]	12/5/06	1400

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

Rec'd By: Matthew J. Howard 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

HGL 070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 2 of 7	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: ASTM D6784-2 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample Filter)	12-2-06	1305	—	1	filter No. A118	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-2-06	1317	—	1			X			
Cont. 2A (ACE FW)	12-2-06	1316	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	1345	1 Mol/L KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-2-06	1325	5% HNO_3 – 10% H_2SO_4	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-2-06	1338	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1ml dichromate				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hopley	12-2-06	1345	1. Relinquished By: Bill Hopley	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [illegible] 12/4/06 0820 [illegible] 12/5/06 1400

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Rec'd BY: Matthew T. Howard 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 3 of 7	
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 3	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample filter)	12-2-06	2114	—	1	filter No. A119	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-2-06	2129	—	1			X			
Cont. 2A (ACE FW)	12-2-06	2124	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	2111	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-2-06	2051	5% HNO_3 – 10% ~~H_2SO_4~~ H_2O_2	1					X	
Cont 5 (Imps 5,6,7 + Rinse)	12-2-06	2104	4% $KMnO_4$ 10% H_2SO_4	1	Added 1ml dichromate				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☐ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-2-06	2129	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins, Jr	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [illegible] 12/4/06 0820 [illegible] 12/5/06 1400

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Rec'd By: Matthew F. Howard 12-6-06, 09:15

H6L070246

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 4 of 7	
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 1	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Container 1 (Sample filter)	12-1-06	1253	—	1	Thimble No. 53	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-1-06	1307	—	1			X			
Cont. 2A (ACE FW)	12-1-06	1303	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-1-06	1248	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-1-06	1310	5% HNO_3 – 10% H_2O_2	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-1-06	1323	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1ml dichromate.				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1323	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: 12/4/06 0820 ~~12/5/06 1400~~

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Rec'd BY: Matthew F. Hound 12-6-06 ~~09:2~~ 09:15

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 5 of 7	
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: ASTM D6784-02 (Ontariohydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample filter)	12-2-06	1228	—	1	Thimble No. 54	X	X			
Cont. 2 (0.1N HNO_3 F.W.)	12-2-06	1234	—	1			X			
Cont. 2A (ACE F.W.)	12-2-06	1235	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	1210	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-2-06	1151	5% HNO_3 – 10% H_2O_2	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-2-06	1203	4% $KMnO_4$ – 10% H_2SO_4	1					X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-2-06	1236	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0520

Comments:

12/4/06 0820 12/5/06 1400

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Rec'd By: Matthew J. Howard 12/6/06 09:15

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 6 of 7
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund
Run No.: 3	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part Bound Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample filter)	12-2-06	2036	—	1	Thimble No. 55	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-2-06	2040	—	1		X	X			
Cont. 2A (ACE FW)	12-2-06	2038	—	1	BH Part Bound Hg only	X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	2018	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-2-06	2004	5% HNO_3 – 10% H_2O_2	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-2-06	2029	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1 ml dichromate				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyley	12-2-06	2040	1. Relinquished By: Bill Hyley	12/3/06	0905
2. Received By: Billy J. Mullins, Jr	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Hoylance	12/3/06	1330	3. Relinquished By: Alan D. Hoylance	12/4/06	0820

Comments:

12/4/06 0820 — 12/5/06 1400

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Rec'd BY: Matthew F. Howard 12/6/06, 09:15

1H6L070241

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page (BH) ~~6~~ 7 of 7	
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet & Stack	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: Reagent Blanks	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg
Cont. 7 (0.1 N HNO_3)	12-1-06	0914	—	1	50 ml			X	X
Cont. 8 (1 Mol/L KCl)	12-1-06	0917	—	1	50 ml			X	
Cont. 9 (5% HNO_3 – 10% H_2O_2)	12-1-06	0920	—	1	50 ml				X
Cont. 10 (4% $KMnO_4$ – 10% H_2SO_4)	12-1-06	0922	—	1	50 ml				X
Cont. 11 (Hydroxylamine 10%)	12-1-06	0926	—	1	100 ml			X	X

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyde	12-1-06	0926	1. Relinquished By: Bill Hyde	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: 12/4/06 0820 12/5/06 1400

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Rec'd By: Matthew F. Howard 12-6-06, 09:15

STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: Air Sampling Associates, INC. **Project:** _____ **Lot Number:** H6L070246

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	4A.
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?	✓			☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?			✓	If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: 72504 PM Instructions: _____

Sample Receiving Associate: Matthew F. Howard Date: _____

QA026R18.doc, 1/30/06

Metals

Sample Results

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 FH

TOTAL Metals

Lot-Sample #...: H6L070246-003 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	0.038	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK1WA1AA
		Dilution Factor: 0.1		Analysis Time..: 11:21	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-004 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	0.11 B	0.13	ug	ASTM D6784-02	01/04/07	JK1WE1AA
		Dilution Factor: 1.32		Analysis Time..: 10:51	MDL.....: 0.079	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-005 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.041 B	0.060	ug	ASTM D6784-02	01/03-01/05/07	JK1WF1AA
		Dilution Factor: 0.6		Analysis Time..: 11:46	MDL.....: 0.036	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-006 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	6.8	0.078	ug	ASTM D6784-02	01/04/07	JK1WG1AA
		Dilution Factor: 0.78		Analysis Time..: 11:00	MDL.....: 0.047	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 FH

TOTAL Metals

Lot-Sample #...: H6L070246-009 **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK1XD1AA
		Dilution Factor: 0.1		Analysis Time..: 11:25	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-010 **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	ND	0.15	ug	ASTM D6784-02	01/04/07	JK1XE1AA
		Dilution Factor: 1.47		Analysis Time..: 11:06	MDL.....: 0.088	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-011 **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	ND	0.075	ug	ASTM D6784-02	01/03-01/05/07	JK1XR1AA
		Dilution Factor: 0.75		Analysis Time..: 11:51	MDL.....: 0.045	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-012 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	12.1	0.46	ug	ASTM D6784-02	01/04/07	JK1XT1AA
		Dilution Factor: 4.6		Analysis Time..: 11:55	MDL.....: 0.28	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 FH

TOTAL Metals

Lot-Sample #...: H6L070246-015 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	0.0090 B	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK1X51AA
		Dilution Factor: 0.1		Analysis Time..: 11:27	MDL.....: 0.0060	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-016 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	0.080 B	0.12	ug	ASTM D6784-02	01/04/07	JK1X81AA
		Dilution Factor: 1.25		Analysis Time..: 11:11	MDL.....: 0.075	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-017 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.064	0.063	ug	ASTM D6784-02	01/03-01/05/07	JK10A1AA
		Dilution Factor: 0.63		Analysis Time..: 11:53	MDL.....: 0.038	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-018 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	6.4	0.089	ug	ASTM D6784-02	01/04/07	JK10E1AA
		Dilution Factor: 0.89		Analysis Time..: 11:13	MDL.....: 0.053	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 FH

TOTAL Metals

Lot-Sample #...: H6L070246-021 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	0.61	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK1051AA
		Dilution Factor: 0.1		Analysis Time..: 11:29	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-022 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	1.6	0.11	ug	ASTM D6784-02	01/04/07	JK1061AA
		Dilution Factor: 1.11		Analysis Time..: 11:15	MDL.....: 0.067	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-023 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.064 B	0.065	ug	ASTM D6784-02	01/03-01/05/07	JK1071AA
		Dilution Factor: 0.65		Analysis Time..: 11:55	MDL.....: 0.039	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-024 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	3.6	0.089	ug	ASTM D6784-02	01/04/07	JK11A1AA
		Dilution Factor: 0.89		Analysis Time..: 11:17	MDL.....: 0.053	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 FH

TOTAL Metals

Lot-Sample #...: H6L070246-027 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	1.5	0.050	ug	ASTM D6784-02	01/02-01/05/07	JK11F1AA
		Dilution Factor: 0.5		Analysis Time..: 12:08	MDL.....: 0.030	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-028 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	1.7	0.12	ug	ASTM D6784-02	01/04/07	JK11K1AA
		Dilution Factor: 1.15		Analysis Time..: 11:19	MDL.....: 0.069	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-029 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.10	0.063	ug	ASTM D6784-02	01/03-01/05/07	JK11L1AA
		Dilution Factor: 0.63		Analysis Time..: 11:57	MDL.....: 0.038	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-030 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	4.6	0.092	ug	ASTM D6784-02	01/04/07	JK11Q1AA
		Dilution Factor: 0.92		Analysis Time..: 11:25	MDL.....: 0.055	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 FH

TOTAL Metals

Lot-Sample #...: H6L070246-033 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	0.64	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK1121AA
		Dilution Factor: 0.1		Analysis Time..: 11:33	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 KCL

TOTAL Metals

Lot-Sample #...: H6L070246-034 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	3.3	0.081	ug	ASTM D6784-02	01/04/07	JK1131AA
		Dilution Factor: 0.81		Analysis Time..: 11:27	MDL.....: 0.049	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-035 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.058 B	0.068	ug	ASTM D6784-02	01/03-01/05/07	JK1141AA
		Dilution Factor: 0.68		Analysis Time..: 12:03	MDL.....: 0.041	

NOTE(S):

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H6L070246-036 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	0.79	0.11	ug	ASTM D6784-02	01/04/07	JK1171AA
		Dilution Factor: 1.11		Analysis Time..: 11:29	MDL.....: 0.067	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB 0.1N HNO3

TOTAL Metals

Lot-Sample #...: H6L070246-037 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002025						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JK12A1AA
		Dilution Factor: 0.1		Analysis Time..: 11:39	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB KCL

TOTAL Metals

Lot-Sample #...: H6L070246-038 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	ND	0.010	ug	ASTM D6784-02	01/04/07	JK12F1AA
		Dilution Factor: 0.1		Analysis Time..: 11:31	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H6L070246-039 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002026						
Mercury	0.034	0.024	ug	ASTM D6784-02	01/03-01/05/07	JK12G1AA
		Dilution Factor: 0.24		Analysis Time..: 12:06	MDL.....: 0.014	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB KMNO4/H2SO4/HYD

TOTAL Metals

Lot-Sample #...: H6L070246-040 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002028						
Mercury	ND	0.011	ug	ASTM D6784-02	01/04/07	JK12H1AA
		Dilution Factor: 0.11		Analysis Time..: 11:33	MDL.....: 0.0066	

QC Summary

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: H7A020000-025 **Prep Batch #...:** 7002025						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JL97P1AA
		Dilution Factor: 0.1				
		Analysis Time..: 11:15				
MB Lot-Sample #: H7A020000-026 **Prep Batch #...:** 7002026						
Mercury	ND	0.025	ug	ASTM D6784-02	01/03-01/05/07	JL97R1AA
		Dilution Factor: 0.25				
		Analysis Time..: 11:41				
MB Lot-Sample #: H7A020000-028 **Prep Batch #...:** 7002028						
Mercury	ND	0.010	ug	ASTM D6784-02	01/04/07	JL97W1AA
		Dilution Factor: 0.1				
		Analysis Time..: 10:46				
Mercury	ND	0.010	ug	ASTM D6784-02	01/04/07	JL97W1AC
		Dilution Factor: 0.1				
		Analysis Time..: 10:46				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: H6L070246 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #
Mercury	97	(80 - 120)			ASTM D6784-02	01/02-01/05/07	7002025
	95	(80 - 120)	2.7	(0-20)	ASTM D6784-02	01/02-01/05/07	7002025

Dilution Factor: 0.1 Analysis Time..: 11:17

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: H6L070246 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Mercury	0.500	0.487	ug	97		ASTM D6784-02	01/02-01/05/07	7002025
	0.500	0.474	ug	95	2.7	ASTM D6784-02	01/02-01/05/07	7002025

Dilution Factor: 0.1 Analysis Time..: 11:17

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: H7A020000-026 **Prep Batch #...:** 7002026					
Mercury	80	(80 - 120)	ASTM D6784-02	01/03-01/05/07	JL97R1AC
		Dilution Factor: 0.25	Analysis Time..: 11:44		
LCS Lot-Sample#: H7A020000-028 **Prep Batch #...:** 7002028					
Mercury	97	(80 - 120)	ASTM D6784-02	01/04/07	JL97W1AD
		Dilution Factor: 0.1	Analysis Time..: 10:48		
Mercury	97	(80 - 120)	ASTM D6784-02	01/04/07	JL97W1AE
		Dilution Factor: 0.1	Analysis Time..: 10:48		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: H7A020000-026 **Prep Batch #...:** 7002026							
Mercury	1.25	1.00	ug	80	ASTM D6784-02	01/03-01/05/07	JL97R1AC
			Dilution Factor: 0.25		Analysis Time..: 11:44		
LCS Lot-Sample#: H7A020000-028 **Prep Batch #...:** 7002028							
Mercury	0.500	0.483	ug	97	ASTM D6784-02	01/04/07	JL97W1AD
			Dilution Factor: 0.1		Analysis Time..: 10:48		
Mercury	0.500	0.483	ug	97	ASTM D6784-02	01/04/07	JL97W1AE
			Dilution Factor: 0.1		Analysis Time..: 10:48		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-005 **Prep Batch #...:** 7002026							
Mercury	88	(80 - 120)			ASTM D6784-02	01/03-01/05/07	JK1WF1AC
	91	(80 - 120)	2.8	(0-20)	ASTM D6784-02	01/03-01/05/07	JK1WF1AD
		Dilution Factor: 0.6					
		Analysis Time..: 11:47					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-005 **Prep Batch #...:** 7002026									
Mercury									
	0.041	0.600	0.569	ug	88		ASTM D6784-02	01/03-01/05/07	JK1WF1AC
	0.041	0.600	0.586	ug	91	2.8	ASTM D6784-02	01/03-01/05/07	JK1WF1AD

Dilution Factor: 0.6
Analysis Time..: 11:47

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-004 **Prep Batch #...:** 7002028							
Mercury	99	(80 - 120)			ASTM D6784-02	01/04/07	JK1WE1AC
	104	(80 - 120)	4.6	(0-20)	ASTM D6784-02	01/04/07	JK1WE1AD

Dilution Factor: 1.32
Analysis Time..: 10:53

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-004 **Prep Batch #...:** 7002028									
Mercury									
	0.11	1.32	1.41	ug	99		ASTM D6784-02	01/04/07	JK1WE1AC
	0.11	1.32	1.48	ug	104	4.6	ASTM D6784-02	01/04/07	JK1WE1AD

Dilution Factor: 1.32
Analysis Time..: 10:53

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-006 **Prep Batch #...:** 7002028							
Mercury	NC,MSB	(80 - 120)			ASTM D6784-02	01/04/07	JK1WG1AC
	NC,MSB	(80 - 120)		(0-20)	ASTM D6784-02	01/04/07	JK1WG1AD

Dilution Factor: 0.78
Analysis Time..: 11:02

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated because the sample amount was greater than four times the spike amount.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H6L070246 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H6L070246-006 **Prep Batch #...:** 7002028									
Mercury									
	6.8	0.780	7.88	ug			ASTM D6784-02	01/04/07	JK1WG1AC
			Qualifiers: NC,MSB						
	6.8	0.780	8.11	ug			ASTM D6784-02	01/04/07	JK1WG1AD
			Qualifiers: NC,MSB						
			Dilution Factor: 0.78						
			Analysis Time..: 11:02						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated because the sample amount was greater than four times the spike amount.

STL Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: H010507. PRN

Element	PDS JK1WAA	Original Sample JK1WA	Spike Added	Percent Recovery
Hg	1.36	0.34	1.0	102

Quality Control Results Mercury

STL Knoxville

Mercury Data Reporting Form

Initial Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010407.PRN

		Ck2icv 1/4/2007 9:50 AM											
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	2.5	2.43	97.2										

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010407.PRN

Elem	True Conc	Ck3ccv 1/4/2007 9:56 AM		Ck3ccv 1/4/2007 10:14 AM		Ck3ccv 1/4/2007 10:33 AM		Ck3ccv 1/4/2007 10:56 AM		Ck3ccv 1/4/2007 11:21 AM		Ck3ccv 1/4/2007 11:35 AM	
		Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	5.0	4.92	**98.4**	4.94	**98.8**	4.94	**98.8**	4.95	**99.0**	4.91	**98.2**	4.89	**97.8**

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010407.PRN

		Ck3ccv 1/4/2007 11:57 AM											
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	5.0	4.87	97.4										

STL Knoxville

Mercury Data Reporting Form

Contract Required Detection Limit Standard(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010407.PRN

Elem	True Conc	CRA 1/4/2007 9:54 AM Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	0.2	0.18	**88.0**										

STL Knoxville

Mercury Data Reporting Form

Initial Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010407.PRN

Elem	Reporting Limit	ICB 1/4/2007 9:52 AM											
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U										

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg Ana

Data File Name: M010407.PRN

Elem	Reporting Limit	Ck1ccb 1/4/2007 9:58 AM		Ck1ccb 1/4/2007 10:16 AM		Ck1ccb 1/4/2007 10:35 AM		Ck1ccb 1/4/2007 10:58 AM		Ck1ccb 1/4/2007 11:23 AM		Ck1ccb 1/4/2007 11:37 AM	
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U	-0.07	B	0.06	U	0.06	U	0.06	U	0.06	U

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

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Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010407.PRN

Elem	Reporting Limit	Ck1ccb 1/4/2007 11:59 AM											
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U										

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

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Mercury Data Reporting Form

Instrument Detection Limits

Units: ug/L (ppb)

IDL Completion Date: 12/14/2006

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010407.PRN

Element	Wavelength (nm)	Reporting Limit	IDL
Hg	253.70	0.1	0.06

STL Knoxville

Sample ID Nomenclature

The sample ID consists of 5 alpha-numeric characters followed by a suffix in the 6th position that designates the sample type:

Suffix	Sample Type:
B	Method Blank
C	Laboratory Control Sample
L	Laboratory Control Sample Duplicate
S	Matrix Spike
D	Matrix Spike Duplicate
X	Sample Duplicate
P	Serial Dilution
A	Post Digestion Spike
Z#	Dilution; # = Dilution Factor

STL Knoxville

Mercury Data Reporting Form

Initial Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

		Ck2icv 1/5/2007 10:05 AM											
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	2.5	2.48	99.2										

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

Elem	True Conc	Ck3ccv 1/5/2007 10:11 AM Found	% Rec	Ck3ccv 1/5/2007 10:30 AM Found	% Rec	Ck3ccv 1/5/2007 10:48 AM Found	% Rec	Ck3ccv 1/5/2007 11:11 AM Found	% Rec	Ck3ccv 1/5/2007 11:35 AM Found	% Rec	Ck3ccv 1/5/2007 11:59 AM Found	% Rec
Hg	5.0	4.83	**96.6**	4.80	**96.0**	4.86	**97.2**	4.84	**96.8**	4.83	**96.6**	4.90	**98.0**

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

		Ck3ccv 1/5/2007 12:10 PM											
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	5.0	4.88	97.6										

STL Knoxville

Mercury Data Reporting Form

Contract Required Detection Limit Standard(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

Elem	True Conc	CRA 1/5/2007 10:09 AM Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	0.2	0.19	**95.0**										

STL Knoxville

Mercury Data Reporting Form

Initial Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

Elem	Reporting Limit	ICB 1/5/2007 10:07 AM											
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U										

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg Ana

Data File Name: M010507.PRN

Elem	Reporting Limit	Ck1ccb 1/5/2007 10:14 AM		Ck1ccb 1/5/2007 10:32 AM		Ck1ccb 1/5/2007 10:50 AM		Ck1ccb 1/5/2007 11:13 AM		Ck1ccb 1/5/2007 11:37 AM		Ck1ccb 1/5/2007 12:01 PM	
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

Elem	Reporting Limit	Ck1ccb 1/5/2007 12:12 PM											
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U										

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

STL Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: H010507. PRN

Element	PDS JK1WAA	Original Sample JK1WA	Spike Added	Percent Recovery
Hg	1.36	0.34	1.0	102

STL Knoxville

Mercury Data Reporting Form

Instrument Detection Limits

Units: ug/L (ppb)

IDL Completion Date: 12/14/2006

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

Element	Wavelength (nm)	Reporting Limit	IDL
Hg	253.70	0.1	0.06

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Sample ID Nomenclature

The sample ID consists of 5 alpha-numeric characters followed by a suffix in the 6th position that designates the sample type:

Suffix	Sample Type:
B	Method Blank
C	Laboratory Control Sample
L	Laboratory Control Sample Duplicate
S	Matrix Spike
D	Matrix Spike Duplicate
X	Sample Duplicate
P	Serial Dilution
A	Post Digestion Spike
Z#	Dilution; # = Dilution Factor

Raw Data
Mercury

STL Knoxville
Mercury Analysis Cover Sheet

Analyst	DKW	**Instrument**	**Leeman Hydra AA Mercury Analyzer**
Run Date	01/04/07	**Chart Name**	M010407

Daily Maintenance		**As Needed Maintenance**	
☑	Check tubing.	☑	Adjust/change Hg lamp.
☑	Check maintenance schedule flags.	☐	Clean or replace optical cell.
		☐	Lubricate pump and autosampler arm.
		☐	Change the drying tube.

```
--------------------------------------------------------------------------------
:       Instrument Upload                                   Run Log - Page  1 :
:       Started Thu Jan  4 13:14:22 2007 by WILBURND                          :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M010407.PRN;1                       :
--------------------------------------------------------------------------------
```

#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
1	CK2ICV	1.00	04-JAN-2007	09:50:37			HG
2	ICB	1.00	04-JAN-2007	09:52:22			HG
3	CRA	1.00	04-JAN-2007	09:54:18			HG
4	CK3CCV	1.00	04-JAN-2007	09:56:14			HG
5	CK1CCB	1.00	04-JAN-2007	09:58:21			HG
6	MDL1	1.00	04-JAN-2007	10:00:08			HG
7	MDL2	1.00	04-JAN-2007	10:01:55			HG
8	MDL3	1.00	04-JAN-2007	10:04:02			HG
9	MDL4	1.00	04-JAN-2007	10:05:54			HG
10	MDL5	1.00	04-JAN-2007	10:07:50			HG
11	MDL6	1.00	04-JAN-2007	10:10:19			HG
12	MDL7	1.00	04-JAN-2007	10:12:08			HG
13	CK3CCV	1.00	04-JAN-2007	10:14:05			HG
14	CK1CCB	1.00	04-JAN-2007	10:16:05			HG
15	MDL1	1.00	04-JAN-2007	10:17:54			HG
16	MDL2	1.00	04-JAN-2007	10:20:26			HG
17	MDL3	1.00	04-JAN-2007	10:22:52			HG
18	MDL4	1.00	04-JAN-2007	10:24:42			HG
19	MDL5	1.00	04-JAN-2007	10:26:30			HG
20	MDL6	1.00	04-JAN-2007	10:28:21			HG
21	MDL7	1.00	04-JAN-2007	10:30:47			HG
22	CK3CCV	1.00	04-JAN-2007	10:33:26			HG
23	CK1CCB	1.00	04-JAN-2007	10:35:34			HG
24	JL99EBT	1.00	04-JAN-2007	10:37:24	7003044	H7A020000	HG
25	JMCENCT	1.00	04-JAN-2007	10:39:10	7003044	H7A030000	HG
26	JL57ET	1.00	04-JAN-2007	10:41:08	7003044	H6L270125	HG
27	JL57EST	1.00	04-JAN-2007	10:42:56	7003044	H6L270125	HG
28	JL57EDT	1.00	04-JAN-2007	10:44:48	7003044	H6L270125	HG
29	JL97WB	0.10	04-JAN-2007	10:46:39	7002028	H7A020000	HG
30	JL97WC	0.10	04-JAN-2007	10:48:41	7002028	H7A020000	HG
31	JK1WE	1.32	04-JAN-2007	10:51:03	7002028	H6L070246	HG
32	JK1WES	1.32	04-JAN-2007	10:53:00	7002028	H6L070246	HG
33	JK1WED	1.32	04-JAN-2007	10:54:57	7002028	H6L070246	HG
34	CK3CCV	1.00	04-JAN-2007	10:56:46			HG
35	CK1CCB	1.00	04-JAN-2007	10:58:37			HG
36	JK1WG	0.78	04-JAN-2007	11:00:24	7002028	H6L070246	HG
37	JK1WGS	0.78	04-JAN-2007	11:02:44	7002028	H6L070246	HG
38	JK1WGD	0.78	04-JAN-2007	11:04:36	7002028	H6L070246	HG
39	JK1XE	1.47	04-JAN-2007	11:06:48	7002028	H6L070246	HG
40	JK1XT	0.92	04-JAN-2007	11:08:41	7002028	H6L070246	HG
41	JK1X8	1.25	04-JAN-2007	11:11:18	7002028	H6L070246	HG
42	JK10E	0.89	04-JAN-2007	11:13:26	7002028	H6L070246	HG
43	JK106	1.11	04-JAN-2007	11:15:34	7002028	H6L070246	HG
44	JK11A	0.89	04-JAN-2007	11:17:34	7002028	H6L070246	HG

---------- (continued) ----------

```
-------------------------------------------------------------------------------
:       Instrument Upload                                    Run Log - Page  2 :
:       Started Thu Jan  4 13:14:22 2007 by WILBURND                           :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M010407.PRN;1                        :
-------------------------------------------------------------------------------
```

#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
45	JK11K	1.15	04-JAN-2007	11:19:24	7002028	H6L070246	HG
46	CK3CCV	1.00	04-JAN-2007	11:21:12			HG
47	CK1CCB	1.00	04-JAN-2007	11:23:19			HG
48	JK11Q	0.92	04-JAN-2007	11:25:18	7002028	H6L070246	HG
49	JK113	0.81	04-JAN-2007	11:27:55	7002028	H6L070246	HG
50	JK117	1.11	04-JAN-2007	11:29:43	7002028	H6L070246	HG
51	JK12F	0.10	04-JAN-2007	11:31:40	7002028	H6L070246	HG
52	JK12H	0.11	04-JAN-2007	11:33:30	7002028	H6L070246	HG
53	CK3CCV	1.00	04-JAN-2007	11:35:19			HG
54	CK1CCB	1.00	04-JAN-2007	11:37:17			HG
55	JK1XTZ5	4.60	04-JAN-2007	11:55:32	7002028	H6L070246	HG
56	CK3CCV	1.00	04-JAN-2007	11:57:24			HG
57	CK1CCB	1.00	04-JAN-2007	11:59:21			HG

---------- End of Report ----------

STL Knoxville

Method Information

Method Name: 7pt.std/SW-846 7470A/7471A/0.1 RL **Element:** Hg **Chart Number:** **m010407.prn**

Instrument Calibrated Every ? Hours:	24	**Number of Calibration Standards:**	6
Correlation Coefficient >/=:	0.995	**Run ICV Immediately After Calibration?:**	Yes
CRA Required?:	Yes	**Number of Samples Between CCVs:**	10
Duplicate RPD:	20	**Calculate Duplicates by CLP or SW-846?:**	SW-846 Protocol

CRA Recovery Range:	30.0	**CRA Conc. (ug/L):**	0.2
ICV Recovery Range:	10.5	**ICV Conc. (ug/L):**	2.5
CCV Recovery Range:	20.5	**CCV Conc. (ug/L):**	5
LCS Recovery Range:	10.5	**LCS Spike Level (ug/L):**	5
MS/MSD Recovery Range:	15.5	**MS Spike Level (ug/L):**	1

Letter to Signify Blanks:	B	**Position to Signify Blanks:**	6
Letter to Signify LCS's:	C	**Position to Signify LCS's:**	6
Letter to Signify LCSD's:	L	**Position to Signify LCSD's:**	6
Letter to Signify Dilutions:	Z	**Position to Signify Dilutions:**	6
Letter to Signify Duplicates:	X	**Position to Signify Duplicates:**	6
Letter to Signify MS's:	S	**Position to Signify MS's:**	6
Letter to Signify MSD's:	D	**Position to Signify MSD's:**	6
Letters to Signify MSA's:	MSA+	**Position to Signify MSA's:**	6
Number of Additions:	3		

Calibration Standard Concentrations (ug/L)

Standard 1 Conc: 0.1	**Standard 2 Conc:** 0.2	**Standard 3 Conc:** 0.5	**Standard 4 Conc:** 1
Standard 5 Conc: 5	**Standard 6 Conc:** 10	**Standard 7 Conc:** 0	**Standard 8 Conc:** 0

ICB/CCB Check Level (ug/L): 0.059 **Prep Blank Check Level (ug/L):** 0.049 **Reporting Limit (ug/L):** 0.1

IDL (ug/L): 0.06 **Date of IDL:** 12/14/2006

STL Knoxville Mercury Data Review Checklist

Method: 7pt.std/SW-846 7470A/7471A/0.1 RL

Analyst:	DKW			**Instrument:**	Leeman Hydra AA Mercury Analyzer		
Run Date:	Jan-04-07	**Calibration Number:**	1	**Chart Name:**	m010407.prn	**Element:**	Hg

A. Calibration/Instrument Run QC		**N/A**	**Yes**	**No**	**Comments**
1.	Instrument calibrated every 24 hours?		X		Calibration was 2 hours and 25 minutes long
2.	Instrument calibrated using a minimum of a blank and 5 standards?		X		
3.	Do standard absorbances increase as standard concentrations increase?		X		
4.	Instrument calibrated with standards at the SOP levels?		X		
5.	Correlation coefficient greater than or equal to 0.995?		X		Correlation coefficient was 0.9999
6.	ICV analyzed directly after calibration?		X		
7.	ICV within specified control limits?		X		
8.	ICB analyzed immediately after ICV?		X		
9.	ICB within acceptable range?		X		
10.	CRA analyzed at the beginning of the run?		X		
11.	CRA results within acceptable range?		X		
12.	All CCV's within specified control limits?		X		
13.	All CCB's within acceptable range?		X		
14.	All CCB's analyzed immediately after CCV's?		X		
B. Client Sample and QC Sample Results					
1.	Were all sample results within the linear range of the instrument ?			X	See Comments on Next Page
2.	Were there any samples with results more negative than Report Limit?			X	
3.	Were samples analyzed within the holding time?		X		
C. Preparation/Matrix QC					
1.	Was one method blank prepared for each batch?		X		
2.	Were all method blanks less than the specified level?		X		
3.	Was an LCS prepared for each batch?		X		
4.	Were all LCS recoveries within QC limits?		X		
5.	Were matrix spikes, sample duplicates and/or post-digestion spikes run at required frequency?		X		
6.	Were all matrix spike recoveries within QC limits?			X	See Comments on Next Page
7.	Were post-digestion spike recoveries within QC limits?	X			
8.	Were duplicate RPDs within QC limits?		X		
D. Other					
1.	Current IDL data on file?		X		
2.	Current MDL data on file?		X		
3.	Are all nonconformances documented appropriately?	X			
4.	Were all project specific instructions followed?		X		NCM#:

Question Number:	Problem(s) Found:
B1	Sample JK1WGS at 1/4/2007 11:02:44 AM exceeded linear range and an acceptable dilution was NOT found. } MSB, NC DID NOT REANALYZE
B1	Sample JK1WGD at 1/4/2007 11:04:36 AM exceeded linear range and an acceptable dilution was NOT found.
C6	Matrix spike sample JL57EST at 1/4/2007 10:42:56 AM had ~~493~~ 98.6% recovery. } TCLP RECOVERIES ACCEPTABLE
C6	Matrix spike sample JL57EDT at 1/4/2007 10:44:48 AM had ~~500~~ 100.0% recovery.
C6	Matrix spike sample JK1WGS at 1/4/2007 11:02:44 AM had 132% recovery. } MSB, NC DID NOT REANALYZE
C6	Matrix spike sample JK1WGD at 1/4/2007 11:04:36 AM had 162% recovery.

STL Knoxville Mercury Data Review Checklist

Analyst: DKW **Date:** 1/4/07

Analyst Comments:

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INTERMEDIATE STANDARD -- VERIFICATION

Stock Std Name: ICP 080
Element: Hg
Stock Source: Ultra
Stock Std Lot #: F00424
Stock Std Expiration Date: 8/31/08
Stock Conc.: 1000 ppm
Acid Lot: B44032

Stock Vol (ml)/100ml: 1.0 ml
Date Prepared: 1/2/07
Expiration Date: 2/2/07
QC Check: M010307
Initials: KWD
Matrix: 2% HNO_3

WORKING STANDARD -- VERIFICATION

1 ml Intermediate Standard/100 ml 0.15 % Concentrated Nitric Acid

1. I-VER 3426-6-1	Initials DKW	Date: 010307	Exp. Date: 010407	HN03 Lot: B44032
2. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
3. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
4. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
5. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
6. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
7. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
8. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
9. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
10. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
11. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
12. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
13. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
14. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
15. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
16. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
17. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
18. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
19. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
20. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
21. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
22. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
23. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
24. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
25. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:

STL KNOXVILLE

INTERMEDIATE STANDARD -- VERIFICATION

Stock Std Name: ICP 080
Element: Hg
Stock Source: Ultra
Stock Std Lot #: F00424
Stock Std Expiration Date: 8/31/08
Stock Conc.: 1000 ppm
Acid Lot: B44032

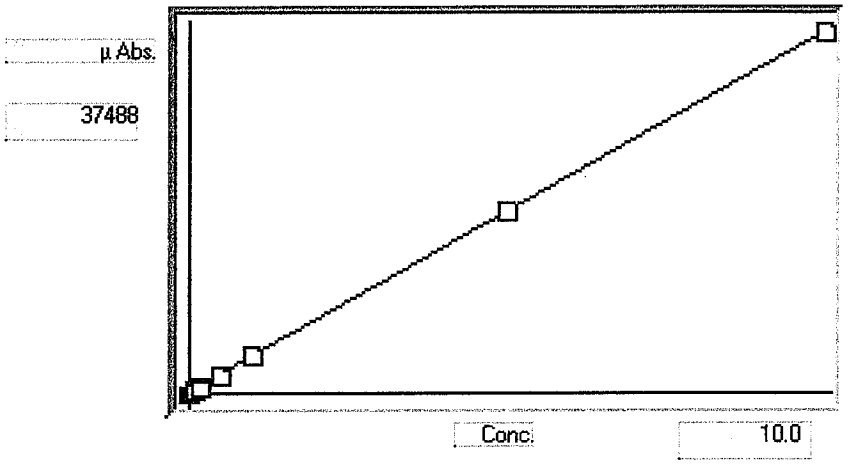
Stock Vol (ml)/100ml: 1.0 ml
Date Prepared: 1/2/07
Expiration Date: 2/2/07
QC Check: M010307
Initials: KWD
Matrix: 2% HNO_3

WORKING STANDARD -- VERIFICATION

1 ml Intermediate Standard/100 ml 0.15 % Concentrated Nitric Acid

1. I-VER 3426-6-1	Initials DKW	Date: 010307	Exp. Date: 010407	HN03 Lot: B44032
2. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
3. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
4. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
5. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
6. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
7. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
8. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
9. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
10. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
11. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
12. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
13. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
14. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
15. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
16. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
17. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
18. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
19. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
20. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
21. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
22. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
23. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
24. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
25. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:

Protocol: 7ptcurve



Wt. lin.

☑ Calibrated

☑ Accepted

A	
B	2.67307e-4
C	-3.50539e-2
Rhc	.999980

Accepted Date: 04-Jan-07 09:48

S	Conc.	Calc.	Dev.	Mean	SD or %RSD	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
01	.00000	-.022	-.022	50	0	50				
02	.10000	.103	.003	517	0%	517				
03	.20000	.166	-.034	753	0%	752				
04	.50000	.513	.013	2053	0%	2052				
05	1.0000	1.03	.032	3992	0%	3992				
06	5.0000	5.02	.021	18917	0%	18916				
07	10.000	9.99	-.014	37489	0%	37488				
08										
09										
10										

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Standard: 1 Rep: 1              Seq:  0       09:34:36 04 Jan 07   HG

Hg    .000    ppb      50

*** Standard: 2 Rep: 1              Seq:  1       09:36:35 04 Jan 07   HG

Hg    .100    ppb      517

*** Standard: 3 Rep: 1              Seq:  2       09:38:42 04 Jan 07   HG

Hg    .200    ppb      752

*** Standard: 4 Rep: 1              Seq:  3       09:40:39 04 Jan 07   HG

Hg    .500    ppb      2052

*** Standard: 5 Rep: 1              Seq:  4       09:42:50 04 Jan 07   HG

Hg    1.00    ppb      3992

*** Standard: 6 Rep: 1              Seq:  5       09:44:48 04 Jan 07   HG

Hg    5.00    ppb      18916

*** Standard: 7 Rep: 1              Seq:  6       09:47:11 04 Jan 07   HG

Hg    10.0    ppb      37488

*** Check Standard: 2  Ck2icv       Seq:  7       09:50:37 04 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          97.1     2.43    2.50  ppb         .000  %

*** Sample ID: ICB                   Seq:  8       09:52:22 04 Jan 07   HG
                            ICB
Hg   -.046    ppb       .000  %  -.046

*** Sample ID: CRA                   Seq:  9       09:54:18 04 Jan 07   HG
                            CRA
Hg    .176    ppb       .000  %   .176

*** Check Standard: 3  Ck3ccv       Seq:  10      09:56:14 04 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          98.4     4.92    5.00  ppb         .000  %

*** Check Standard: 1  Ck1ccb       Seq:  11      09:58:21 04 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.037     .059     ppb        .000  %

*** Sample ID: MDL1                  Seq:  12      10:00:08 04 Jan 07   HG
                            KMN04 0.1ppb
Hg    .086    ppb       .000  %   .086

*** Sample ID: MDL2                  Seq:  13      10:01:55 04 Jan 07   HG

Hg    .062    ppb       .000  %   .062

*** Sample ID: MDL3                  Seq:  14      10:04:02 04 Jan 07   HG

Hg    .106    ppb       .000  %   .106

*** Sample ID: MDL4                  Seq:  15      10:05:54 04 Jan 07   HG

Hg    .063    ppb       .000  %   .063
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Sample ID: MDL5                    Seq:  16     10:07:50 04 Jan 07   HG

Hg    .072    ppb       .000  %   .072

*** Sample ID: MDL6                    Seq:  17     10:10:19 04 Jan 07   HG

Hg    .079    ppb       .000  %   .079

*** Sample ID: MDL7                    Seq:  18     10:12:08 04 Jan 07   HG

Hg    .081    ppb       .000  %   .081

*** Check Standard: 3  Ck3ccv          Seq:  19     10:14:05 04 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          98.9     4.94    5.00  ppb         .000  %

*** Check Standard: 1  Ck1ccb          Seq:  20     10:16:05 04 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg       OK -.066     .059     ppb        .000  %
         DKW 1-4-07

*** Sample ID: MDL1                    Seq:  21     10:17:54 04 Jan 07   HG
                          KCL 0.1ppb
Hg    .063    ppb       .000  %   .063

*** Sample ID: MDL2                    Seq:  22     10:20:26 04 Jan 07   HG

Hg    .079    ppb       .000  %   .079

*** Sample ID: MDL3                    Seq:  23     10:22:52 04 Jan 07   HG

Hg    .088    ppb       .000  %   .088

*** Sample ID: MDL4                    Seq:  24     10:24:42 04 Jan 07   HG

Hg    .083    ppb       .000  %   .083

*** Sample ID: MDL5                    Seq:  25     10:26:30 04 Jan 07   HG

Hg    .088    ppb       .000  %   .088

*** Sample ID: MDL6                    Seq:  26     10:28:21 04 Jan 07   HG

Hg    .077    ppb       .000  %   .077

*** Sample ID: MDL7                    Seq:  27     10:30:47 04 Jan 07   HG

Hg    .099    ppb       .000  %   .099

*** Check Standard: 3  Ck3ccv          Seq:  28     10:33:26 04 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          98.8     4.94    5.00  ppb         .000  %

*** Check Standard: 1  Ck1ccb          Seq:  29     10:35:34 04 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.016     .059     ppb        .000  %

*** Sample ID: JL99EBT                 Seq:  30     10:37:24 04 Jan 07   HG
                          7003044
Hg   -.034    ppb       .000  %  -.034

*** Sample ID: JMCENCT                 Seq:  31     10:39:10 04 Jan 07   HG

Hg    4.99    ppb       .000  %   4.99
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Sample ID: JL57ET                Seq:  32     10:41:08 04 Jan 07   HG

Hg   -.033    ppb       .000  %  -.033

*** Sample ID: JL57EST               Seq:  33     10:42:56 04 Jan 07   HG

Hg    4.93    ppb       .000  %   4.93

*** Sample ID: JL57EDT               Seq:  34     10:44:48 04 Jan 07   HG

Hg    5.00    ppb       .000  %   5.00

*** Sample ID: JL97WB                Seq:  35     10:46:39 04 Jan 07   HG
                          7002028
Hg   -.060    ppb       .000  %  -.060

*** Sample ID: JL97WC                Seq:  36     10:48:41 04 Jan 07   HG

Hg    4.83    ppb       .000  %   4.83

*** Sample ID: JK1WE                 Seq:  37     10:51:03 04 Jan 07   HG

Hg    .084    ppb       .000  %   .084

*** Sample ID: JK1WES                Seq:  38     10:53:00 04 Jan 07   HG

Hg    1.07    ppb       .000  %   1.07

*** Sample ID: JK1WED                Seq:  39     10:54:57 04 Jan 07   HG

Hg    1.12    ppb       .000  %   1.12

*** Check Standard: 3  Ck3ccv        Seq:  40     10:56:46 04 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          99.0     4.95    5.00  ppb        .000  %

*** Check Standard: 1  Ck1ccb        Seq:  41     10:58:37 04 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.053     .059    ppb        .000  %

*** Sample ID: JK1WG                 Seq:  42     11:00:24 04 Jan 07   HG

Hg    8.78    ppb       .000  %   8.78

*** Sample ID: JK1WGS                Seq:  43     11:02:44 04 Jan 07   HG

Hg    10.1    ppb       .000  %   10.1

*** Sample ID: JK1WGD                Seq:  44     11:04:36 04 Jan 07   HG

Hg    10.4    ppb       .000  %   10.4

*** Sample ID: JK1XE                 Seq:  45     11:06:48 04 Jan 07   HG

Hg   -.014    ppb       .000  %  -.014

*** Sample ID: JK1XT                 Seq:  46     11:08:41 04 Jan 07   HG

Hg    12.5    ppb       .000  %   12.5

*** Sample ID: JK1X8                 Seq:  47     11:11:18 04 Jan 07   HG

Hg    .064    ppb       .000  %   .064
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-------------------------------------------------------------------------------

*** Sample ID: JK10E                    Seq:  48     11:13:26 04 Jan 07   HG

Hg    7.18    ppb       .000  %   7.18

*** Sample ID: JK106                    Seq:  49     11:15:34 04 Jan 07   HG

Hg    1.43    ppb       .000  %   1.43

*** Sample ID: JK11A                    Seq:  50     11:17:34 04 Jan 07   HG

Hg    3.99    ppb       .000  %   3.99

*** Sample ID: JK11K                    Seq:  51     11:19:24 04 Jan 07   HG

Hg    1.46    ppb       .000  %   1.46

*** Check Standard: 3  Ck3ccv           Seq:  52     11:21:12 04 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          98.2     4.91    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb           Seq:  53     11:23:19 04 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.021     .059     ppb        .000  %

*** Sample ID: JK11Q                    Seq:  54     11:25:18 04 Jan 07   HG

Hg    5.00    ppb       .000  %   5.00

*** Sample ID: JK113                    Seq:  55     11:27:55 04 Jan 07   HG

Hg    4.03    ppb       .000  %   4.03

*** Sample ID: JK117                    Seq:  56     11:29:43 04 Jan 07   HG

Hg    .708    ppb       .000  %   .708

*** Sample ID: JK12F                    Seq:  57     11:31:40 04 Jan 07   HG

Hg   -.034    ppb       .000  %  -.034

*** Sample ID: JK12H                    Seq:  58     11:33:30 04 Jan 07   HG

Hg   -.015    ppb       .000  %  -.015

*** Check Standard: 3  Ck3ccv           Seq:  59     11:35:19 04 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          97.8     4.89    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb           Seq:  60     11:37:17 04 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.028     .059     ppb        .000  %

*** Sample ID: JK1XTZ5                  Seq:  61     11:55:32 04 Jan 07   HG

Hg    2.62    ppb       .000  %   2.62

*** Check Standard: 3  Ck3ccv           Seq:  62     11:57:24 04 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          97.3     4.87    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb           Seq:  63     11:59:21 04 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.040     .059     ppb        .000  %
```

STL Knoxville
Mercury Analysis Cover Sheet

Scanned

Analyst	DKW	**Instrument**	**Leeman Hydra AA Mercury Analyzer**
Run Date	1/5/07	**Chart Name**	M010507

Daily Maintenance		**As Needed Maintenance**	
☑	Check tubing.	☐	Adjust/change Hg lamp.
☑	Check maintenance schedule flags.	☐	Clean or replace optical cell.
		☐	Lubricate pump and autosampler arm.
		☐	Change the drying tube.

```
--------------------------------------------------------------------------------
:       Instrument Upload                                    Run Log - Page  1 :
:       Started Fri Jan  5 11:40:01 2007 by WILBURND                           :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M010507.PRN;1                        :
--------------------------------------------------------------------------------
```

#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
1	CK2ICV	1.00	05-JAN-2007	10:05:28			HG
2	ICB	1.00	05-JAN-2007	10:07:24			HG
3	CRA	1.00	05-JAN-2007	10:09:20			HG
4	CK3CCV	1.00	05-JAN-2007	10:11:09			HG
5	CK1CCB	1.00	05-JAN-2007	10:14:08			HG
6	MDL1	1.00	05-JAN-2007	10:15:56			HG
7	MDL2	1.00	05-JAN-2007	10:18:14			HG
8	MDL3	1.00	05-JAN-2007	10:20:05			HG
9	MDL4	1.00	05-JAN-2007	10:21:52			HG
10	MDL5	1.00	05-JAN-2007	10:23:50			HG
11	MDL6	1.00	05-JAN-2007	10:25:46			HG
12	MDL7	1.00	05-JAN-2007	10:27:54			HG
13	CK3CCV	1.00	05-JAN-2007	10:30:21			HG
14	CK1CCB	1.00	05-JAN-2007	10:32:18			HG
15	MDL1	1.00	05-JAN-2007	10:34:09			HG
16	MDL2	1.00	05-JAN-2007	10:36:01			HG
17	MDL3	1.00	05-JAN-2007	10:37:53			HG
18	MDL4	1.00	05-JAN-2007	10:40:01			HG
19	MDL5	1.00	05-JAN-2007	10:41:58			HG
20	MDL6	1.00	05-JAN-2007	10:43:56			HG
21	MDL7	1.00	05-JAN-2007	10:46:04			HG
22	CK3CCV	1.00	05-JAN-2007	10:48:21			HG
23	CK1CCB	1.00	05-JAN-2007	10:50:10			HG
24	JL971B	0.10	05-JAN-2007	10:52:11	7002029	H7A020000	HG
25	JL971C	0.10	05-JAN-2007	10:54:39	7002029	H7A020000	HG
26	JL971L	0.10	05-JAN-2007	10:56:37	7002029	H7A020000	HG
27	JLHWK	0.20	05-JAN-2007	10:58:24	7002029	H6L140394	HG
28	JLHWKA	0.20	05-JAN-2007	11:00:17	7002029	H6L140394	HG
29	JLHXD	0.20	05-JAN-2007	11:02:10	7002029	H6L140394	HG
30	JLHXF	0.20	05-JAN-2007	11:03:58	7002029	H6L140394	HG
31	JLHXH	0.10	05-JAN-2007	11:05:48	7002029	H6L140394	HG
32	JLHXK	0.10	05-JAN-2007	11:07:43	7002029	H6L140394	HG
33	JLHXM	0.10	05-JAN-2007	11:09:45	7002029	H6L140394	HG
34	CK3CCV	1.00	05-JAN-2007	11:11:32			HG
35	CK1CCB	1.00	05-JAN-2007	11:13:21			HG
36	JL97PB	0.10	05-JAN-2007	11:15:29	7002025	H7A020000	HG
37	JL97PC	0.10	05-JAN-2007	11:17:27	7002025	H7A020000	HG
38	JL97PL	0.10	05-JAN-2007	11:19:38	7002025	H7A020000	HG
39	JK1WA	0.10	05-JAN-2007	11:21:27	7002025	H6L070246	HG
40	JK1WAA	0.10	05-JAN-2007	11:23:14	7002025	H6L070246	HG
41	JK1XD	0.10	05-JAN-2007	11:25:13	7002025	H6L070246	HG
42	JK1X5	0.10	05-JAN-2007	11:27:13	7002025	H6L070246	HG
43	JK105	0.10	05-JAN-2007	11:29:00	7002025	H6L070246	HG
44	JK11F	0.50	05-JAN-2007	11:31:17	7002025	H6L070246	HG

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```
--------------------------------------------------------------------------------
:       Instrument Upload                                    Run Log - Page  2 :
:       Started Fri Jan  5 11:40:01 2007 by WILBURND                           :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M010507.PRN;1                        :
--------------------------------------------------------------------------------
```

#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
45	JK112	0.10	05-JAN-2007	11:33:35	7002025	H6L070246	HG
46	CK3CCV	1.00	05-JAN-2007	11:35:37			HG
47	CK1CCB	1.00	05-JAN-2007	11:37:34			HG
48	JK12A	0.10	05-JAN-2007	11:39:43	7002025	H6L070246	HG
49	JL97RB	0.25	05-JAN-2007	11:41:55	7002026	H7A020000	HG
50	JL97RC	0.25	05-JAN-2007	11:44:14	7002026	H7A020000	HG
51	JK1WF	0.60	05-JAN-2007	11:46:04	7002026	H6L070246	HG
52	JK1WFS	0.60	05-JAN-2007	11:47:54	7002026	H6L070246	HG
53	JK1WFD	0.60	05-JAN-2007	11:49:46	7002026	H6L070246	HG
54	JK1XR	0.75	05-JAN-2007	11:51:57	7002026	H6L070246	HG
55	JK10A	0.63	05-JAN-2007	11:53:48	7002026	H6L070246	HG
56	JK107	0.65	05-JAN-2007	11:55:35	7002026	H6L070246	HG
57	JK11L	0.63	05-JAN-2007	11:57:33	7002026	H6L070246	HG
58	CK3CCV	1.00	05-JAN-2007	11:59:24			HG
59	CK1CCB	1.00	05-JAN-2007	12:01:12			HG
60	JK114	0.68	05-JAN-2007	12:03:28	7002026	H6L070246	HG
61	JK12G	0.24	05-JAN-2007	12:06:15	7002026	H6L070246	HG
62	JK11FZ5	0.50	05-JAN-2007	12:08:04	7002025	H6L070246	HG
63	CK3CCV	1.00	05-JAN-2007	12:10:04			HG
64	CK1CCB	1.00	05-JAN-2007	12:12:32			HG

---------- End of Report ----------

STL Knoxville

Method Information

Method Name: Ontario Hydro **Element:** Hg **Chart Number:** **m010507.prn**

Instrument Calibrated Every ? Hours:	24	**Number of Calibration Standards:**	6
Correlation Coefficient >/=:	0.995	**Run ICV Immediately After Calibration?:**	Yes
CRA Required?:	Yes	**Number of Samples Between CCVs:**	10
Duplicate RPD:	20	**Calculate Duplicates by CLP or SW-846?:**	SW-846 Protocol

CRA Recovery Range:	30.0	**CRA Conc. (ug/L):**	0.2
ICV Recovery Range:	10.5	**ICV Conc. (ug/L):**	2.5
CCV Recovery Range:	20.5	**CCV Conc. (ug/L):**	5
LCS Recovery Range:	20.5	**LCS Spike Level (ug/L):**	5
MS/MSD Recovery Range:	20.5	**MS Spike Level (ug/L):**	1

Letter to Signify Blanks:	B	**Position to Signify Blanks:**	6
Letter to Signify LCS's:	C	**Position to Signify LCS's:**	6
Letter to Signify LCSD's:	L	**Position to Signify LCSD's:**	6
Letter to Signify Dilutions:	Z	**Position to Signify Dilutions:**	6
Letter to Signify Duplicates:	X	**Position to Signify Duplicates:**	6
Letter to Signify MS's:	S	**Position to Signify MS's:**	6
Letter to Signify MSD's:	D	**Position to Signify MSD's:**	6
Letters to Signify MSA's:	MSA+	**Position to Signify MSA's:**	6
Number of Additions:	3		

Calibration Standard Concentrations (ug/L)

Standard 1 Conc: 0.1	**Standard 2 Conc:** 0.2	**Standard 3 Conc:** 0.5	**Standard 4 Conc:** 1
Standard 5 Conc: 5	**Standard 6 Conc:** 10	**Standard 7 Conc:** 0	**Standard 8 Conc:** 0

ICB/CCB Check Level (ug/L): 0.099 **Prep Blank Check Level (ug/L):** 0.099 **Reporting Limit (ug/L):** 0.1

IDL (ug/L): 0.06 **Date of IDL:** 12/14/2006

STL Knoxville Mercury Data Review Checklist

Method: Ontario Hydro

Analyst:	DKW			**Instrument:**	Leeman Hydra AA Mercury Analyzer		
Run Date:	Jan-05-07	**Calibration Number:**	1	**Chart Name:**	m010507.prn	**Element:**	Hg

A. Calibration/Instrument Run QC		**N/A**	**Yes**	**No**	**Comments**
1.	Instrument calibrated every 24 hours?		X		Calibration was 2 hours and 22 minutes long
2.	Instrument calibrated using a minimum of a blank and 5 standards?		X		
3.	Do standard absorbances increase as standard concentrations increase?		X		
4.	Instrument calibrated with standards at the SOP levels?		X		
5.	Correlation coefficient greater than or equal to 0.995?		X		Correlation coefficient was 0.9996
6.	ICV analyzed directly after calibration?		X		
7.	ICV within specified control limits?		X		
8.	ICB analyzed immediately after ICV?		X		
9.	ICB within acceptable range?		X		
10.	CRA analyzed at the beginning of the run?		X		
11.	CRA results within acceptable range?		X		
12.	All CCV's within specified control limits?		X		
13.	All CCB's within acceptable range?		X		
14.	All CCB's analyzed immediately after CCV's?		X		
B. Client Sample and QC Sample Results					
1.	Were all sample results within the linear range of the instrument ?		X		
2.	Were there any samples with results more negative than Report Limit?			X	
3.	Were samples analyzed within the holding time?		X		
C. Preparation/Matrix QC					
1.	Was one method blank prepared for each batch?		X		
2.	Were all method blanks less than the specified level?		X		
3.	Was an LCS prepared for each batch?		X		
4.	Were all LCS recoveries within QC limits?		X		
5.	Were matrix spikes, sample duplicates and/or post-digestion spikes run at required frequency?		X		
6.	Were all matrix spike recoveries within QC limits?		X		
7.	Were post-digestion spike recoveries within QC limits?		X		
8.	Were duplicate RPDs within QC limits?		X		
D. Other					
1.	Current IDL data on file?		X		
2.	Current MDL data on file?		X		
3.	Are all nonconformances documented appropriately?		X		
4.	Were all project specific instructions followed?		X		NCM#: 08-0006722 & 080006721

Analyst: DKW **Date:** 01/05/07

Analyst Comments:

STL KNOXVILLE

INTERMEDIATE STANDARD -- CALIBRATION

Stock Std Name: PLHG4-24
Element: Hg
Stock Source: Spex
Stock Std Lot #: 12-43HG
Stock Std Expiration Date: 4/30/07
Stock Conc.: 1000 ppm
HNO_3 Lot B44032

Stock Vol (ml)/100ml: 1ml
Date Prepared: 1/2/07
Expiration Date: 2/2/07
QC Check: M010307
Initials: KND
Matrix: 2% HNO_3

WORKING STANDARD -- CALIBRATION

One ml Intermediate Standard/100ml 0.15% Concentrated Nitric Acid

1. I-CAL 3425-6-1	Initials KND	Date: 1/2/07	Exp. Date: 1/3/07	HN03 Lot: B44032
2. I-CAL 3425-6-2	Initials KND	Date: 1/3/07	Exp. Date: 1/4/07	HN03 Lot: B44032
3. .I-CAL 3425-6-3	Initials DKW	Date: 010407	Exp. Date: 010507	HN03 Lot: B44032
4. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
5. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
6. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
7. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
8. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
9. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
10..I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
11..I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
12..I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
13. I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
14. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
15. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
16. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
17. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
18. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
19. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
20. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
21. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
22. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
23. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
24. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
25. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:

STL KNOXVILLE

INTERMEDIATE STANDARD -- VERIFICATION

Stock Std Name: ICP 080
Element: Hg
Stock Source: Ultra
Stock Std Lot #: F00424
Stock Std Expiration Date: 8/31/08
Stock Conc.: 1000 ppm
Acid Lot: B44032

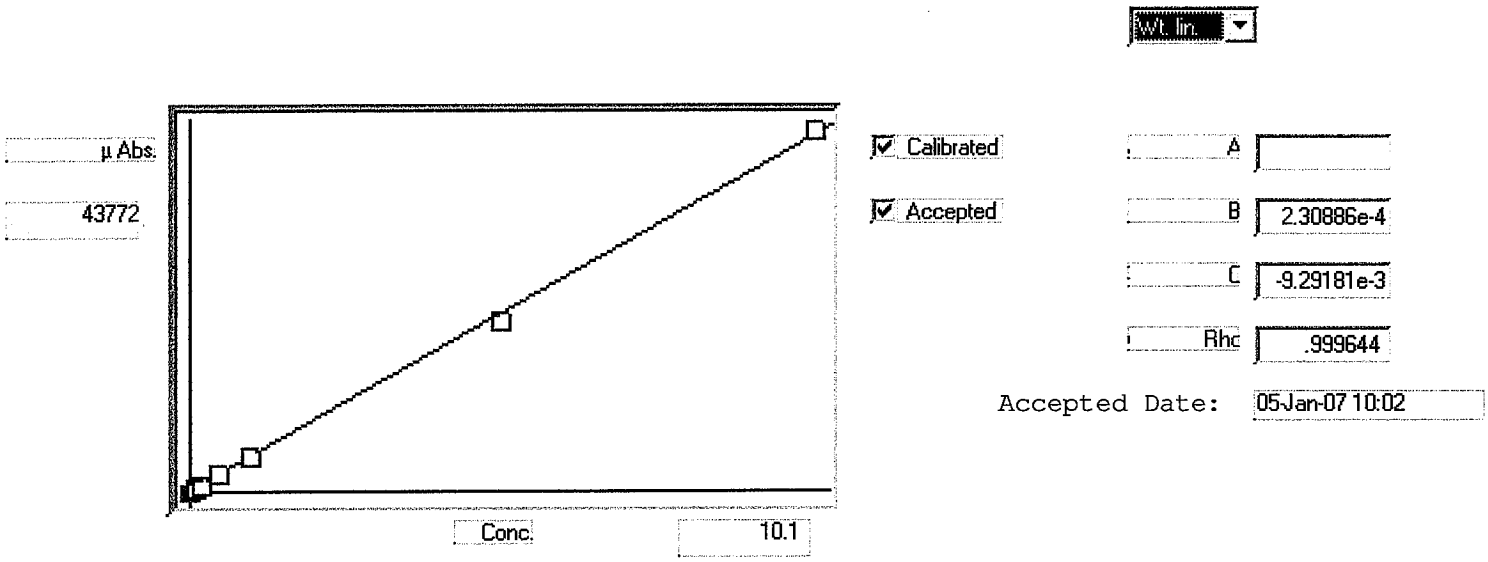
Stock Vol (ml)/100ml: 1.0 ml
Date Prepared: 1/2/07
Expiration Date: 2/2/07
QC Check: M010307
Initials: KWD
Matrix: 2% HNO_3

WORKING STANDARD -- VERIFICATION

1 ml Intermediate Standard/100 ml 0.15 % Concentrated Nitric Acid

1. I-VER 3426-6-1	Initials DKW	Date: 010307	Exp. Date: 010407	HN03 Lot: B44032
2. I-VER 3426-6-2	Initials DKW	Date: 010407	Exp. Date: 010507	HN03 Lot: B44032
3. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
4. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
5. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
6. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
7. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
8. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
9. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
10. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
11. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
12. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
13. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
14. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
15. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
16. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
17. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
18. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
19. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
20. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
21. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
22. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
23. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
24. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
25. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:

Protocol: 7ptcurve



S	Conc.	Calc.	Dev.	Mean	SD or %RSD	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
01	.00000	.014	.014	103	0	103				
02	.10000	-.122	.022	568	0%	567				
03	.20000	.205	.005	926	0%	926				
04	.50000	.545	.045	2400	0%	2400				
05	1.0000	1.04	.036	4528	0%	4528				
06	5.0000	4.78	-.219	20750	0%	20749				
07	10.000	10.1	.097	43772	0%	43772				
08										
09										
10										

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Standard: 1 Rep: 1              Seq:  0       09:50:53 05 Jan 07   HG

Hg    .000    ppb      103

*** Standard: 2 Rep: 1              Seq:  1       09:52:41 05 Jan 07   HG

Hg    .100    ppb      567

*** Standard: 3 Rep: 1              Seq:  2       09:54:30 05 Jan 07   HG

Hg    .200    ppb      926

*** Standard: 4 Rep: 1              Seq:  3       09:56:18 05 Jan 07   HG

Hg    .500    ppb      2400

*** Standard: 5 Rep: 1              Seq:  4       09:58:17 05 Jan 07   HG

Hg    1.00    ppb      4528

*** Standard: 6 Rep: 1              Seq:  5       10:00:05 05 Jan 07   HG

Hg    5.00    ppb      20749

*** Standard: 7 Rep: 1              Seq:  6       10:01:52 05 Jan 07   HG

Hg    10.0    ppb      43772

*** Check Standard: 2  Ck2icv       Seq:  7       10:05:28 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          99.0     2.48    2.50  ppb         .000  %

*** Sample ID: ICB                   Seq:  8      10:07:24 05 Jan 07   HG
                            ICB
Hg   -.008    ppb       .000  %  -.008

*** Sample ID: CRA                   Seq:  9      10:09:20 05 Jan 07   HG
                            CRA
Hg    .190    ppb       .000  %   .190

*** Check Standard: 3  Ck3ccv       Seq:  10      10:11:09 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          96.6     4.83    5.00  ppb         .000  %

*** Check Standard: 1  Ck1ccb       Seq:  11      10:14:08 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.006     .059     ppb        .000  %

*** Sample ID: MDL1                  Seq:  12     10:15:56 05 Jan 07   HG
                            Front Half OH 0.1ppb
Hg    .084    ppb       .000  %   .084

*** Sample ID: MDL2                  Seq:  13     10:18:14 05 Jan 07   HG

Hg    .094    ppb       .000  %   .094

*** Sample ID: MDL3                  Seq:  14     10:20:05 05 Jan 07   HG

Hg    .081    ppb       .000  %   .081

*** Sample ID: MDL4                  Seq:  15     10:21:52 05 Jan 07   HG

Hg    .094    ppb       .000  %   .094
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-------------------------------------------------------------------------------

*** Sample ID: MDL5                    Seq:  16     10:23:50 05 Jan 07   HG

Hg    .091    ppb       .000  %   .091

*** Sample ID: MDL6                    Seq:  17     10:25:46 05 Jan 07   HG

Hg    .100    ppb       .000  %   .100

*** Sample ID: MDL7                    Seq:  18     10:27:54 05 Jan 07   HG

Hg    .129    ppb       .000  %   .129

*** Check Standard: 3  Ck3ccv          Seq:  19     10:30:21 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          96.0     4.80    5.00  ppb         .000  %

*** Check Standard: 1  Ck1ccb          Seq:  20     10:32:18 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.012     .059     ppb        .000  %

*** Sample ID: MDL1                    Seq:  21     10:34:09 05 Jan 07   HG
                            Back Half OH 0.1ppb
Hg    .041    ppb       .000  %   .041

*** Sample ID: MDL2                    Seq:  22     10:36:01 05 Jan 07   HG

Hg    .062    ppb       .000  %   .062

*** Sample ID: MDL3                    Seq:  23     10:37:53 05 Jan 07   HG

Hg    .044    ppb       .000  %   .044

*** Sample ID: MDL4                    Seq:  24     10:40:01 05 Jan 07   HG

Hg    .075    ppb       .000  %   .075

*** Sample ID: MDL5                    Seq:  25     10:41:58 05 Jan 07   HG

Hg    .048    ppb       .000  %   .048

*** Sample ID: MDL6                    Seq:  26     10:43:56 05 Jan 07   HG

Hg    .053    ppb       .000  %   .053

*** Sample ID: MDL7                    Seq:  27     10:46:04 05 Jan 07   HG

Hg    .080    ppb       .000  %   .080

*** Check Standard: 3  Ck3ccv          Seq:  28     10:48:21 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          97.2     4.86    5.00  ppb         .000  %

*** Check Standard: 1  Ck1ccb          Seq:  29     10:50:10 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg          .011     .059     ppb        .000  %

*** Sample ID: JL971B                  Seq:  30     10:52:11 05 Jan 07   HG
                            H6L140394 FH OH
Hg   -.017    ppb       .000  %  -.017

*** Sample ID: JL971C                  Seq:  31     10:54:39 05 Jan 07   HG

Hg    4.91    ppb       .000  %   4.91
```

Line Conc. Units SD/RSD 1 2 3 4 5

*** Sample ID: JL971L Seq: 32 10:56:37 05 Jan 07 HG

Hg 5.15 ppb .000 % 5.15

*** Sample ID: JLHWK Seq: 33 10:58:24 05 Jan 07 HG

Hg -.013 ppb .000 % -.013

*** Sample ID: JLHWKA 9ML SAMPLE + 1ML DIGESTED 10 ppb STD. Seq: 34 11:00:17 05 Jan 07 HG

Hg 1.04 ppb .000 % 1.04

*** Sample ID: JLHXD Seq: 35 11:02:10 05 Jan 07 HG

Hg .003 ppb .000 % .003

*** Sample ID: JLHXF Seq: 36 11:03:58 05 Jan 07 HG

Hg .016 ppb .000 % .016

*** Sample ID: JLHXH Seq: 37 11:05:48 05 Jan 07 HG

Hg .006 ppb .000 % .006

*** Sample ID: JLHXK Seq: 38 11:07:43 05 Jan 07 HG

Hg .052 ppb .000 % .052

*** Sample ID: JLHXM Seq: 39 11:09:45 05 Jan 07 HG

Hg .003 ppb .000 % .003

*** Check Standard: 3 Ck3ccv Seq: 40 11:11:32 05 Jan 07 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		96.9	4.84	5.00	ppb	.000 %

*** Check Standard: 1 Ck1ccb Seq: 41 11:13:21 05 Jan 07 HG

Line	Flag	Found	Range(+/-)	Units	SD/RSD
Hg		-.009	.059	ppb	.000 %

*** Sample ID: JL97PB Seq: 42 11:15:29 05 Jan 07 HG
H6L070246 FH OH

Hg .006 ppb .000 % .006

*** Sample ID: JL97PC Seq: 43 11:17:27 05 Jan 07 HG

Hg 4.87 ppb .000 % 4.87

*** Sample ID: JL97PL Seq: 44 11:19:38 05 Jan 07 HG

Hg 4.74 ppb .000 % 4.74

*** Sample ID: JK1WA Seq: 45 11:21:27 05 Jan 07 HG

Hg .378 ppb .000 % .378

*** Sample ID: JK1WAA 9ML SAMPLE + 1ML DIGESTED 10 ppb STD Seq: 46 11:23:14 05 Jan 07 HG

Hg 1.36 ppb .000 % 1.36

*** Sample ID: JK1XD Seq: 47 11:25:13 05 Jan 07 HG

Hg .044 ppb .000 % .044

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Sample ID: JK1X5                    Seq:  48     11:27:13 05 Jan 07   HG

Hg    .090    ppb       .000  %   .090

*** Sample ID: JK105                    Seq:  49     11:29:00 05 Jan 07   HG

Hg    6.13    ppb       .000  %   6.13

*** Sample ID: JK11F                    Seq:  50     11:31:17 05 Jan 07   HG

Hg    14.2    ppb       .000  %   14.2

*** Sample ID: JK112                    Seq:  51     11:33:35 05 Jan 07   HG

Hg    6.43    ppb       .000  %   6.43

*** Check Standard: 3  Ck3ccv           Seq:  52     11:35:37 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          96.6    4.83    5.00  ppb         .000  %

*** Check Standard: 1  Cklccb           Seq:  53     11:37:34 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.026     .059    ppb        .000  %

*** Sample ID: JK12A                    Seq:  54     11:39:43 05 Jan 07   HG

Hg    .012    ppb       .000  %   .012

*** Sample ID: JL97RB                   Seq:  55     11:41:55 05 Jan 07   HG
                            H6L070246 BH OH
Hg    .008    ppb       .000  %   .008

*** Sample ID: JL97RC                   Seq:  56     11:44:14 05 Jan 07   HG

Hg    4.00    ppb       .000  %   4.00

*** Sample ID: JK1WF                    Seq:  57     11:46:04 05 Jan 07   HG

Hg    .069    ppb       .000  %   .069

*** Sample ID: JK1WFS                   Seq:  58     11:47:54 05 Jan 07   HG

Hg    .949    ppb       .000  %   .949

*** Sample ID: JK1WFD                   Seq:  59     11:49:46 05 Jan 07   HG

Hg    .976    ppb       .000  %   .976

*** Sample ID: JK1XR                    Seq:  60     11:51:57 05 Jan 07   HG

Hg    .058    ppb       .000  %   .058

*** Sample ID: JK10A                    Seq:  61     11:53:48 05 Jan 07   HG

Hg    .102    ppb       .000  %   .102

*** Sample ID: JK107                    Seq:  62     11:55:35 05 Jan 07   HG

Hg    .099    ppb       .000  %   .099

*** Sample ID: JK11L                    Seq:  63     11:57:33 05 Jan 07   HG

Hg    .160    ppb       .000  %   .160
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Check Standard: 3  Ck3ccv       Seq:  64      11:59:24 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          98.0     4.90    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb       Seq:  65      12:01:12 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.037     .059     ppb        .000  %

*** Sample ID: JK114                 Seq:  66     12:03:28 05 Jan 07   HG

Hg    .085    ppb       .000  %   .085

*** Sample ID: JK12G                 Seq:  67     12:06:15 05 Jan 07   HG

Hg    .143    ppb       .000  %   .143

*** Sample ID: JK11FZ5               Seq:  68     12:08:04 05 Jan 07   HG

Hg    2.94    ppb       .000  %   2.94

*** Check Standard: 3  Ck3ccv       Seq:  69      12:10:04 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          97.6     4.88    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb       Seq:  70      12:12:32 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg          .016     .059     ppb        .000  %
```

Miscellaneous Data

STL Knoxville Mercury Data Review / Narrative Checklist
Methods 7470A/7471A and 245.1/245.5 - KNOX-MT-0009, Rev 6 and KNOX-MT-0010, Rev 5

Lot / SDG #: H6L0702-46	☐ No QC reported	☑ Batch QC reported	☐ Client QC reported

A. Review of QuantIMS / QDS Results	NA	Yes	No	*Why is data reportable?*
1. Were PM checklists, Lot Summary and any applicable QAS reviewed?		✓		
2. Were all prep sheets, prep spreadsheets and any existing NCMs reviewed?		✓		
3. Were manual calculations of results and RLs performed for each sample, blank, LCS, LCSD, MS, MSD and DUP? (Document 1 calculation per batch.)		✓		
4. Were elements with negative results >RL reported as ND G?	✓			
5. For each sample, blank, LCS, LCSD, MS, MSD and DUP, were flags, units, DFs, prep date, date/time of analysis verified to be correct?		✓		
6. Were spike amounts verified for each LCS/MS? (Document 1 manual calculation.)		✓		
7. Were method blank results ≤1/2 RL for water/solid samples or <RL for air train samples?		✓		☐ **[mb3] No analyte >QC limit in associated samples.*** ☐ **[mb5] Insufficient sample for reanalysis.***
8. LCS or LCS/LCSD within QC limits? (90-110%R)		✓		☐ **[lcs2] Insufficient sample for reanalysis.** ☐ **[lcs3] LCS%R >QC limits & sample results < RL.***
9. MS/MSD or MS/DUP run at required frequency?		✓		☐ [lcsd] Insufficient sample – lcs/lcsd analyzed.
10. MS %R or MS/MSD %R & RPD within QC limits?			✓	☐ [ms1] ☐ [msd1] LCS acceptable - matrix effects. ☐ [ms2] ☑ [msd2] Native analyte > 4x spike level. ☐ [ms3] ☐ [msd3] Matrix effects & native >4x spike. ☐ [batch] Batch QC on client's sample outside limits.
11. DUP RPD within limits? (0-20 RPD for results ≥5xRL; +RL if result <5xRL)	✓			☐ [rpd] LCS acceptable. Results indicate sample heterogeneity.
12. Were J flags added to the DUP as needed?	✓			
13. Is DUP RPD=0 for two ND results and RPD=200 for one ND and a positive result?	✓			
14. Are all results present for all samples?		✓		
15. Were the samples analyzed within the holding time?		✓		☐ [ht1] HT expired upon receipt ☐ *[ht2] Analysis requested after HT expired.* ☐ See comments section below.

Data Reviewer: [signature] **Date:** Jan 5, 07

Calculation Checks / Comments:

~~Back Half 7002025 JKIXT: 2.62 µg/L x 0.460 L x 50 ml/25 ml x 5 Dil. = 12.05 µg RL: 0.1 µg/L x 0.460 L x 50 ml/25 ml x 5 = 0.46 µg~~

~~7002026 JKIWF: 0.069 µg/L x 0.120 L x 50 ml/10 ml = 0.0414 µg RL: 0.1 µg/L x 0.120 L x 50 ml/10 ml = 0.060 µg~~

~~Front Half 7002025 JKIIF: 2.94 µg/L x 0.1 L x 5 Bench Dil. = 1.47 µg RL: 0.1 µg/L x 0.1 L x 5 = 0.05 µg~~

*Such action must be taken in consultation with client.

NOTE: Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville Mercury Data Review / Narrative Checklist
Methods 7470A/7471A and 245.1/245.5 - KNOX-MT-0009, Rev 6 and KNOX-MT-0010, Rev 5

Lot / SDG #: H6L070246

B. Review of QC Summary Forms *Note:* Y=Yes, N=No, NA=Not Applicable	Chart # M010407	Chart #	Chart #	Chart #	***Why is data reportable?***
1. ICV within limits? (7470A/7471A=90-110%R; 245.1/245.5=95-105%R)	Y				
2. CCV within limits? (7470A/7471A=80-120%R; 245.1/245.5=90-110%R)	Y				If no, list details:
3. ICB/CCB within limits? (<MDL for water/solid samples; <RL for air train samples)	Y				If no, list details:
4. CRA within limits? (The CRA standard contains mercury at 0.2 ug/L. The CRA result must fall within 30% of the true value.)	Y				
5. PDS or PDS/PDSD run at required frequency?	Y				
6. PDS/PDSD within limits? (75-125%R) **Reminder:** Place copy of PDS results in Sample Data Summary and QC Summary sections of report.	Y				☐ [pds1] ☐ [pdsd1] LCS acceptable - matrix effects. ☐ [pds2] ☐ [pdsd2] Native analyte > 4x spike level. ☐ [pds3] ☐ [pdsd3] Matrix effects & native >4x spike.
7. Are the IDLs on summary forms current?	Y				
8. Are the QC summary forms correct?	Y				

Data Reviewer: [signature] **Date:** Jan. 5, 07

Comments:

*Such action must be taken in consultation with client.

NOTE: Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville Metals Final Deliverable Data Review / Narrative Checklist

Lot / SDG #:	H6L0702446			
Report Type:	☐ Report (COA)	☑ Level 4 Package	☐ QDS Package	☐ Forms Only ☐ Other _____

C. Review of Final Deliverable	NA	Yes	No	
1. Are all nonconformances documented and discussed in narrative? (**Reminder:** Place copy of all NCMs in front of deliverable.)		✓		List NCM #: 06-0006722
2. For air trains, was the appropriate autotext selected for the narrative? (**Reminder:** Review the autotext and make all appropriate changes.)		✓		☐ [MMT1] Multi-metals trains analyzed for ICP & Hg. ☐ [MMT2] Multi-metals trains analyzed for ICP only. ☐ [MMT3] Multi-metals trains analyzed for Hg only. ☐ [MMT4] Combined FH/BH analyzed for ICP only. ☑ [OH] Ontario-Hydro train. ☐ [OH thimble] Ontario-Hydro train with thimble-FH.
3. For PM10 projects, was the appropriate autotext selected for the narrative?	✓			☐ [pm10] PM10 filters analyzed for ICP & Hg. ☐ [pm10icp] PM10 filters analyzed for ICP only.
4. Was a Filter Lot Check report included for PM10 filters?	✓			☐ [fb1] Filter Lot Check Report in Misc. Section. ☐ [fb2] Filter Lot Check Report after LCS report.
5. Is the narrative complete and does it contain the appropriate deviations noted on the analyst DRCs, ICP DRC, Hg DRC and ICP-MS DRC?		✓		
6. Were all client/project specific requirements met? (As described in PM checklists, Lot Summary or Client Analysis Summary, and any applicable QAS.)		✓		
7. Are the original DRCs behind narrative with copy in report?		✓		
8. Are results present for all samples?		✓		
9. Is the final deliverable in the proper format?		✓		
10. Were the ICP and Hg charts and cover pages scanned? (Check .pdf files.)		✓		

Data Reviewer: [signature] **Date:** Jan 5, 07

Comments:

STL Knoxville
Ontario-Hydro Air Train - SOP KNOX-IP-0006rev2
Front Half Mercury Sample Preparation Worksheet

Batch Number: 7002025

Prep Date: 01/02/2007 0900

Comp Date: 01/03/2007 1700

Microwave Prep Performed by: KND Date: 1/2/2007

1st Level Review/Relinquished by: DKW Date: 10507

2nd Level Review/Received by: NTM Date: Jan 5, 07 NTM Jan5,07

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	PDS	Total Volume Probe Rinse (L)	Probe Rinse pH	Final Microwave Digestate Volume (L)	Final Hg Digestate Volume (ml)	Volume Microwave Digestate Used (ml)	Hg Bench Dilution Factor	QuantIMS Upload Dilution Factor	QuantIMS Upload Multiplier
H6L070246	3		DXLO	HARDIN STACK RUN 1 FH	JK1WA	*	0.063	<2	0.100	50.0	50.0	1	0.10	0.10
H6L070246	9		DXLO	HARDIN STACK RUN 2 FH	JK1XD		0.085	<2	0.100	50.0	50.0	1	0.10	0.10
H6L070246	15		DXLO	HARDIN STACK RUN 3 FH	JK1X5		0.038	<2	0.100	50.0	50.0	1	0.10	0.10
H6L070246	21		DXLO	HARDIN SDA INLET DUCT RUN 1 FH	JK105		0.075	<2	0.100	50.0	50.0	1	0.10	0.10
H6L070246	27		DXLO	HARDIN SDA INLET DUCT RUN 2 FH	JK11F		0.070	<2	0.100	50.0	50.0	5	0.50	0.50
H6L070246	33		DXLO	HARDIN SDA INLET DUCT RUN 3 FH	JK112		0.055	<2	0.100	50.0	50.0	1	0.10	0.10
H6L070246	37		DXLO	HARDIN SDA INLET+STACK RB 0.1N HNO3	JK12A		0.050	<2	0.100	50.0	50.0	1	0.10	0.10
H7A020000	25	B	DXLO	INTRA-LAB BLANK	JL97P			<2	0.100	50.0	50.0	1	0.10	0.10
H7A020000	25	C	DXLO	INTRA-LAB CHECK	JL97P			<2	0.100	50.0	50.0	1	0.10	0.10
H7A020000	25	L	DXLO	INTRA-LAB CHECK	JL97P			<2	0.100	50.0	50.0	1	0.10	0.10

* = Sample chosen for PDS.

** = Sample chosen for PDS/PDSD.

Hg LCS/LCSD Spike: 50 uL of ICAL-3425-6 — Expiration Date 2/2/2007

HNO_3 Lot #: B44032 HF Lot #: 5105110

HCl Lot #: C07001 H_3BO_3 Lot # 2664:86

Comments: 0.1N HN03 2664:84

MDL study (0.1ppb) spiked with 100 uL of ICAL-3425-6-1 (Daily Std.) JK12A= Probe rinse only

QuantIMS Upload Dilution Factor *and* QuantIMS Multiplier = Final Microwave Digestate Volume (L) x Final Hg Digestate Volume (ml) / Volume Microwave Digestate Used (ml) x Hg Bench Dilution Factor

STL Knoxville
Mercury Air Prep Spiking Form

Analyst: KND/DKW Date: 01/04/07 Batch: 7002025

Bath A Temp: 93°C
Bath B Temp: 94°C
(Acceptance range 90°–95°C)

☐ Hg in PM10 filters: KNOX-IP-0003, Rev. 4
☐ MMT train: KNOX-MT-0006, Rev. 9
☑ Ontario Hydro: KNOX-IP-0006, Rev. 2

Standard Type	Standard ID	Intermediate Std.		Volume Used (ml)	Final Volume (ml)	Final Concentration (ug/L)
		Source	Conc.(ug/L)			
Calibration Std 1	N/A		N/A	N/A	50	Blank
Calibration Std 2	I-CAL- 3425-6-3	SPEX	100	0.05	50	0.1
Calibration Std 3	I-CAL-		100	0.1	50	0.2
Calibration Std 4	I-CAL-		100	0.25	50	0.5
Calibration Std 5	I-CAL-		100	0.5	50	1.0
Calibration Std 6	I-CAL-		100	2.5	50	5.0
Calibration Std 7	I-CAL-		100	5.0	50	10.0

Standard Type	Standard ID	Intermediate Std.		Amount Used (ml)	Final Volume (ml)	Final Conc. (ug/L)
		Source	Conc.(ug/L)			
ICV	I-VER- 3426-6-2	ULTRA	100	1.25	50	2.5
CCV	I-CAL- 3425-6-3	SPEX	100	2.5	50	5.0
CRA	I-CAL-		100	0.1	50	0.2

Standard Type	Standard ID	Intermediate Std.		Amount Used @ ICP prep/final volume	ICP Sample Volume used @ Hg prep (ml)	Final Conc. @ Hg prep (ug/L)	Final Amount (ug)
		Source	Conc.(ug/L)				
Air (PM10) LCS	I-CAL-		10,000	0.250 ml/50ml	5.0	5.0	11.25
Air (PM10) MS	I-CAL-		10,000	0.050 ml/50ml	5.0	1.0	2.25

REAGENTS			
Conc. H_2SO_4 Lot #:	C15045	5% $KMnO_4$ ID #:	B-3122-12-C
Conc. HNO_3 Lot #:	B44032	5% $K_2S_2O_8$ ID #:	D-2638-17-E
Conc. HCL Lot #:	C42A22	$SnCl_2$ Solution ID #:	A-3382-20-B
12% $NaCl{\cdot}NH_2OH{\cdot}HCL$ ID #:	C-3267-3-E		

STL Knoxville
Ontario-Hydro Air Train - SOP KNOX-IP-0006rev2
Back Half Mercury Sample Preparation Worksheet

Batch Number: 7002028

Prep Date: 01/04/2007 0800

Comp Date: 01/04/2007 1300

Pre-prep Performed by: KND Date: 10207

1st Level Review/Relinquished by: DKW Date: 10307

2nd Level Review/Received by: DKW Date: 1/04/07

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	PDS	Total Sample Volume (L)	Sample pH	Volume NH_2OH Added (L)	Final Hg Digestate Volume (ml)	Volume Sample Used (ml)	Hg Bench Dilution Factor	QuantIMS Upload Dilution Factor	QuantIMS Upload Multiplier
H6L070246	4		GNLO	HARDIN STACK RUN 1 KCL	JK1WE		0.655	<2	0.005	50.0	25.0	1	1.32	1.32
H6L070246	4	D	GNLO	HARDIN STACK RUN 1 KCL	JK1WE		0.655	<2	0.005	50.0	25.0	1	1.32	1.32
H6L070246	4	S	GNLO	HARDIN STACK RUN 1 KCL	JK1WE		0.655	<2	0.005	50.0	25.0	1	1.32	1.32
H6L070246	6		DZLO	HARDIN STACK RUN 1 KMNO4/H2SO4	JK1WG		0.370	<2	0.020	50.0	25.0	1	0.78	0.78
H6L070246	6	D	DZLO	HARDIN STACK RUN 1 KMNO4/H2SO4	JK1WG		0.370	<2	0.020	50.0	25.0	1	0.78	0.78
H6L070246	6	S	DZLO	HARDIN STACK RUN 1 KMNO4/H2SO4	JK1WG		0.370	<2	0.020	50.0	25.0	1	0.78	0.78
H6L070246	10		GNLO	HARDIN STACK RUN 2 KCL	JK1XE		0.730	<2	0.005	50.0	25.0	1	1.47	1.47
H6L070246	12		DZLO	HARDIN STACK RUN 2 KMNO4/H2SO4	JK1XT		0.440	<2	0.020	50.0	25.0	5	4.60	4.60
H6L070246	16		GNLO	HARDIN STACK RUN 3 KCL	JK1X8		0.620	<2	0.005	50.0	25.0	1	1.25	1.25
H6L070246	18		DZLO	HARDIN STACK RUN 3 KMNO4/H2SO4	JK10E		0.425	<2	0.020	50.0	25.0	1	0.89	0.89
H6L070246	22		GNLO	HARDIN SDA INLET DUCT RUN 1 KCL	JK106		0.550	<2	0.005	50.0	25.0	1	1.11	1.11
H6L070246	24		DZLO	HARDIN SDA INLET DUCT RUN 1 KMNO4/H2SO4	JK11A		0.425	<2	0.020	50.0	25.0	1	0.89	0.89
H6L070246	28		GNLO	HARDIN SDA INLET DUCT RUN 2 KCL	JK11K		0.570	<2	0.005	50.0	25.0	1	1.15	1.15
H6L070246	30		DZLO	HARDIN SDA INLET DUCT RUN 2 KMNO4/H2SO4	JK11Q		0.440	<2	0.020	50.0	25.0	1	0.92	0.92
H6L070246	34		GNLO	HARDIN SDA INLET DUCT RUN 3 KCL	JK113		0.395	<2	0.010	50.0	25.0	1	0.81	0.81
H6L070246	36		DZLO	HARDIN SDA INLET DUCT RUN 3 KMNO4/H2SO4	JK117		0.550	<2	0.005	50.0	25.0	1	1.11	1.11
H6L070246	38		GNLO	HARDIN SDA INLET+STACK RB KCL	JK12F		0.050	7	0.000	50.0	25.0	1	0.10	0.10
H6L070246	40		DZLO	HARDIN SDA INLET+STACK RB KMNO4/H2SO4/H	JK12H		0.045	<2	0.010	50.0	25.0	1	0.11	0.11
H7A020000	28	B	DZLO	INTRA-LAB BLANK	JL97W		0.050			50.0	25.0	1	0.10	0.10
H7A020000	28	B	GNLO	INTRA-LAB BLANK	JL97W		0.050			50.0	25.0	1	0.10	0.10
H7A020000	28	C	DZLO	INTRA-LAB CHECK	JL97W		0.050			50.0	25.0	1	0.10	0.10
H7A020000	28	C	GNLO	INTRA-LAB CHECK	JL97W		0.050			50.0	25.0	1	0.10	0.10

		Expiration Date
Hg LCS/LCSD Spike: 2.5 mL of	I-CAL-3425-6-2	10407
Hg MS/MSD Spike: 0.5 mL of	I-CAL-3425-6-2	10407

Comments:

Pre-prep KMnO4 Lot #: NA

* = Sample chosen for PDS.

** = Sample chosen for PDS/PDSD.

QuantIMS Upload Dilution Factor *and* QuantIMS Multiplier = (Total Sample Volume (L) + Volume NH_2OH Added (L)) x Final Hg Digestate Volume (ml) / Volume Sample Used (ml) x Hg Bench Dilution Factor

STL Knoxville
Mercury Air Prep Spiking Form

Analyst: KND/DKW **Date:** 01/03/07 **Batch:** 7002028

Bath A Temp: 93 °C
Bath B Temp: 94 °C
(Acceptance range 90°–95°C)

☐ **Hg in PM10 filters: KNOX-IP-0003, Rev. 4**
☐ **MMT train: KNOX-MT-0006, Rev. 9**
☑ **Ontario Hydro: KNOX-IP-0006, Rev. 2**

Standard Type	Standard ID	Intermediate Std.		Volume Used (ml)	Final Volume (ml)	Final Concentration (ug/L)
		Source	Conc.(ug/L)			
Calibration Std 1	N/A		N/A	N/A	50	Blank
Calibration Std 2	I-CAL-3425-6-2	SPEX	100	0.05	50	0.1
Calibration Std 3	I-CAL-		100	0.1	50	0.2
Calibration Std 4	I-CAL-		100	0.25	50	0.5
Calibration Std 5	I-CAL-		100	0.5	50	1.0
Calibration Std 6	I-CAL-		100	2.5	50	5.0
Calibration Std 7	I-CAL-		100	5.0	50	10.0

Standard Type	Standard ID	Intermediate Std.		Amount Used (ml)	Final Volume (ml)	Final Conc. (ug/L)
		Source	Conc.(ug/L)			
ICV	I-VER-3426-6-1	ULTPA	100	1.25	50	2.5
CCV	I-CAL-3425-10-2	SPEX	100	2.5	50	5.0
CRA	I-CAL-		100	0.1	50	0.2

Standard Type	Standard ID	Intermediate Std.		Amount Used @ ICP prep/final volume	ICP Sample Volume used @ Hg prep (ml)	Final Conc. @ Hg prep (ug/L)	Final Amount (ug)
		Source	Conc.(ug/L)				
Air (PM10) LCS	I-CAL-		10,000	0.250 ml/50ml	5.0	5.0	11.25
Air (PM10) MS	I-CAL-		10,000	0.050 ml/50ml	5.0	1.0	2.25

REAGENTS			
Conc. H_2SO_4 Lot #:	C15045	5% $KMnO_4$ ID #:	B-3122-12-C
Conc. HNO_3 Lot #:	B44032	5% $K_2S_2O_8$ ID #:	D-2638-17-E
Conc. HCL Lot #:	C07001	$SnCl_2$ Solution ID #:	A-3382-20-A
12% $NaCl{\cdot}NH_2OH{\cdot}HCL$ ID #:	C-3267-3-E		

STL Knoxville
Ontario-Hydro Air Train - SOP KNOX-IP-0006rev2
Back Half Mercury Sample Preparation Worksheet

Batch Number: 7002026

Prep Date: 01/03/2007 0800

Comp Date: 01/03/2007 1700

Pre-prep Performed by: KND — Date: 1/3/2007

1st Level Review/Relinquished by: DKW — Date: 10507

2nd Level Review/Received by: NTM — Date: Jan 5 2007

NTM Jan 5, 07

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	PDS	Total Sample Volume (L)	Sample pH	Volume NH_2OH Added (L)	Final Hg Digestate Volume (ml)	Volume Sample Used (ml)	Hg Bench Dilution Factor	QuantIMS Upload Dilution Factor	QuantIMS Upload Multiplier
H6L070246	5		DYLO	HARDIN STACK RUN 1 HNO3/H2O2	JK1WF		0.120	<2		50.0	10.0	1	0.60	0.60
H6L070246	5	D	DYLO	HARDIN STACK RUN 1 HNO3/H2O2	JK1WF		0.120	<2		50.0	10.0	1	0.60	0.60
H6L070246	5	S	DYLO	HARDIN STACK RUN 1 HNO3/H2O2	JK1WF		0.120	<2		50.0	10.0	1	0.60	0.60
H6L070246	11		DYLO	HARDIN STACK RUN 2 HNO3/H2O2	JK1XR		0.150	<2		50.0	10.0	1	0.75	0.75
H6L070246	17		DYLO	HARDIN STACK RUN 3 HNO3/H2O2	JK10A		0.125	<2		50.0	10.0	1	0.63	0.63
H6L070246	23		DYLO	HARDIN SDA INLET DUCT RUN 1 HNO3/H2O2	JK107		0.130	<2		50.0	10.0	1	0.65	0.65
H6L070246	29		DYLO	HARDIN SDA INLET DUCT RUN 2 HNO3/H2O2	JK11L		0.125	<2		50.0	10.0	1	0.63	0.63
H6L070246	35		DYLO	HARDIN SDA INLET DUCT RUN 3 HNO3/H2O2	JK114		0.135	<2		50.0	10.0	1	0.68	0.68
H6L070246	39		DYLO	HARDIN SDA INLET+STACK RB HNO3/H2O2	JK12G		0.048	<2		50.0	10.0	1	0.24	0.24
H7A020000	26	B	DYLO	INTRA-LAB BLANK	JL97R		0.050			50.0	10.0	1	0.25	0.25
H7A020000	26	C	DYLO	INTRA-LAB CHECK	JL97R		0.050			50.0	10.0	1	0.25	0.25

		Expiration Date
Hg LCS/LCSD Spike: 2.5 mL of	ICAL-3425-6-2	1/4/2007
Hg MS/MSD Spike: 0.5 mL of	ICAL-3425-6-2	1/4/2007

Comments: MDL spiked with 50 uL ICAL-3425-6-2

Pre-prep KMnO4 Lot #: A38H24

* = Sample chosen for PDS.

** = Sample chosen for PDS/PDSD.

QuantIMS Upload Dilution Factor *and* QuantIMS Multiplier = (Total Sample Volume (L) + Volume NH_2OH Added (L)) x Final Hg Digestate Volume (ml) / Volume Sample Used (ml) x Hg Bench Dilution Factor

STL Knoxville
Mercury Air Prep Spiking Form

Analyst: KND/DKW Date: 01/04/07 Batch: 70020216 Bath A Temp: 95°C
Bath B Temp: 94°C
(Acceptance range 90°–95°C)

☐ Hg in PM10 filters: KNOX-IP-0003, Rev. 4 ☑ Ontario Hydro: KNOX-IP-0006, Rev. 2
☐ MMT train: KNOX-MT-0006, Rev. 9

Standard Type	Standard ID	Intermediate Std.		Volume Used (ml)	Final Volume (ml)	Final Concentration (ug/L)
		Source	Conc.(ug/L)			
Calibration Std 1	N/A		N/A	N/A	50	Blank
Calibration Std 2	I-CAL- 3425-6-3	SPEX	100	0.05	50	0.1
Calibration Std 3	I-CAL-		100	0.1	50	0.2
Calibration Std 4	I-CAL-		100	0.25	50	0.5
Calibration Std 5	I-CAL-		100	0.5	50	1.0
Calibration Std 6	I-CAL-		100	2.5	50	5.0
Calibration Std 7	I-CAL-		100	5.0	50	10.0

Standard Type	Standard ID	Intermediate Std.		Amount Used (ml)	Final Volume (ml)	Final Conc. (ug/L)
		Source	Conc.(ug/L)			
ICV	I-VER- 3426-6-2	ULTRA	100	1.25	50	2.5
CCV	I-CAL- 3425-6-3	SPEX	100	2.5	50	5.0
CRA	I-CAL-		100	0.1	50	0.2

Standard Type	Standard ID	Intermediate Std.		Amount Used @ ICP prep/final volume	ICP Sample Volume used @ Hg prep (ml)	Final Conc. @ Hg prep (ug/L)	Final Amount (ug)
		Source	Conc.(ug/L)				
Air (PM10) LCS	I-CAL-		10,000	0.250 ml/50ml	5.0	5.0	11.25
Air (PM10) MS	I-CAL-		10,000	0.050 ml/50ml	5.0	1.0	2.25

REAGENTS			
Conc. H_2SO_4 Lot #:	C15045	5% $KMnO_4$ ID #:	B-3122-12-C
Conc. HNO_3 Lot #:	B44032	5% $K_2S_2O_8$ ID #:	D-2638-17-E
Conc. HCL Lot #:	C42A22	$SnCl_2$ Solution ID #:	A-3382-20-B
12% $NaCl{\cdot}NH_2OH{\cdot}HCL$ ID #:	C-3267-3-E		

Wet Chemistry

Sample Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 FILTER A117

General Chemistry

Lot-Sample #...: H6L070246-001 Work Order #...: JK1V2 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	387	0.50	mg	CFR60A 5	12/12-12/14/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-002 Work Order #...: JK1V7 Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	16.3	0.50	mg	CFR60A 5	12/12-12/14/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 FILTER A118

General Chemistry

Lot-Sample #...: H6L070246-007 Work Order #...: JK1W8 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	383	0.50	mg	CFR60A 5	12/12-12/13/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-008 **Work Order #...:** JK1XA **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	13.9	0.50	mg	CFR60A 5	12/12-12/15/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 FILTER A119

General Chemistry

Lot-Sample #...: H6L070246-013 Work Order #...: JK1X1 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	392	0.50	mg	CFR60A 5	12/12-12/14/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-014 Work Order #...: JK1X4 Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	12.1	0.50	mg	CFR60A 5	12/12-12/14/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 FILTER (THIMBLE 53)

General Chemistry

Lot-Sample #...: H6L070246-019 Work Order #...: JK10X Matrix.....: AIR
Date Sampled...: 12/01/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	10100	0.50	mg	CFR60A 5	12/12-12/15/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-020 **Work Order #...:** JK101 **Matrix.....:** AIR
Date Sampled...: 12/01/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**3250**	**0.50**	**mg**	**CFR60A 5**	**12/12-12/14/06**	**6346334**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 FILTER (THIMBLE 54)

General Chemistry

Lot-Sample #...: H6L070246-025 **Work Order #...:** JK11C **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**12700**	**0.50**	**mg**	**CFR60A 5**	**12/12-12/15/06**	**6346334**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-026 Work Order #...: JK11D Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	2930	0.50	mg	CFR60A 5	12/12-12/14/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 FILTER (THIMBLE 55)

General Chemistry

Lot-Sample #...: H6L070246-031 Work Order #...: JK11X Matrix.....: AIR
Date Sampled...: 12/02/06 Date Received..: 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	12500	0.50	mg	CFR60A 5	12/12-12/15/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 ACETONE

General Chemistry

Lot-Sample #...: H6L070246-032 **Work Order #...:** JK111 **Matrix.....:** AIR
Date Sampled...: 12/02/06 **Date Received..:** 12/06/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	730	0.50	mg	CFR60A 5	12/12-12/14/06	6346334

Dilution Factor: 1 MDL.....: 0.50

Raw Data

Total Particulates

STL Knoxville Particulate Matter Determination Data Review/Narrative Checklist
Method: SW-846 Method 0050 by SOP KNOX-WC-0006, Rev. 2
Page 1 of 1

Batch Number:	6346334
Lot Number(s):	H6L070246

Review Items **A. Calibration**	**N/A**	**Y**	**N**	**If No, why is data reportable?**	**2nd** √
1. Was the balance calibration checked with 5, 50 & 100 gram weights prior to use?		✓			✓
2. Was the balance checked with 100 gram weight after every 10 samples?		✓			✓
3. Was the balance tared before each weighing?		✓			✓
4. Was the balance ID documented?		✓			✓
B. Client Sample and QC Sample Results					
1. Were all special project requirements met? **(Were PM Checklists, Lot Summary, and any applicable QAS reviewed?)**		✓			✓
2. Were sample IDs verified?		✓			✓
3. Were all transcriptions checked?		✓			✓
4. Calculations checked for error?		✓			✓
5. Final report acceptable? (Results correct, units correct, **deviations noted in narrative**, and analysis dates correct.)		✓			✓
C. Preparation/Matrix QC					
1. Were all sample weighings performed in duplicate (at least)?		✓			✓
2. Was the average of the last two weighings used?		✓			✓
D. Other					
1. Are all nonconformances documented appropriately?	✓			**NCM No.:**	NA

Analyst: Jon Humphrey	**Date:** 12/15/06	**2nd Level Reviewer:** [illegible]	**Date:** 12/15/06
Comments:		**Comments:**	
* Samples were fly ash which are hydroscopic		Reported totals data with	
Large samples JHH weights kept weighed results		complete sig. figs in	
within 1%		narrative because cannot	
		print all digits required	
* FILTER JK1W8/A118 IS TORN AND SHREDDED –		from Quant IMS!	
SOME SMALL PIECES WERE LOST IN HANDLING			
FILTER ; REPORTED FIRST WEIGHING RESULT			
* NO TARE WEIGHTS PROVIDED FOR FILTERS –			
REPORTED RESULTS AS WEIGHED			

STL Knoxville
SOP KNOX-WC-0006
Particulate Data Worksheet

Batch Number: 6346334
Prep Date: 12/12/2006 0000
Comp Date: 12/13/2006 0000

Analyst: jmh

Reviewed by: [illegible]

Date: 12-15-06

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	1	2	3	*Tare Weight Average (g)*	1	2	3	*Final Weight Average (g)*	*Particulate Weight (mg)*
H6L070246	1		88AG	HARDIN STACK RUN 1 FILTER	JK1V21AA	0.0000			***0.00000***	0.3866	0.3871		***0.38685***	386.8
H6L070246	2		88AG	HARDIN STACK RUN 1 ACETONE	JK1V71AA	68.1291			***68.12910***	68.1456	68.1451		***68.14535***	16.3
H6L070246	7		88AG	HARDIN STACK RUN 2 FILTER	JK1W81AA	0.0000			***0.00000***	0.3829			***0.38290***	382.9
H6L070246	8		88AG	HARDIN STACK RUN 2 ACETONE	JK1XA1AA	66.1945			***66.19450***	66.2084	66.2084		***66.20840***	13.9
H6L070246	13		88AG	HARDIN STACK RUN 3 FILTER	JK1X11AA	0.0000			***0.00000***	0.3920	0.3916		***0.39180***	391.8
H6L070246	14		88AG	HARDIN STACK RUN 3 ACETONE	JK1X41AA	67.5076			***67.50760***	67.5197	67.5197		***67.51970***	12.1
H6L070246	19		88AG	HARDIN SDA INLET DUCT RUN 1 FI	JK10X1AA	0.0000			***0.00000***	10.1455	10.1433		***10.14440***	10144.4
H6L070246	20		88AG	HARDIN SDA INLET DUCT RUN 1 A	JK1011AA	66.6358			***66.63580***	69.8867	69.8900		***69.88835***	3252.6
H6L070246	25		88AG	HARDIN SDA INLET DUCT RUN 2 FI	JK11C1AA	0.0000			***0.00000***	12.6956	12.6948		***12.69520***	12695.2
H6L070246	26		88AG	HARDIN SDA INLET DUCT RUN 2 A	JK11D1AA	65.8788			***65.87880***	68.8042	68.8048		***68.80450***	2925.7
H6L070246	31		88AG	HARDIN SDA INLET DUCT RUN 3 FI	JK11X1AA	0.0000			***0.00000***	12.4710	12.4740		***12.47250***	12472.5
H6L070246	32		88AG	HARDIN SDA INLET DUCT RUN 3 A	JK1111AA	67.1794			***67.17940***	67.9096	67.9102		***67.90990***	730.5

Comments: Filter JK1W8/A118 is torn and shredded, some small pieces were lost in handling; use the first weighing for reporting.

STL Knoxville
Sample Data Log
Particulate Matter by KNOX-WC-0006

Batch Number: 6346334

	Sample Number	Work Order Number	Matrix	Filter or Beaker No.	Probe Rinse Volume (mL)	Tare Weight (g)	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials	
1	H6L070246-001	JK1V2-1AA	F	JK1V2 / A117	NA	NA	1	H-47372	100.0000	✓	0.3866	12/13/06	1611	JMH	
							2	↓	99.9999	✓	0.3871	12/14/06	1456	JMH	
							3	–	–			JMH			
							4	–	–			12/15/06			
2	-002	JK1V7-1AA	A C E	JK1V7	56	68.1291 ✓	1	H-47372	99.9999	✓	68.1456	12/13/06	1613	JMH	
							2	↓	99.9999	✓	68.1451	12/14/06	1502	JMH	
							3	–	–			JMH			
							4	–	–			12/15/06			
3	-007 ~~-003~~ JMH	JK1W8-1AA	F	JK1W8 / A118	NA	NA	1	H-47372	100.0000	✓	0.3829	12/13/06	1607	JMH	
							2	↓	~~99.9999~~	~~✓~~	~~0.3894~~ JMH 12/14/06	~~12/14/06~~	~~1457~~	~~JMH~~	*
							3	–	–			JMH			
							4	–	–			12/15/06			
4	-008 ~~-004~~ JMH	JK1XA-1AA	A C E	JK1XA	87	66.1945 ✓	1	H-47372	99.9999	✓	~~66.2095~~	~~12/13/06~~	~~1614~~	JMH	NOT USED
							2	↓	99.9999	✓	66.2084	12/14/06	1503	JMH	
							3	↓	100.0003	✓	66.2084	12/15/06	1301	JMH	
							4	–	– JMH						
5	-013 ~~-005~~ JMH	JK1X1-1AA	F	JK1X1 / A119	NA	NA	1	H-47372	100.000	✓	0.3920	12/13/06	1609	JMH	
							2	↓	99.9999	✓	0.3916	12/14/06	1500	JMH	
							3	–	–			JMH			
							4	–	–			12/15/06			

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

* FILTER TORN & ~~SHED~~ SHREDDED JMH, SOME PIECES LOST IN HANDLING
USE FIRST WEIGHING FOR REPORT JMH 12/14/06

STL Knoxville
Sample Data Log
Particulate Matter by KNOX-WC-0006

Batch Number: 6346334

	Sample Number	Work Order Number	Matrix	Filter or Beaker No.	Probe Rinse Volume (mL)	Tare Weight (g)	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials
1	H6L070246-014	JK1X4-1AA	ACE	JK1X4	43	67.5076	1	H-47372	99.9999	✓	67.5197	12/13/06	1615	JMH
							2	↓	99.9999	✓	67.5197	12/14/06	1503	JMH
							3	–				JMH		
							4	–	–			12/15/06		
2	-019	JK10X-1AA	THIMBLE	JK10X #53	NA	NA	1	H-47372	100.0000	✓	10.1606	12/13/06	1601	JMH
							2	↓	99.9999	✓	10.1455	12/14/06	1450	JMH
							3	↓	100.0003	✓	10.1433	12/15/06	1303	JMH
							4	—	— JMH					
3	-020	JK101-1AA	ACE	JK101	209	66.6358	1	H-47372	99.9999	✓	69.8867	12/13/06	1616	JMH
							2	↓	99.9999	✓	69.8900	12/14/06	1505	JMH
							3	–	–			JMH		
							4	–	–			12/15/06		
4	-025	JK11C-1AA	THIMBLE	JK11C #54	NA	NA	1	H-47372	100.0000	✓	12.7115	12/13/06	1602	JMH
							2	↓	99.9999	✓	12.6956	12/14/06	1451	JMH
							3	↓	100.0003	✓	12.6948	12/15/06	1305	JMH
							4	—	— JMH					
5	-026	JK11D-1AA	ACE	JK11D	152	65.8788	1	H-47372	99.9999	✓	68.8042	12/13/06	1617	JMH
							2	↓	99.9999	✓	68.8048	12/14/06	1506	JMH
							3	–	–			JMH		
							4	–	–			12/15/06		

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

STL Knoxville
Sample Data Log
Particulate Matter by KNOX-WC-0006

Batch Number: 6346334

	Sample Number	Work Order Number	Matrix	Filter or Beaker No.	Probe Rinse Volume (mL)	Tare Weight (g)	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials
1	H6L070246-031	JK11X-1AA	THIMBLE	JK11X #55	NA	NA	1	H-47372	100.0000	✓	12.4814	12/13/06	1604	JMH
							2		99.9999	✓	12.4710	12/14/06	1452	JMH
							3		100.0003	✓	12.4740	12/15/06	1306	JMH
							4	—	— JMH					
2	-032	JK111-1AA	ACE	JK111	87	67.1794	1	H-47372	99.9999	✓	67.9096	12/13/06	1618	JMH
							2		99.9999	✓	67.9102	12/14/06	1507	JMH
							3	—	—			JMH		
							4	—	—			12/15/06		
3							1							
							2							
							3							
							4							
4							1	JMH						
							2							
							3	12/15/06						
							4							
5							1							
							2							
							3							
							4							

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

STL Knoxville

Tare Weight Log
Particulate Matter by KNOX-WC-0006

	Filter or Beaker No.	Matrix	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials	Tare Weight (g)
1	PK1829	F	1	H-47372	100.0000	✓	33.4243	12-12-06	10:15	LDW	33.4244
			2	↓	↓	✓	33.4245	↓	15:30	↓	
			3								
			4				LDW				
2	PK1830	F	1	H-47372	100.0000	✓	46.1156	12-12-06	10:16	LDW	46.1157
			2	↓	↓	✓	46.1158	↓	15:31	↓	
			3								
			4				LDW				
3	PK1831	F	1	H-47372	100.0000	✓	32.1098	12-12-06	10:17	LDW	32.1100
			2	↓	↓	✓	32.1102	↓	15:32	↓	
			3								
			4				LDW				
4	PK1832	F	1	H-47372	100.0000	✓	35.2943	12-12-06	10:18	LDW	35.2945
			2	↓	↓	✓	35.2947	↓	15:33	↓	
			3								
			4				LDW				
5	JK1V7	AC_E	1	H-47372	100.0000	✓	68.1291	12-12-06	1229	JMH	68.1291
			2				JMH				
			3								
			4				12-12-06				
6	JK1XA	AC_E	1	H-47372	100.0000	✓	66.1945	12-12-06	1230	JMH	66.1945
			2				JMH				
			3								
			4				12-12-06				
7	JK1X4	AC_E	1	H-47372	100.0000	✓	67.5076	12-12-06	1231	JMH	67.5076
			2					JMH			
			3								
			4					12-12-06			
8	JK101	AC_E	1	H-47372	100.0000	✓	66.6358	12-12-06	1232	JMH	66.6358
			2					JMH			
			3								
			4					12-12-06			
9	JK11D	AC_E	1	H-47372	100.0000	✓	65.8788	12-12-06	1233	JMH	65.8788
			2					JMH			
			3								
			4					12-12-06			
10	JK111	AC_E	1	H-47372	100.0000	✓	67.1794	12-12-06	1234	JMH	67.1794
			2					JMH			
			3								
			4					12-12-06			

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

Sample Receipt Documentation

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 7
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Waomund
Run No.: 1	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg
Cont. 1 (Sample filter)	12-1-06	1358	—	1	Filter No. A117	X	X		
Cont. 2 (0.1N HNO_3 FW)	12-1-06	1450	—	1			X		
Cont. 2A (ACE FW)	12-1-06	1445	—	1		X	X		
Cont. 3 (Imps 1,2,3 + Rinse)	12-1-06	1420	1 Mol/l KCl	1				X	
Cont. 4 (Imp 4 + Rinse)	12-1-06	1425	5% HNO_3 – 10% H_2O_2	1					X
Cont. 5 (Imps 5,6,7 + Rinse)	12-1-06	1436	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1ml dichromate				X
					Rec'd temp. Ambient, NO Custody Seals ~~intact~~ MFH 12-6-06				
					9 containers Fedex #'s: 6967 6945 9203 9199 9214 9144 9133 9177 9166		6967 "	6945 "	9188 9225

Special Instructions: MFH 12-6-06

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☐ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1450	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Raybance	12/3/06	1330	3. Relinquished By: Alan D. Raybance	12/4/06	0520
Comments: [signature]	12/4/06	0820	[signature]	12/5/06	1400

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Rec'd By: Matthew J. Howard 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

HGL 070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 2 of 7	
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville	
City: Littleton / State: CO / Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: ASTM D6784-2 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample Filter)	12-2-06	1305	—	1	filter No. A118	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-2-06	1317	—	1			X			
Cont. 2A (ACE FW)	12-2-06	1316	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	1345	1 Mol/L KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-2-06	1325	5% HNO_3 – 10% H_2SO_4	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-2-06	1338	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1ml dichromate				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hopley	12-2-06	1345	1. Relinquished By: Bill Hopley	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [illegible] 12/4/06 0820 [illegible] 12/5/06 1400

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Rec'd BY: Matthew T. Howard 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 3 of 7	
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 3	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample filter)	12-2-06	2114	—	1	filter No. A119	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-2-06	2129	—	1			X			
Cont. 2A (ACE FW)	12-2-06	2124	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	2111	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-2-06	2051	5% HNO_3 – 10% ~~H_2SO_4~~ H_2O_2	1					X	
Cont 5 (Imps 5,6,7 + Rinse)	12-2-06	2104	4% $KMnO_4$ 10% H_2SO_4	1	Added 1ml dichromate				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☐ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-2-06	2129	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins, Jr	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

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H6L070246

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 4 of 7	
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Waomund	
Run No.: 1	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Container 1 (Sample filter)	12-1-06	1253	—	1	Thimble No. 53	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-1-06	1307	—	1			X			
Cont. 2A (ACE FW)	12-1-06	1303	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-1-06	1248	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-1-06	1310	5% HNO_3 – 10% H_2O_2	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-1-06	1323	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1ml dichromate.				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1323	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [signature] 12/4/06 0820 [signature] ~~12/5/06 1400~~

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Rec'd BY: Matthew F. Howard 12-6-06 ~~09:2~~ 09:15

200

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 5 of 7	
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: ASTM D6784-02 (Ontariohydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample filter)	12-2-06	1228	—	1	Thimble No. 54	X	X			
Cont. 2 (0.1N HNO_3 F.W.)	12-2-06	1234	—	1			X			
Cont. 2A (ACE F.W.)	12-2-06	1235	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	1210	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-2-06	1151	5% HNO_3 – 10% H_2O_2	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-2-06	1203	4% $KMnO_4$ – 10% H_2SO_4	1					X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-2-06	1236	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0520

Comments:

12/4/06 0820 12/5/06 1400

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Rec'd By: Matthew J. Howard 12/6/06 09:15

AIR SAMPLING ASSOCIATES, INC.

46L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 6 of 7
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund
Run No.: 3	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part Bound Hg	Oxidized Hg	Elemental Hg	
Cnt. 1 (Sample filter)	12-2-06	2036	—	1	Thimble No. 55	X	X			
Cnt. 2 (0.1N HNO_3 FW)	12-2-06	2040	—	1		~~X~~	X			
Cnt. 2A (ACE FW)	12-2-06	2038	—	1	BH Part Bound Only	X	X			
Cnt. 3 (Imps 1,2,3 + Rinse)	12-2-06	2018	1 Mol/l KCl	1				X		
Cnt. 4 (Imp 4 + Rinse)	12-2-06	2004	5% HNO_3 – 10% H_2O_2	1					X	
Cnt. 5 (Imps 5,6,7 + Rinse)	12-2-06	2029	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1 ml dichromate				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyby	12-2-06	2040	1. Relinquished By: Bill Hyby	12/3/06	0905
2. Received By: Billy J. Mullins, Jr	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Hoylance	12/3/06	1330	3. Relinquished By: Alan D. Hoylance	12/4/06	0820

Comments:

12/4/06 0820 — 12/6/06 1400

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Rec'd BY: Matthew F. Howard 12/6/06, 09:15

1H6L070241

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page (BH) ~~8~~ 7 of 7
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet & Stack	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund
Run No.: Reagent Blanks	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg
Cont. 7 (0.1 N HNO_3)	12-1-06	0914	—	1	50 ml			X	X
Cont. 8 (1 Mol/L KCl)	12-1-06	0917	—	1	50 ml			X	
Cont. 9 (5% HNO_3 – 10% H_2O_2)	12-1-06	0920	—	1	50 ml				X
Cont. 10 (4% $KMnO_4$ – 10% H_2SO_4)	12-1-06	0922	—	1	50 ml				X
Cont. 11 (Hydroxylamine 10%)	12-1-06	0926	—	1	100 ml			X	X

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyde	12-1-06	0926	1. Relinquished By: Bill Hyde	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: 12/4/06 0820 12/5/06 1400

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Rec'd By: Matthew F. Howard 12-6-06, 09:15

STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: Air Sampling Associates, INC. **Project:** _____ **Lot Number:** H6L070246

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	4A.
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?	✓			☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?			✓	If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: 72504 PM Instructions: _____

Sample Receiving Associate: Matthew F. Howard Date: _____

QA026R18.doc, 1/30/06

Return to Navigator

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SEVERN TRENT STL

STL Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921

Tel: 865 291 3000 Fax: 865 584 4315
www.stl-inc.com

ANALYTICAL REPORT

PROJECT NO. 06-057

Hardin, Montana

Lot #: H6L140394

Bill Hefley

Air Sampling Associates, Inc.
407-2B Holford's Prairie Road
Lewisville, TX 75056

SEVERN TRENT LABORATORIES, INC.

Terry Wasmund
Project Manager

January 8, 2007

QC DATA ASSOCIATION SUMMARY

H6L140394

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	AIR	CFR60A 5		6354260	
	AIR	ASTM D6784-02		7002029	
002	AIR	CFR60A 5		6354260	
	AIR	ASTM D6784-02		7002029	
003	AIR	CFR60A 5		6354260	
	AIR	ASTM D6784-02		7002029	
004	AIR	CFR60A 5		6354260	
	AIR	ASTM D6784-02		7002029	
005	AIR	CFR60A 5		6354260	
	AIR	ASTM D6784-02		7002029	
006	AIR	CFR60A 5		6354260	
	AIR	ASTM D6784-02		7002029	

ANALYTICAL METHODS SUMMARY

H6L140394

PARAMETER	ANALYTICAL METHOD
Mercury (Ontario Hydro)	ASTM D6784-02
Particulate Emissions	CFR60A 5

References:

ASTM Annual Book Of ASTM Standards.

CFR60A "Test Methods", 40 CFR, Part 60, Appendix A, July 1, 1993.

SAMPLE SUMMARY

H6L140394

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
JLHWK	001	HARDIN SDA DUCT+STACK RB FILTER 66	12/11/06	16:00
JLHXD	002	HARDIN SDA DUCT+STACK RB FILTER 67	12/11/06	16:00
JLHXF	003	HARDIN SDA DUCT+STACK RB FILTER 68	12/11/06	16:00
JLHXH	004	HARDIN SDA DUCT+STACK RB FILTER A120	12/11/06	16:00
JLHXK	005	HARDIN SDA DUCT+STACK RB FILTER A121	12/11/06	16:00
JLHXM	006	HARDIN SDA DUCT+STACK RB FILTER A122	12/11/06	16:00

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

PROJECT NARRATIVE
H6L140394

The results reported herein are applicable to the samples submitted for analysis only.

This report shall not be reproduced except in full, without the written approval of the laboratory.

The original chain of custody documentation is included with this report.

Sample Receipt

Custody seals were not present upon sample receipt at STL Knoxville.

The chain of custody documentation did not list the sample IDs for the filter samples. For log in purposes the sample ID will be taken from the filter itself.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Metals

These stack gas samples were prepared and analyzed using STL Knoxville standard operating procedure KNOX-IP-0006 which is based on ASTM Method D6784-02, "Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)" with modifications from EPA Method 29. SW-846 Method 7470A, as incorporated in STL Knoxville standard operating procedure KNOX-MT-0009, was used to perform the final instrument analysis.

Acid digestion was performed on the front half particulate filter fractions using HNO_3, HCl and HF. After digestion, the HF was sequestered using H_3BO_3 followed by another heating cycle. These digestates were adjusted to final volume and a portion was digested for CVAA analysis in order to determine the particle-bound mercury. Results were calculated using the following equation:

PROJECT NARRATIVE
H6L140394

$$Hg,\ ug = (Hg,\ ug/L) * (Micr.\ Digestate\ Volume, L) * \left(\frac{Final\ Volume\ Hg\ Digestate\ (mL)}{Volume\ Micr.\ Digestate\ Used\ (mL)} \right) * Bench\ Dilution$$

Thimbles were received instead of filters for three of the front half samples. Each thimble was divided in two because the digestion vessels are not large enough for the entire thimble. Acid digestion was performed on each half of the front half particulate thimbles using HNO_3, HCl and HF. Heating was done by microwave. For each of the two digestates, the HF was sequestered using H_3BO_3 followed by another microwave cycle, and the final volume for each was adjusted to 100 mL. These digestates were combined (total volume of 200 mL) and a portion was digested for CVAA analysis in order to determine the particle-bound mercury. Results were calculated using the following equation:

$$Hg,\ ug = (Hg,\ ug/L) * (Micr.\ Digestate\ Volume, L) * \left(\frac{Final\ Volume\ Hg\ Digestate\ (mL)}{Volume\ Micr.\ Digestate\ Used\ (mL)} \right) * Bench\ Dilution$$

Please note that the dilution factor reported on the sample result form for the front half samples is actually a combination of preparation factors and bench dilution factors.

Wet Chemistry

The measurement of the mass of particulate matter trapped by the particulate filter and probe rinse derived from an M-5 sampling train was performed using SOP number KNOX-WC-0006 (based on EPA Methods 0050 and 5). Microfiber filters, Petri dishes, and 150 mL beakers are carefully inspected and tare weighed to constant weight. After sample collection, the filters are dried, and then carefully weighed to constant weight to determine the mass of particulate matter trapped on the filters. The acetone probe rinse solution is evaporated to dryness, and then weighed to constant weight to determine the total particulate mass collected in the rinse. The total particulate mass collected by an M-5 train is the sum of the particulate filter and the acetone probe rinse residue weights.

Filter thimbles and disks that were not prepared by STL Knoxville were submitted for analysis. The reported weight is the gross weight, which includes the total weight of the

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filter and the entrained particulate material. Unfortunately, the laboratory information system will not report sufficient digits to obtain a precise net particulate weight when the tare weight is subtracted from the gross weight. The actual raw data is tabulated below for the user's convenience.

Lot-Sample Number	Work Order Number	Client ID	Gross Weight Average (mg)
H6L140394-001	JLHWK1AC	HARDIN SDA DUCT+STACK RB FILTER 66	2855.6
H6L140394-002	JLHXD1AC	HARDIN SDA DUCT+STACK RB FILTER 67	2934.5
H6L140394-003	JLHXF1AC	HARDIN SDA DUCT+STACK RB FILTER 68	2510.3
H6L140394-004	JLHXH1AC	HARDIN SDA DUCT+STACK RB FILTER A120	360.0
H6L140394-005	JLHXK1AC	HARDIN SDA DUCT+STACK RB FILTER A121	359.8
H6L140394-006	JLHXM1AC	HARDIN SDA DUCT+STACK RB FILTER A122	359.4

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. #05-043-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. #000687, Indiana DOH Cert. #C-TN-02, Iowa DNR Cert. #375, Kansas DHE Cert. #E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Ohio EPA VAP Cert. #CL0059, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. #68-00576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. # QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, West Virginia DEP Cert. #345, Wisconsin DNR Lab ID #998044300, Naval Facilities Engineering Service Center and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

Sample Data Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 66

TOTAL Metals

Lot-Sample #...: H6L140394-001 Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.020	ug	ASTM D6784-02	01/02-01/05/07	JLHWK1AA
		Dilution Factor: 0.2		Analysis Time..: 10:58	MDL.....: 0.012	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 67

TOTAL Metals

Lot-Sample #...: H6L140394-002 **Matrix.....:** AIR
Date Sampled...: 12/11/06 **Date Received..:** 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.020	ug	ASTM D6784-02	01/02-01/05/07	JLHXD1AA
		Dilution Factor: 0.2		Analysis Time..: 11:02	MDL.....: 0.012	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 68

TOTAL Metals

Lot-Sample #...: H6L140394-003 Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.020	ug	ASTM D6784-02	01/02-01/05/07	JLHXF1AA
		Dilution Factor: 0.2		Analysis Time..: 11:03	MDL.....: 0.012	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A120

TOTAL Metals

Lot-Sample #...: H6L140394-004 Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JLHXH1AA
		Dilution Factor: 0.1		Analysis Time..: 11:05	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A121

TOTAL Metals

Lot-Sample #...: H6L140394-005 Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JLHXK1AA
		Dilution Factor: 0.1		Analysis Time..: 11:07	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A122

TOTAL Metals

Lot-Sample #...: H6L140394-006 Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JLHXM1AA
		Dilution Factor: 0.1		Analysis Time..: 11:09	MDL.....: 0.0060	

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H6L140394 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: H7A020000-029 **Prep Batch #...:** 7002029						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JL9711AA
		Dilution Factor: 0.1				
		Analysis Time..: 10:52				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: H6L140394 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #
Mercury	98	(80 - 120)			ASTM D6784-02	01/02-01/05/07	7002029
	103	(80 - 120)	4.8	(0-20)	ASTM D6784-02	01/02-01/05/07	7002029

Dilution Factor: 0.1 Analysis Time..: 10:54

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: H6L140394 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Mercury	0.500	0.491	ug	98		ASTM D6784-02	01/02-01/05/07	7002029
	0.500	0.515	ug	103	4.8	ASTM D6784-02	01/02-01/05/07	7002029

Dilution Factor: 0.1 Analysis Time..: 10:54

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

STL Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: H010507. PRN

Element	PDS JLHWKA	Original Sample JLHWK	Spike Added	Percent Recovery
Hg	1.04	ND	1.0	104

Sample Data Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 66

General Chemistry

Lot-Sample #...: H6L140394-001 **Work Order #...:** JLHWK **Matrix.....:** AIR
Date Sampled...: 12/11/06 **Date Received..:** 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**2860**	**0.50**	**mg**	**CFR60A 5**	**12/19-12/20/06**	**6354260**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 67

General Chemistry

Lot-Sample #...: H6L140394-002 Work Order #...: JLHXD Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	2930	0.50	mg	CFR60A 5	12/19-12/20/06	6354260

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 68

General Chemistry

Lot-Sample #...: H6L140394-003 Work Order #...: JLHXF Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	2510	0.50	mg	CFR60A 5	12/19-12/20/06	6354260

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A120

General Chemistry

Lot-Sample #...: H6L140394-004 Work Order #...: JLHXH Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	360	0.50	mg	CFR60A 5	12/19-12/20/06	6354260

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A121

General Chemistry

Lot-Sample #...: H6L140394-005 Work Order #...: JLHXK Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	360	0.50	mg	CFR60A 5	12/19-12/20/06	6354260

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A122

General Chemistry

Lot-Sample #...: H6L140394-006 Work Order #...: JLHXM Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	359	0.50	mg	CFR60A 5	12/19-12/20/06	6354260

Dilution Factor: 1 MDL.....: 0.50

Sample Receipt Documentation

AIR SAMPLING ASSOCIATES, INC.

H6L140394

Chain of Custody Record

Client: ADAES	Project No.: 06-057	Page 1 of 1	Analysis
Address: 8100 Southpark Way	Unit No.: SDA Inlet Duct & Stack	Lab: STL - Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Hefley / Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: Reagent Blanks	Test Method: ASTM D6784-02 (OH)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part. Hg	Oxidized Hg	Elemental Hg		
Cont. 12	12-11-06	1600	—	~~12~~ 6 BM	Filter Blanks	✓				
					NO CUSTODY SEALS					
					RECEIVED AT AMBIENT TEMP					
					DKO 12-12-06					
					1 PACK VPS#					
					12Y4928W019250411 65					

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hefley	12-11-06	1600	1. Relinquished By: Bill Hefley	12-11-06	1600
2. Received By: Bryan Dunnigan	12-12-06	0930	2. Relinquished By:		
3. Received By:			3. Relinquished By:		

Comments:

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: AIR SAMPLING ASSOCIATES **Project:** _____ **Lot Number:** H6440314

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)		✓		☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	1B. NO ID'S LISTED ON COC FOR FILTERS. WILL USE ID'S FROM FILTERS, FILTER IDS 66, 67, 68, A120, A121, A122
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?			✓	☐ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intaet?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?		✓		☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?		✓		If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?	✓				

Quote #: _____ PM Instructions: _____

Sample Receiving Associate: Bryan Emerson Date: 12-12-06

QA026R18.doc, 1/30/06

Metals

Sample Results

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 66

TOTAL Metals

Lot-Sample #...: H6L140394-001 Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.020	ug	ASTM D6784-02	01/02-01/05/07	JLHWK1AA
		Dilution Factor: 0.2		Analysis Time..: 10:58	MDL.....: 0.012	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 67

TOTAL Metals

Lot-Sample #...: H6L140394-002 **Matrix.....:** AIR
Date Sampled...: 12/11/06 **Date Received..:** 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.020	ug	ASTM D6784-02	01/02-01/05/07	JLHXD1AA
		Dilution Factor: 0.2		Analysis Time..: 11:02	MDL.....: 0.012	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 68

TOTAL Metals

Lot-Sample #...: H6L140394-003 Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.020	ug	ASTM D6784-02	01/02-01/05/07	JLHXF1AA
		Dilution Factor: 0.2		Analysis Time..: 11:03	MDL.....: 0.012	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A120

TOTAL Metals

Lot-Sample #...: H6L140394-004 **Matrix.....:** AIR
Date Sampled...: 12/11/06 **Date Received..:** 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JLHXH1AA
		Dilution Factor: 0.1		Analysis Time..: 11:05	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A121

TOTAL Metals

Lot-Sample #...: H6L140394-005 Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JLHXK1AA
		Dilution Factor: 0.1		Analysis Time..: 11:07	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A122

TOTAL Metals

Lot-Sample #...: H6L140394-006 Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7002029						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JLHXM1AA
		Dilution Factor: 0.1		Analysis Time..: 11:09	MDL.....: 0.0060	

QC Summary

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H6L140394 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: H7A020000-029 **Prep Batch #...:** 7002029						
Mercury	ND	0.010	ug	ASTM D6784-02	01/02-01/05/07	JL9711AA
		Dilution Factor: 0.1				
		Analysis Time..: 10:52				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: H6L140394 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #
Mercury	98	(80 - 120)			ASTM D6784-02	01/02-01/05/07	7002029
	103	(80 - 120)	4.8	(0-20)	ASTM D6784-02	01/02-01/05/07	7002029

Dilution Factor: 0.1 Analysis Time..: 10:54

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: H6L140394 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Mercury	0.500	0.491	ug	98		ASTM D6784-02	01/02-01/05/07	7002029
	0.500	0.515	ug	103	4.8	ASTM D6784-02	01/02-01/05/07	7002029

Dilution Factor: 0.1 Analysis Time..: 10:54

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

STL Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: H010507. PRN

Element	PDS JLHWKA	Original Sample JLHWK	Spike Added	Percent Recovery
Hg	1.04	ND	1.0	104

Quality Control Results Mercury

STL Knoxville

Mercury Data Reporting Form

Initial Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

		Ck2icv 1/5/2007 10:05 AM											
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	2.5	2.48	**99.2**										

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

Elem	True Conc	Ck3ccv 1/5/2007 10:11 AM Found	% Rec	Ck3ccv 1/5/2007 10:30 AM Found	% Rec	Ck3ccv 1/5/2007 10:48 AM Found	% Rec	Ck3ccv 1/5/2007 11:11 AM Found	% Rec	Ck3ccv 1/5/2007 11:35 AM Found	% Rec	Ck3ccv 1/5/2007 11:59 AM Found	% Rec
Hg	5.0	4.83	**96.6**	4.80	**96.0**	4.86	**97.2**	4.84	**96.8**	4.83	**96.6**	4.90	**98.0**

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

		Ck3ccv 1/5/2007 12:10 PM											
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	5.0	4.88	97.6										

STL Knoxville

Mercury Data Reporting Form

Contract Required Detection Limit Standard(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

		CRA 1/5/2007 10:09 AM											
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	0.2	0.19	**95.0**										

STL Knoxville

Mercury Data Reporting Form

Initial Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

Elem	Reporting Limit	ICB 1/5/2007 10:07 AM											
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U										

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg Ana

Data File Name: M010507.PRN

Elem	Reporting Limit	Ck1ccb 1/5/2007 10:14 AM		Ck1ccb 1/5/2007 10:32 AM		Ck1ccb 1/5/2007 10:50 AM		Ck1ccb 1/5/2007 11:13 AM		Ck1ccb 1/5/2007 11:37 AM		Ck1ccb 1/5/2007 12:01 PM	
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

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Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

Elem	Reporting Limit	Ck1ccb 1/5/2007 12:12 PM											
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U										

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

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Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: H010507. PRN

Element	PDS JLHWKA	Original Sample JLHWK	Spike Added	Percent Recovery
Hg	1.04	ND	1.0	104

STL Knoxville

Mercury Data Reporting Form

Instrument Detection Limits

Units: ug/L (ppb)

IDL Completion Date: 12/14/2006

Instrument ID: Leeman HydraAA Hg An

Data File Name: M010507.PRN

Element	Wavelength (nm)	Reporting Limit	IDL
Hg	253.70	0.1	0.06

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Sample ID Nomenclature

The sample ID consists of 5 alpha-numeric characters followed by a suffix in the 6th position that designates the sample type:

Suffix	Sample Type:
B	Method Blank
C	Laboratory Control Sample
L	Laboratory Control Sample Duplicate
S	Matrix Spike
D	Matrix Spike Duplicate
X	Sample Duplicate
P	Serial Dilution
A	Post Digestion Spike
Z#	Dilution; # = Dilution Factor

Raw Data
Mercury

STL Knoxville
Mercury Analysis Cover Sheet

Scanned

Analyst	DKW	Instrument	Leeman Hydra AA Mercury Analyzer
Run Date	1/5/07	Chart Name	M010507

Daily Maintenance		As Needed Maintenance	
☑	Check tubing.	☐	Adjust/change Hg lamp.
☑	Check maintenance schedule flags.	☐	Clean or replace optical cell.
		☐	Lubricate pump and autosampler arm.
		☐	Change the drying tube.

```
--------------------------------------------------------------------------------
:       Instrument Upload                                   Run Log - Page  1 :
:       Started Fri Jan  5 11:40:01 2007 by WILBURND                          :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M010507.PRN;1                       :
--------------------------------------------------------------------------------
```

#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
1	CK2ICV	1.00	05-JAN-2007	10:05:28			HG
2	ICB	1.00	05-JAN-2007	10:07:24			HG
3	CRA	1.00	05-JAN-2007	10:09:20			HG
4	CK3CCV	1.00	05-JAN-2007	10:11:09			HG
5	CK1CCB	1.00	05-JAN-2007	10:14:08			HG
6	MDL1	1.00	05-JAN-2007	10:15:56			HG
7	MDL2	1.00	05-JAN-2007	10:18:14			HG
8	MDL3	1.00	05-JAN-2007	10:20:05			HG
9	MDL4	1.00	05-JAN-2007	10:21:52			HG
10	MDL5	1.00	05-JAN-2007	10:23:50			HG
11	MDL6	1.00	05-JAN-2007	10:25:46			HG
12	MDL7	1.00	05-JAN-2007	10:27:54			HG
13	CK3CCV	1.00	05-JAN-2007	10:30:21			HG
14	CK1CCB	1.00	05-JAN-2007	10:32:18			HG
15	MDL1	1.00	05-JAN-2007	10:34:09			HG
16	MDL2	1.00	05-JAN-2007	10:36:01			HG
17	MDL3	1.00	05-JAN-2007	10:37:53			HG
18	MDL4	1.00	05-JAN-2007	10:40:01			HG
19	MDL5	1.00	05-JAN-2007	10:41:58			HG
20	MDL6	1.00	05-JAN-2007	10:43:56			HG
21	MDL7	1.00	05-JAN-2007	10:46:04			HG
22	CK3CCV	1.00	05-JAN-2007	10:48:21			HG
23	CK1CCB	1.00	05-JAN-2007	10:50:10			HG
24	JL971B	0.10	05-JAN-2007	10:52:11	7002029	H7A020000	HG
25	JL971C	0.10	05-JAN-2007	10:54:39	7002029	H7A020000	HG
26	JL971L	0.10	05-JAN-2007	10:56:37	7002029	H7A020000	HG
27	JLHWK	0.20	05-JAN-2007	10:58:24	7002029	H6L140394	HG
28	JLHWKA	0.20	05-JAN-2007	11:00:17	7002029	H6L140394	HG
29	JLHXD	0.20	05-JAN-2007	11:02:10	7002029	H6L140394	HG
30	JLHXF	0.20	05-JAN-2007	11:03:58	7002029	H6L140394	HG
31	JLHXH	0.10	05-JAN-2007	11:05:48	7002029	H6L140394	HG
32	JLHXK	0.10	05-JAN-2007	11:07:43	7002029	H6L140394	HG
33	JLHXM	0.10	05-JAN-2007	11:09:45	7002029	H6L140394	HG
34	CK3CCV	1.00	05-JAN-2007	11:11:32			HG
35	CK1CCB	1.00	05-JAN-2007	11:13:21			HG
36	JL97PB	0.10	05-JAN-2007	11:15:29	7002025	H7A020000	HG
37	JL97PC	0.10	05-JAN-2007	11:17:27	7002025	H7A020000	HG
38	JL97PL	0.10	05-JAN-2007	11:19:38	7002025	H7A020000	HG
39	JK1WA	0.10	05-JAN-2007	11:21:27	7002025	H6L070246	HG
40	JK1WAA	0.10	05-JAN-2007	11:23:14	7002025	H6L070246	HG
41	JK1XD	0.10	05-JAN-2007	11:25:13	7002025	H6L070246	HG
42	JK1X5	0.10	05-JAN-2007	11:27:13	7002025	H6L070246	HG
43	JK105	0.10	05-JAN-2007	11:29:00	7002025	H6L070246	HG
44	JK11F	0.50	05-JAN-2007	11:31:17	7002025	H6L070246	HG

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```
--------------------------------------------------------------------------------
:       Instrument Upload                                    Run Log - Page  2 :
:       Started Fri Jan  5 11:40:01 2007 by WILBURND                           :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M010507.PRN;1                        :
--------------------------------------------------------------------------------
```

#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
45	JK112	0.10	05-JAN-2007	11:33:35	7002025	H6L070246	HG
46	CK3CCV	1.00	05-JAN-2007	11:35:37			HG
47	CK1CCB	1.00	05-JAN-2007	11:37:34			HG
48	JK12A	0.10	05-JAN-2007	11:39:43	7002025	H6L070246	HG
49	JL97RB	0.25	05-JAN-2007	11:41:55	7002026	H7A020000	HG
50	JL97RC	0.25	05-JAN-2007	11:44:14	7002026	H7A020000	HG
51	JK1WF	0.60	05-JAN-2007	11:46:04	7002026	H6L070246	HG
52	JK1WFS	0.60	05-JAN-2007	11:47:54	7002026	H6L070246	HG
53	JK1WFD	0.60	05-JAN-2007	11:49:46	7002026	H6L070246	HG
54	JK1XR	0.75	05-JAN-2007	11:51:57	7002026	H6L070246	HG
55	JK10A	0.63	05-JAN-2007	11:53:48	7002026	H6L070246	HG
56	JK107	0.65	05-JAN-2007	11:55:35	7002026	H6L070246	HG
57	JK11L	0.63	05-JAN-2007	11:57:33	7002026	H6L070246	HG
58	CK3CCV	1.00	05-JAN-2007	11:59:24			HG
59	CK1CCB	1.00	05-JAN-2007	12:01:12			HG
60	JK114	0.68	05-JAN-2007	12:03:28	7002026	H6L070246	HG
61	JK12G	0.24	05-JAN-2007	12:06:15	7002026	H6L070246	HG
62	JK11FZ5	0.50	05-JAN-2007	12:08:04	7002025	H6L070246	HG
63	CK3CCV	1.00	05-JAN-2007	12:10:04			HG
64	CK1CCB	1.00	05-JAN-2007	12:12:32			HG

---------- End of Report ----------

STL Knoxville

Method Information

Method Name: Ontario Hydro **Element:** Hg **Chart Number:** **m010507.prn**

Instrument Calibrated Every ? Hours:	24	**Number of Calibration Standards:**	6
Correlation Coefficient >/=:	0.995	**Run ICV Immediately After Calibration?:**	Yes
CRA Required?:	Yes	**Number of Samples Between CCVs:**	10
Duplicate RPD:	20	**Calculate Duplicates by CLP or SW-846?:**	SW-846 Protocol

CRA Recovery Range:	30.0	**CRA Conc. (ug/L):**	0.2
ICV Recovery Range:	10.5	**ICV Conc. (ug/L):**	2.5
CCV Recovery Range:	20.5	**CCV Conc. (ug/L):**	5
LCS Recovery Range:	20.5	**LCS Spike Level (ug/L):**	5
MS/MSD Recovery Range:	20.5	**MS Spike Level (ug/L):**	1

Letter to Signify Blanks:	B	**Position to Signify Blanks:**	6
Letter to Signify LCS's:	C	**Position to Signify LCS's:**	6
Letter to Signify LCSD's:	L	**Position to Signify LCSD's:**	6
Letter to Signify Dilutions:	Z	**Position to Signify Dilutions:**	6
Letter to Signify Duplicates:	X	**Position to Signify Duplicates:**	6
Letter to Signify MS's:	S	**Position to Signify MS's:**	6
Letter to Signify MSD's:	D	**Position to Signify MSD's:**	6
Letters to Signify MSA's:	MSA+	**Position to Signify MSA's:**	6
Number of Additions:	3		

Calibration Standard Concentrations (ug/L)

Standard 1 Conc: 0.1	**Standard 2 Conc:** 0.2	**Standard 3 Conc:** 0.5	**Standard 4 Conc:** 1
Standard 5 Conc: 5	**Standard 6 Conc:** 10	**Standard 7 Conc:** 0	**Standard 8 Conc:** 0

ICB/CCB Check Level (ug/L): 0.099 **Prep Blank Check Level (ug/L):** 0.099 **Reporting Limit (ug/L):** 0.1

IDL (ug/L): 0.06 **Date of IDL:** 12/14/2006

STL Knoxville Mercury Data Review Checklist

Method: Ontario Hydro

Analyst:	DKW			**Instrument:**	Leeman Hydra AA Mercury Analyzer		
Run Date:	Jan-05-07	**Calibration Number:**	1	**Chart Name:**	m010507.prn	**Element:**	Hg

A. Calibration/Instrument Run QC		**N/A**	**Yes**	**No**	**Comments**
1.	Instrument calibrated every 24 hours?		X		Calibration was 2 hours and 22 minutes long
2.	Instrument calibrated using a minimum of a blank and 5 standards?		X		
3.	Do standard absorbances increase as standard concentrations increase?		X		
4.	Instrument calibrated with standards at the SOP levels?		X		
5.	Correlation coefficient greater than or equal to 0.995?		X		Correlation coefficient was 0.9996
6.	ICV analyzed directly after calibration?		X		
7.	ICV within specified control limits?		X		
8.	ICB analyzed immediately after ICV?		X		
9.	ICB within acceptable range?		X		
10.	CRA analyzed at the beginning of the run?		X		
11.	CRA results within acceptable range?		X		
12.	All CCV's within specified control limits?		X		
13.	All CCB's within acceptable range?		X		
14.	All CCB's analyzed immediately after CCV's?		X		
B. Client Sample and QC Sample Results					
1.	Were all sample results within the linear range of the instrument ?		X		
2.	Were there any samples with results more negative than Report Limit?			X	
3.	Were samples analyzed within the holding time?		X		
C. Preparation/Matrix QC					
1.	Was one method blank prepared for each batch?		X		
2.	Were all method blanks less than the specified level?		X		
3.	Was an LCS prepared for each batch?		X		
4.	Were all LCS recoveries within QC limits?		X		
5.	Were matrix spikes, sample duplicates and/or post-digestion spikes run at required frequency?		X		
6.	Were all matrix spike recoveries within QC limits?		X		
7.	Were post-digestion spike recoveries within QC limits?		X		
8.	Were duplicate RPDs within QC limits?		X		
D. Other					
1.	Current IDL data on file?		X		
2.	Current MDL data on file?		X		
3.	Are all nonconformances documented appropriately?		X		
4.	Were all project specific instructions followed?		X		NCM#: 08-0006722 & 080006721

Analyst: DKW **Date:** 01/05/07

Analyst Comments:

STL KNOXVILLE

INTERMEDIATE STANDARD -- CALIBRATION

Stock Std Name: PLHG4-24
Element: Hg
Stock Source: Spex
Stock Std Lot #: 12-43HG
Stock Std Expiration Date: 4/30/07
Stock Conc.: 1000 ppm
HNO_3 Lot B44032

Stock Vol (ml)/100ml: 1ml
Date Prepared: 1/2/07
Expiration Date: 2/2/07
QC Check: M010307
Initials: KND
Matrix: 2% HNO_3

WORKING STANDARD -- CALIBRATION

One ml Intermediate Standard/100ml 0.15% Concentrated Nitric Acid

1. I-CAL 3425-6-1	Initials KND	Date: 1/2/07	Exp. Date: 1/3/07	HN03 Lot: B44032
2. I-CAL 3425-6-2	Initials KND	Date: 1/3/07	Exp. Date: 1/4/07	HN03 Lot: B44032
3. .I-CAL 3425-6-3	Initials DKW	Date: 010407	Exp. Date: 010507	HN03 Lot: B44032
4. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
5. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
6. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
7. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
8. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
9. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
10..I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
11..I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
12..I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
13. I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
14. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
15. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
16. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
17. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
18. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
19. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
20. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
21. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
22. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
23. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
24. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:
25. .I-CAL	Initials	Date:	Exp. Date:	HN03 Lot:

STL KNOXVILLE

INTERMEDIATE STANDARD -- VERIFICATION

Stock Std Name: ICP 080
Element: Hg
Stock Source: Ultra
Stock Std Lot #: F00424
Stock Std Expiration Date: 8/31/08
Stock Conc.: 1000 ppm
Acid Lot: B44032

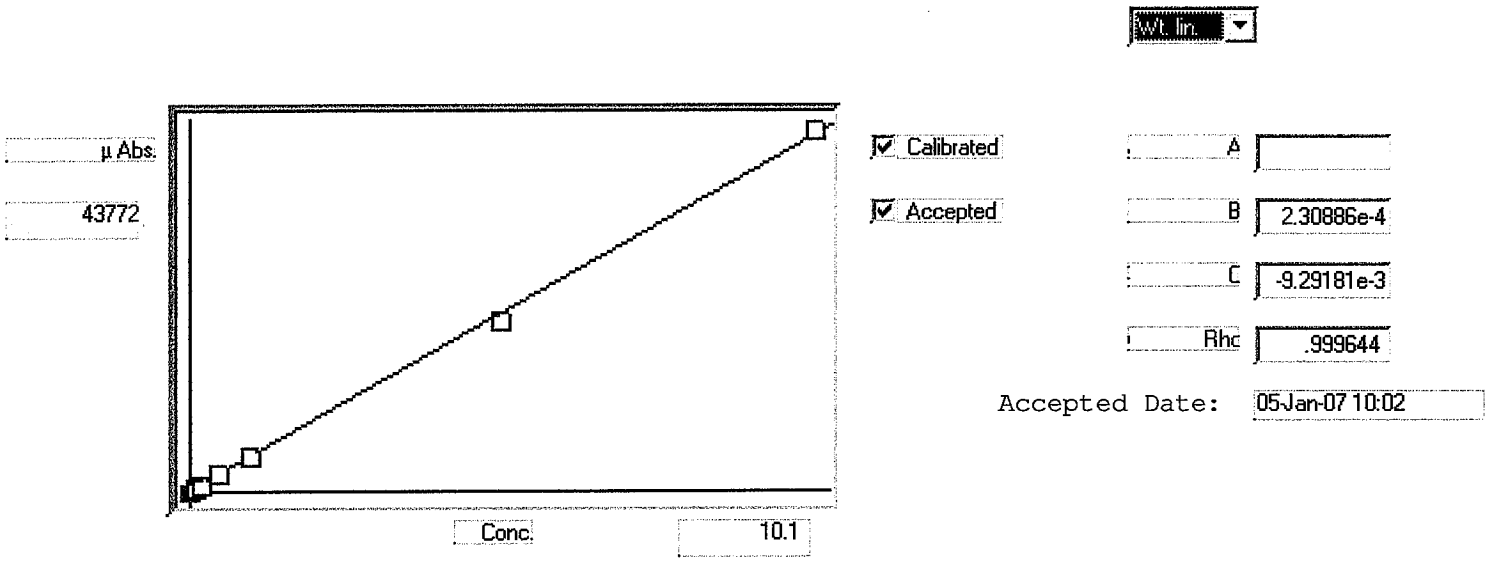
Stock Vol (ml)/100ml: 1.0 ml
Date Prepared: 1/2/07
Expiration Date: 2/2/07
QC Check: M010307
Initials: KWD
Matrix: 2% HNO_3

WORKING STANDARD -- VERIFICATION

1 ml Intermediate Standard/100 ml 0.15 % Concentrated Nitric Acid

1. I-VER 3426-6-1	Initials DKW	Date: 010307	Exp. Date: 010407	HN03 Lot: B44032
2. I-VER 3426-6-2	Initials DKW	Date: 010407	Exp. Date: 010507	HN03 Lot: B44032
3. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
4. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
5. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
6. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
7. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
8. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
9. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
10. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
11. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
12. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
13. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
14. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
15. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
16. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
17. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
18. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
19. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
20. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
21. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
22. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
23. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
24. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
25. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:

Protocol: 7ptcurve



S	Conc.	Calc.	Dev.	Mean	SD or %RSD	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
01	.00000	.014	.014	103	0	103				
02	.10000	-.122	.022	568	0%	567				
03	.20000	.205	.005	926	0%	926				
04	.50000	.545	.045	2400	0%	2400				
05	1.0000	1.04	.036	4528	0%	4528				
06	5.0000	4.78	-.219	20750	0%	20749				
07	10.000	10.1	.097	43772	0%	43772				
08										
09										
10										

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Standard: 1 Rep: 1              Seq:  0       09:50:53 05 Jan 07   HG

Hg    .000    ppb      103

*** Standard: 2 Rep: 1              Seq:  1       09:52:41 05 Jan 07   HG

Hg    .100    ppb      567

*** Standard: 3 Rep: 1              Seq:  2       09:54:30 05 Jan 07   HG

Hg    .200    ppb      926

*** Standard: 4 Rep: 1              Seq:  3       09:56:18 05 Jan 07   HG

Hg    .500    ppb      2400

*** Standard: 5 Rep: 1              Seq:  4       09:58:17 05 Jan 07   HG

Hg    1.00    ppb      4528

*** Standard: 6 Rep: 1              Seq:  5       10:00:05 05 Jan 07   HG

Hg    5.00    ppb      20749

*** Standard: 7 Rep: 1              Seq:  6       10:01:52 05 Jan 07   HG

Hg    10.0    ppb      43772

*** Check Standard: 2  Ck2icv       Seq:  7       10:05:28 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          99.0     2.48    2.50  ppb         .000  %

*** Sample ID: ICB                   Seq:  8      10:07:24 05 Jan 07   HG
                            ICB
Hg   -.008    ppb       .000  %  -.008

*** Sample ID: CRA                   Seq:  9      10:09:20 05 Jan 07   HG
                            CRA
Hg    .190    ppb       .000  %   .190

*** Check Standard: 3  Ck3ccv       Seq:  10      10:11:09 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          96.6     4.83    5.00  ppb         .000  %

*** Check Standard: 1  Ck1ccb       Seq:  11      10:14:08 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.006     .059     ppb        .000  %

*** Sample ID: MDL1                  Seq:  12      10:15:56 05 Jan 07   HG
                            Front Half OH 0.1ppb
Hg    .084    ppb       .000  %   .084

*** Sample ID: MDL2                  Seq:  13      10:18:14 05 Jan 07   HG

Hg    .094    ppb       .000  %   .094

*** Sample ID: MDL3                  Seq:  14      10:20:05 05 Jan 07   HG

Hg    .081    ppb       .000  %   .081

*** Sample ID: MDL4                  Seq:  15      10:21:52 05 Jan 07   HG

Hg    .094    ppb       .000  %   .094
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-------------------------------------------------------------------------------

*** Sample ID: MDL5                    Seq:  16     10:23:50 05 Jan 07   HG

Hg    .091    ppb       .000  %   .091

*** Sample ID: MDL6                    Seq:  17     10:25:46 05 Jan 07   HG

Hg    .100    ppb       .000  %   .100

*** Sample ID: MDL7                    Seq:  18     10:27:54 05 Jan 07   HG

Hg    .129    ppb       .000  %   .129

*** Check Standard: 3  Ck3ccv          Seq:  19     10:30:21 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          96.0     4.80    5.00  ppb         .000  %

*** Check Standard: 1  Ck1ccb          Seq:  20     10:32:18 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.012     .059     ppb        .000  %

*** Sample ID: MDL1                    Seq:  21     10:34:09 05 Jan 07   HG
                            Back Half OH 0.1ppb
Hg    .041    ppb       .000  %   .041

*** Sample ID: MDL2                    Seq:  22     10:36:01 05 Jan 07   HG

Hg    .062    ppb       .000  %   .062

*** Sample ID: MDL3                    Seq:  23     10:37:53 05 Jan 07   HG

Hg    .044    ppb       .000  %   .044

*** Sample ID: MDL4                    Seq:  24     10:40:01 05 Jan 07   HG

Hg    .075    ppb       .000  %   .075

*** Sample ID: MDL5                    Seq:  25     10:41:58 05 Jan 07   HG

Hg    .048    ppb       .000  %   .048

*** Sample ID: MDL6                    Seq:  26     10:43:56 05 Jan 07   HG

Hg    .053    ppb       .000  %   .053

*** Sample ID: MDL7                    Seq:  27     10:46:04 05 Jan 07   HG

Hg    .080    ppb       .000  %   .080

*** Check Standard: 3  Ck3ccv          Seq:  28     10:48:21 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          97.2     4.86    5.00  ppb         .000  %

*** Check Standard: 1  Ck1ccb          Seq:  29     10:50:10 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg          .011     .059     ppb        .000  %

*** Sample ID: JL971B                  Seq:  30     10:52:11 05 Jan 07   HG
                            H6L140394 FH OH
Hg   -.017    ppb       .000  %  -.017

*** Sample ID: JL971C                  Seq:  31     10:54:39 05 Jan 07   HG

Hg    4.91    ppb       .000  %   4.91
```

Line Conc. Units SD/RSD 1 2 3 4 5

*** Sample ID: JL971L Seq: 32 10:56:37 05 Jan 07 HG

Hg 5.15 ppb .000 % 5.15

*** Sample ID: JLHWK Seq: 33 10:58:24 05 Jan 07 HG

Hg -.013 ppb .000 % -.013

*** Sample ID: JLHWKA 9ML SAMPLE + 1ML DIGESTED 10 ppb STD. Seq: 34 11:00:17 05 Jan 07 HG

Hg 1.04 ppb .000 % 1.04

*** Sample ID: JLHXD Seq: 35 11:02:10 05 Jan 07 HG

Hg .003 ppb .000 % .003

*** Sample ID: JLHXF Seq: 36 11:03:58 05 Jan 07 HG

Hg .016 ppb .000 % .016

*** Sample ID: JLHXH Seq: 37 11:05:48 05 Jan 07 HG

Hg .006 ppb .000 % .006

*** Sample ID: JLHXK Seq: 38 11:07:43 05 Jan 07 HG

Hg .052 ppb .000 % .052

*** Sample ID: JLHXM Seq: 39 11:09:45 05 Jan 07 HG

Hg .003 ppb .000 % .003

*** Check Standard: 3 Ck3ccv Seq: 40 11:11:32 05 Jan 07 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		96.9	4.84	5.00	ppb	.000 %

*** Check Standard: 1 Ck1ccb Seq: 41 11:13:21 05 Jan 07 HG

Line	Flag	Found	Range(+/-)	Units	SD/RSD
Hg		-.009	.059	ppb	.000 %

*** Sample ID: JL97PB Seq: 42 11:15:29 05 Jan 07 HG
H6L070246 FH OH

Hg .006 ppb .000 % .006

*** Sample ID: JL97PC Seq: 43 11:17:27 05 Jan 07 HG

Hg 4.87 ppb .000 % 4.87

*** Sample ID: JL97PL Seq: 44 11:19:38 05 Jan 07 HG

Hg 4.74 ppb .000 % 4.74

*** Sample ID: JK1WA Seq: 45 11:21:27 05 Jan 07 HG

Hg .378 ppb .000 % .378

*** Sample ID: JK1WAA 9ML SAMPLE + 1ML DIGESTED 10 ppb STD Seq: 46 11:23:14 05 Jan 07 HG

Hg 1.36 ppb .000 % 1.36

*** Sample ID: JK1XD Seq: 47 11:25:13 05 Jan 07 HG

Hg .044 ppb .000 % .044

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Sample ID: JK1X5                    Seq:  48     11:27:13 05 Jan 07   HG

Hg    .090    ppb       .000  %   .090

*** Sample ID: JK105                    Seq:  49     11:29:00 05 Jan 07   HG

Hg    6.13    ppb       .000  %   6.13

*** Sample ID: JK11F                    Seq:  50     11:31:17 05 Jan 07   HG

Hg    14.2    ppb       .000  %   14.2

*** Sample ID: JK112                    Seq:  51     11:33:35 05 Jan 07   HG

Hg    6.43    ppb       .000  %   6.43

*** Check Standard: 3  Ck3ccv           Seq:  52     11:35:37 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          96.6    4.83    5.00  ppb         .000  %

*** Check Standard: 1  Cklccb           Seq:  53     11:37:34 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.026     .059    ppb        .000  %

*** Sample ID: JK12A                    Seq:  54     11:39:43 05 Jan 07   HG

Hg    .012    ppb       .000  %   .012

*** Sample ID: JL97RB                   Seq:  55     11:41:55 05 Jan 07   HG
                          H6L070246 BH OH
Hg    .008    ppb       .000  %   .008

*** Sample ID: JL97RC                   Seq:  56     11:44:14 05 Jan 07   HG

Hg    4.00    ppb       .000  %   4.00

*** Sample ID: JK1WF                    Seq:  57     11:46:04 05 Jan 07   HG

Hg    .069    ppb       .000  %   .069

*** Sample ID: JK1WFS                   Seq:  58     11:47:54 05 Jan 07   HG

Hg    .949    ppb       .000  %   .949

*** Sample ID: JK1WFD                   Seq:  59     11:49:46 05 Jan 07   HG

Hg    .976    ppb       .000  %   .976

*** Sample ID: JK1XR                    Seq:  60     11:51:57 05 Jan 07   HG

Hg    .058    ppb       .000  %   .058

*** Sample ID: JK10A                    Seq:  61     11:53:48 05 Jan 07   HG

Hg    .102    ppb       .000  %   .102

*** Sample ID: JK107                    Seq:  62     11:55:35 05 Jan 07   HG

Hg    .099    ppb       .000  %   .099

*** Sample ID: JK11L                    Seq:  63     11:57:33 05 Jan 07   HG

Hg    .160    ppb       .000  %   .160
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Check Standard: 3  Ck3ccv       Seq:  64      11:59:24 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          98.0     4.90    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb       Seq:  65      12:01:12 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.037     .059     ppb        .000  %

*** Sample ID: JK114                 Seq:  66     12:03:28 05 Jan 07   HG

Hg    .085    ppb       .000  %   .085

*** Sample ID: JK12G                 Seq:  67     12:06:15 05 Jan 07   HG

Hg    .143    ppb       .000  %   .143

*** Sample ID: JK11FZ5               Seq:  68     12:08:04 05 Jan 07   HG

Hg    2.94    ppb       .000  %   2.94

*** Check Standard: 3  Ck3ccv       Seq:  69      12:10:04 05 Jan 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          97.6     4.88    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb       Seq:  70      12:12:32 05 Jan 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg          .016     .059     ppb        .000  %
```

Miscellaneous Data

STL Knoxville Mercury Data Review / Narrative Checklist
Methods 7470A/7471A and 245.1/245.5 - KNOX-MT-0009, Rev 6 and KNOX-MT-0010, Rev 5

Lot / SDG #: H6L140394	☐ No QC reported	☑ Batch QC reported	☐ Client QC reported

A. Review of QuantIMS / QDS Results	NA	Yes	No	*Why is data reportable?*
1. Were PM checklists, Lot Summary and any applicable QAS reviewed?		✓		
2. Were all prep sheets, prep spreadsheets and any existing NCMs reviewed?		✓		
3. Were manual calculations of results and RLs performed for each sample, blank, LCS, LCSD, MS, MSD and DUP? (Document 1 calculation per batch.)		✓		
4. Were elements with negative results >RL reported as ND G?	✓			
5. For each sample, blank, LCS, LCSD, MS, MSD and DUP, were flags, units, DFs, prep date, date/time of analysis verified to be correct?		✓		
6. Were spike amounts verified for each LCS/MS? (Document 1 manual calculation.)		✓		
7. Were method blank results ≤1/2 RL for water/solid samples or <RL for air train samples?		✓		☐ **[mb3] No analyte >QC limit in associated samples.*** ☐ **[mb5] Insufficient sample for reanalysis.***
8. LCS or LCS/LCSD within QC limits? (90-110%R)		✓		☐ **[lcs2] Insufficient sample for reanalysis.** ☐ **[lcs3] LCS%R >QC limits & sample results < RL.***
9. MS/MSD or MS/DUP run at required frequency?	✓			☐ [lcsd] Insufficient sample – lcs/lcsd analyzed.
10. MS %R or MS/MSD %R & RPD within QC limits?	✓			☐ [ms1] ☐ [msd1] LCS acceptable - matrix effects. ☐ [ms2] ☐ [msd2] Native analyte > 4x spike level. ☐ [ms3] ☐ [msd3] Matrix effects & native >4x spike. ☐ [batch] Batch QC on client's sample outside limits.
11. DUP RPD within limits? (0-20 RPD for results ≥5xRL; +RL if result <5xRL)	✓			☐ [rpd] LCS acceptable. Results indicate sample heterogeneity.
12. Were J flags added to the DUP as needed?	✓			
13. Is DUP RPD=0 for two ND results and RPD=200 for one ND and a positive result?	✓			
14. Are all results present for all samples?		✓		
15. Were the samples analyzed within the holding time?		✓		☐ [ht1] HT expired upon receipt ☐ *[ht2] Analysis requested after HT expired.* ☐ See comments section below.

Data Reviewer: [signature] **Date:** Jan 5, 07

Calculation Checks / Comments:

JL971 C: 4.91 µg/L x 0.112 = 0.491 µg

*Such action must be taken in consultation with client.

NOTE: Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville Mercury Data Review / Narrative Checklist
Methods 7470A/7471A and 245.1/245.5 - KNOX-MT-0009, Rev 6 and KNOX-MT-0010, Rev 5

Lot / SDG #: H6L140394

B. Review of QC Summary Forms *Note:* Y=Yes, N=No, NA=Not Applicable	Chart # M010507	Chart #	Chart #	Chart #	***Why is data reportable?***
1. ICV within limits? (7470A/7471A=90-110%R; 245.1/245.5=95-105%R)	Y				
2. CCV within limits? (7470A/7471A=80-120%R; 245.1/245.5=90-110%R)	Y				If no, list details:
3. ICB/CCB within limits? (<MDL for water/solid samples; <RL for air train samples)	Y				If no, list details:
4. CRA within limits? (The CRA standard contains mercury at 0.2 ug/L. The CRA result must fall within 30% of the true value.)	Y				
5. PDS or PDS/PDSD run at required frequency?	Y				
6. PDS/PDSD within limits? (75-125%R) **Reminder:** Place copy of PDS results in Sample Data Summary and QC Summary sections of report.	Y				☐ [pds1] ☐ [pdsd1] LCS acceptable - matrix effects. ☐ [pds2] ☐ [pdsd2] Native analyte > 4x spike level. ☐ [pds3] ☐ [pdsd3] Matrix effects & native >4x spike.
7. Are the IDLs on summary forms current?	Y				
8. Are the QC summary forms correct?	Y				

Data Reviewer: [signature] **Date:** Jan 5, 07

Comments:

*Such action must be taken in consultation with client.

NOTE: Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville Metals Final Deliverable Data Review / Narrative Checklist

Lot / SDG #:	461,140394			
Report Type:	☐ Report (COA)	☑ Level 4 Package	☐ QDS Package	☐ Forms Only ☐ Other _____

C. Review of Final Deliverable	NA	Yes	No	
1. Are all nonconformances documented and discussed in narrative? (**Reminder:** Place copy of all NCMs in front of deliverable.)		✓		List NCM #: 08-0006721
2. For air trains, was the appropriate autotext selected for the narrative? (**Reminder:** Review the autotext and make all appropriate changes.)		✓		☐ [MMT1] Multi-metals trains analyzed for ICP & Hg. ☐ [MMT2] Multi-metals trains analyzed for ICP only. ☐ [MMT3] Multi-metals trains analyzed for Hg only. ☐ [MMT4] Combined FH/BH analyzed for ICP only. ☑ [OH] Ontario-Hydro train. ☐ [OH thimble] Ontario-Hydro train with thimble-FH.
3. For PM10 projects, was the appropriate autotext selected for the narrative?	✓			☐ [pm10] PM10 filters analyzed for ICP & Hg. ☐ [pm10icp] PM10 filters analyzed for ICP only.
4. Was a Filter Lot Check report included for PM10 filters?	✓			☐ [fb1] Filter Lot Check Report in Misc. Section. ☐ [fb2] Filter Lot Check Report after LCS report.
5. Is the narrative complete and does it contain the appropriate deviations noted on the analyst DRCs, ICP DRC, Hg DRC and ICP-MS DRC?		✓		
6. Were all client/project specific requirements met? (As described in PM checklists, Lot Summary or Client Analysis Summary, and any applicable QAS.)		✓		
7. Are the original DRCs behind narrative with copy in report?		✓		
8. Are results present for all samples?		✓		
9. Is the final deliverable in the proper format?		✓		
10. Were the ICP and Hg charts and cover pages scanned? (Check .pdf files.)		✓		

Data Reviewer: [signature] **Date:** Jan 5, 07

Comments:

STL Knoxville
Ontario-Hydro Air Train - SOP KNOX-IP-0006rev2
Front Half Mercury Sample Preparation Worksheet

Batch Number: 7002029
Prep Date: 01/02/2007 0800
Comp Date: 01/03/2007 1700

Microwave Prep Performed by: KND — Date: 1/3/2007
1st Level Review/Relinquished by: DKW — Date: 1/5/2007
2nd Level Review/Received by: NTM — Date: Jan 5, 07

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	PDS	Total Volume Probe Rinse (L)	Probe Rinse pH	Final Microwave Digestate Volume (L)	Final Hg Digestate Volume (ml)	Volume Microwave Digestate Used (ml)	Hg Bench Dilution Factor	QuantIMS Upload Dilution Factor	QuantIMS Upload Multiplier
H6L140394	1		DXLO	HARDIN SDA DUCT+STACK RB FILTER 66	JLHWK	*			0.200	50.0	50.0	1	0.20	0.20
H6L140394	2		DXLO	HARDIN SDA DUCT+STACK RB FILTER 67	JLHXD				0.200	50.0	50.0	1	0.20	0.20
H6L140394	3		DXLO	HARDIN SDA DUCT+STACK RB FILTER 68	JLHXF				0.200	50.0	50.0	1	0.20	0.20
H6L140394	4		DXLO	HARDIN SDA DUCT+STACK RB FILTER A120	JLHXH				0.100	50.0	50.0	1	0.10	0.10
H6L140394	5		DXLO	HARDIN SDA DUCT+STACK RB FILTER A121	JLHXK				0.100	50.0	50.0	1	0.10	0.10
H6L140394	6		DXLO	HARDIN SDA DUCT+STACK RB FILTER A122	JLHXM				0.100	50.0	50.0	1	0.10	0.10
H7A020000	29	B	DXLO	INTRA-LAB BLANK	JL971				0.100	50.0	50.0	1	0.10	0.10
H7A020000	29	C	DXLO	INTRA-LAB CHECK	JL971				0.100	50.0	50.0	1	0.10	0.10
H7A020000	29	L	DXLO	INTRA-LAB CHECK	JL971				0.100	50.0	50.0	1	0.10	0.10

* = Sample chosen for PDS.
** = Sample chosen for PDS/PDSD.

Hg LCS/LCSD Spike: 50 uL of ICAL-3425-6 — Expiration Date 2/2/2007

HNO_3 Lot #: B44032 — HF Lot #: 5105110
HCl Lot #: C07001 — H_3BO_3 Lot # 2664:86

Comments: Samples that are filter only: JLHXH, JLHXK, and JLHXM. Samples that are thimbles only: JLHWK, JLHXD,and JLHXF.
0.1N HN03 2664:89

QuantIMS Upload Dilution Factor *and* QuantIMS Multiplier = Final Microwave Digestate Volume (L) x Final Hg Digestate Volume (ml) / Volume Microwave Digestate Used (ml) x Hg Bench Dilution Factor

STL Knoxville
Mercury Air Prep Spiking Form

Analyst: KND/DKW Date: 01/04/07 Batch: 7002029

Bath A Temp: 93°C
Bath B Temp: 94°C
(Acceptance range 90°–95°C)

☐ Hg in PM10 filters: KNOX-IP-0003, Rev. 4
☐ MMT train: KNOX-MT-0006, Rev. 9
☑ Ontario Hydro: KNOX-IP-0006, Rev. 2

Standard Type	Standard ID	Intermediate Std.		Volume Used (ml)	Final Volume (ml)	Final Concentration (ug/L)
		Source	Conc.(ug/L)			
Calibration Std 1	N/A		N/A	N/A	50	Blank
Calibration Std 2	I-CAL- 3425-6-3	SPEX	100	0.05	50	0.1
Calibration Std 3	I-CAL-		100	0.1	50	0.2
Calibration Std 4	I-CAL-		100	0.25	50	0.5
Calibration Std 5	I-CAL-		100	0.5	50	1.0
Calibration Std 6	I-CAL-		100	2.5	50	5.0
Calibration Std 7	I-CAL-		100	5.0	50	10.0

Standard Type	Standard ID	Intermediate Std.		Amount Used (ml)	Final Volume (ml)	Final Conc. (ug/L)
		Source	Conc.(ug/L)			
ICV	I-VER- 3426-6-2	ULTRA	100	1.25	50	2.5
CCV	I-CAL- 3425-6-3	SPEX	100	2.5	50	5.0
CRA	I-CAL-		100	0.1	50	0.2

Standard Type	Standard ID	Intermediate Std.		Amount Used @ ICP prep/final volume	ICP Sample Volume used @ Hg prep (ml)	Final Conc. @ Hg prep (ug/L)	Final Amount (ug)
		Source	Conc.(ug/L)				
Air (PM10) LCS	I-CAL-		10,000	0.250 ml/50ml	5.0	5.0	11.25
Air (PM10) MS	I-CAL-		10,000	0.050 ml/50ml	5.0	1.0	2.25

REAGENTS			
Conc. H_2SO_4 Lot #:	C15045	5% $KMnO_4$ ID #:	B-3122-12-C
Conc. HNO_3 Lot #:	B44032	5% $K_2S_2O_8$ ID #:	D-2638-17-E
Conc. HCL Lot #:	C42A22	$SnCl_2$ Solution ID #:	A-3382-20-B
12% $NaCl{\cdot}NH_2OH{\cdot}HCL$ ID #:	C-3267-3-E		

Wet Chemistry

Sample Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 66

General Chemistry

Lot-Sample #...: H6L140394-001 Work Order #...: JLHWK Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	2860	0.50	mg	CFR60A 5	12/19-12/20/06	6354260

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 67

General Chemistry

Lot-Sample #...: H6L140394-002 Work Order #...: JLHXD Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	2930	0.50	mg	CFR60A 5	12/19-12/20/06	6354260

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER 68

General Chemistry

Lot-Sample #...: H6L140394-003 Work Order #...: JLHXF Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	2510	0.50	mg	CFR60A 5	12/19-12/20/06	6354260

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A120

General Chemistry

Lot-Sample #...: H6L140394-004 **Work Order #...:** JLHXH **Matrix.....:** AIR
Date Sampled...: 12/11/06 **Date Received..:** 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	**360**	**0.50**	**mg**	**CFR60A 5**	**12/19-12/20/06**	**6354260**

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A121

General Chemistry

Lot-Sample #...: H6L140394-005 Work Order #...: JLHXK Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	360	0.50	mg	CFR60A 5	12/19-12/20/06	6354260

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA DUCT+STACK RB FILTER A122

General Chemistry

Lot-Sample #...: H6L140394-006 Work Order #...: JLHXM Matrix.....: AIR
Date Sampled...: 12/11/06 Date Received..: 12/12/06

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	359	0.50	mg	CFR60A 5	12/19-12/20/06	6354260

Dilution Factor: 1 MDL.....: 0.50

Raw Data

Total Particulates

STL Knoxville Particulate Matter Determination Data Review/Narrative Checklist
Method: SW-846 Method 0050 by SOP KNOX-WC-0006, Rev. 2
Page 1 of 1

Batch Number:	6354260
Lot Number(s):	H6L140394

Review Items A. Calibration	N/A	Y	N	If No, why is data reportable?	2nd √
1. Was the balance calibration checked with 5, 50 & 100 gram weights prior to use?		✓			✓
2. Was the balance checked with 100 gram weight after every 10 samples?		✓			✓
3. Was the balance tared before each weighing?		✓			✓
4. Was the balance ID documented?		✓			✓
B. Client Sample and QC Sample Results					
1. Were all special project requirements met? **(Were PM Checklists, Lot Summary, and any applicable QAS reviewed?)**		✓			✓
2. Were sample IDs verified?		✓			✓
3. Were all transcriptions checked?		✓			✓
4. Calculations checked for error?		✓			✓
5. Final report acceptable? (Results correct, units correct, **deviations noted in narrative**, and analysis dates correct.)		✓			✓
C. Preparation/Matrix QC					
1. Were all sample weighings performed in duplicate (at least)?		✓			✓
2. Was the average of the last two weighings used?		✓			✓
D. Other					
1. Are all nonconformances documented appropriately?	✓			NCM No.:	NA

Analyst: Lauren Walker	Date: 12/20/06	2nd Level Reviewer: [signature]	Date: 12/26/06
Comments:		Comments:	
		Report all s.f. in narrative.	

STL Knoxville
SOP KNOX-WC-0006
Particulate Data Worksheet

Batch Number: 6354260
Prep Date: 12/19/2006 1645
Comp Date: 12/20/2006 1330

Analyst: LDW

Reviewed by: [signature]

Date: 12/26/06

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	1	2	3	*Tare Weight Average (g)*	1	2	3	*Final Weight Average (g)*	*Particulate Weight (mg)*
H6L140394	1		88AG	HARDIN SDA DUCT+STACK RB FILT	JLHWK1AC	0.0000			***0.00000***	2.8554	2.8558		***2.85560***	2855.6
H6L140394	2		88AG	HARDIN SDA DUCT+STACK RB FILT	JLHXD1AC	0.0000			***0.00000***	2.9345	2.9345		***2.93450***	2934.5
H6L140394	3		88AG	HARDIN SDA DUCT+STACK RB FILT	JLHXF1AC	0.0000			***0.00000***	2.5101	2.5105		***2.51030***	2510.3
H6L140394	4		88AG	HARDIN SDA DUCT+STACK RB FILT	JLHXH1AC	0.0000			***0.00000***	0.3601	0.3600		***0.36005***	360.0
H6L140394	5		88AG	HARDIN SDA DUCT+STACK RB FILT	JLHXK1AC	0.0000			***0.00000***	0.3599	0.3597		***0.35980***	359.8
H6L140394	6		88AG	HARDIN SDA DUCT+STACK RB FILT	JLHXM1AC	0.0000			***0.00000***	0.3595	0.3594		***0.35945***	359.4

Comments:

STL Knoxville
Sample Data Log
Particulate Matter by KNOX-WC-0006

Batch Number: 6354260

	Sample Number	Work Order Number	Matrix	Filter or Beaker No.	Probe Rinse Volume (mL)	Tare Weight (g)	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials
1	HGL140394-001	JLHWKIAC	THIMBLE	66	NA	NA	1	H-47372	99.9999	✓	2.8554	12·20·06	11:03	LDW
							2	↓	↓	✓	2.8558	↓	13:10	↓
							3							
							4					LDW		
2	002	JLHXDIAC	THIMBLE	67	NA	NA	1	H-47372	99.9999	✓	2.9339	12·20·06	11:04	LDW
							2	↓	↓	✓	2.9345	↓	13:11	↓
							3	↓	↓	✓	2.9345	↓	15:48	↓
							4					LDW		
3	003	JLHXFIAC	THIMBLE	68	NA	NA	1	H-47372	99.9999	✓	2.5101	12·20·06	11:05	LDW
							2	↓	↓	✓	2.5105	↓	13:12	↓
							3							
							4					LDW		
4	004	JLHXHIAC	F	A120	NA	NA	1	H-47372	99.9999	✓	0.3601	12·20·06	11:06	LDW
							2	↓	↓	✓	0.3600	↓	13:13	↓
							3							
							4					LDW		
5	005	JLHXKIAC	F	A121	NA	NA	1	H-47372	99.9999	✓	0.3599	12·20·06	11:07	LDW
							2	↓	↓	✓	0.3597	↓	13:14	↓
							3							
							4					LDW		

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing? * Filter wt only *

STL Knoxville
Sample Data Log
Particulate Matter by KNOX-WC-0006

Batch Number: 6354260 CONT.

	Sample Number	Work Order Number	Matrix	Filter or Beaker No.	Probe Rinse Volume (mL)	Tare Weight (g)	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials
1	H6L140394-006	JLHXMIAC	F	A122	NA	NA	1	H-47372	99.9999	✓	0.3595	12·20·06	11:08	LDW
							2	↓	↓	✓	0.3594	↓	13:15	↓
							3							
							4					LDW		
2							1							
							2							
							3							
							4							
3							1							
							2							
							3	LDW						
							4	12/20/06						
4							1							
							2							
							3							
							4							
5							1							
							2							
							3							
							4							

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

Sample Receipt Documentation

AIR SAMPLING ASSOCIATES, INC.

H6L140394

Chain of Custody Record

Client: ADAES	Project No.: 06-057	Page 1 of 1	Analysis
Address: 8100 Southpark Way	Unit No.: SDA Inlet Duct & Stack	Lab: STL - Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Hefley / Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: Reagent Blanks	Test Method: ASTM D6784-02 (OH)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part. Hg	Oxidized Hg	Elemental Hg		
Cont. 12	12-11-06	1600	—	~~12~~ 6 BM	Filter Blanks	✓				
					NO CUSTODY SEALS					
					RECEIVED AT AMBIENT TEMP					
					DKO 12-12-06					
					1 PACK VPS#					
					12Y4928W019250411 65					

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hefley	12-11-06	1600	1. Relinquished By: Bill Hefley	12-11-06	1600
2. Received By: Bryan Dunnigan	12-12-06	0930	2. Relinquished By:		
3. Received By:			3. Relinquished By:		

Comments:

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STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: AIR SAMPLING ASSOCIATES **Project:** _____ **Lot Number:** H6440314

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)		✓		☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	1B. NO ID'S LISTED ON COC FOR FILTERS. WILL USE ID'S FROM FILTERS, FILTER IDS 66, 67, 68, A120, A121, A122
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?			✓	☐ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intaet?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?		✓		☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?		✓		☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?		✓		If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?	✓				

Quote #: _____ PM Instructions: _____

Sample Receiving Associate: Bryan Emerson Date: 12-12-06

QA026R18.doc, 1/30/06

Appendix I:

NCASI Method 8A (Sulfur Trioxide) Analytical Data

AIR SAMPLING ASSOCIATES, INC.

SULFUR TRIOXIDE EMISSION DATA

Job No.: 06-057 Location: Hardin, MT

Job Name: ADA-ES Unit ID: SDA Inlet Duct

Run No.	1	2	3	
Date	11/30/06	11/30/06	12/01/06	
Time	1323-1423	1648-1748	1401-1501	
N - normality of $Ba(ClO_4)_2$	0.0099	0.0099	0.0099	
ML_I - ml in impinger	113	131	81	
ML_A - ml in aliquot	1.0	1.0	1.0	
ML_B - ml of $Ba(ClO_4)_2$ to titrate	0.2	0.2	0.1	
	0.3	0.2	0.2	
	0.2	0.1	0.2	
Avg. ML_B - ml of $Ba(ClO_4)_2$ to titrate	0.2	0.2	0.2	
ML_{BB} - ml of $Ba(ClO_4)_2$ to titrate blank	0.05	0.05	0.05	
T_m - avg. gs meter temp. (°F)	70	74	72	
V_m - Vol. of dry gas sampled @ meter conditions (ft^3)	21.571	22.079	21.825	
P_b - barometric pressure ("Hg Abs.)	26.94	26.96	27.14	
Q_s - stack gas Vol dry @ standard conditions (SCFM*)	NA	NA	NA	
C_I - SO_3 in impinger (mgs)	6.71	7.78	4.81	
ppm SO_3	3.69	4.20	2.60	
C_{SO3} - emission rate of SO_3 (lbs/day)	NA	NA	NA	
C_s - emission rate of S (lbs/day)	NA	NA	NA	

* 29.92" Hg, 68° F (760 mm Hg, 20° C)

$$C_I = \frac{ML_I \times (ML_B \times ML_{BB}) \times \underline{N} \times 40}{ML_A}$$

$$C_{SO3} = \text{ppm}\,SO_3 \times Q_s \times 299.1 \times 10^{-6}$$

$$\text{ppm}\,SO_3 = \frac{0.6021 \times C_I \times (T_M + 460)}{V_m \times P_b}$$

$$C_s = \frac{C_{SO3}}{2.5}$$

AIR SAMPLING ASSOCIATES, INC.

Appendix J:

Chain of Custodies

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 4
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: ASAI / Western
City: Littleton, State: CO, Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Bill Hefley / Lonnie Bull
Run No.: 1	Test Method: 5/202	Lab Phone No.: 972-492-1400 /

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	CPM	Sulfates	Chlorides	Volume Recovered Beaker
Cont. 1	11-30-06	1900	—	1	Filter All	X				
Cont. 2	11-30-06	1908	—	1	ACE F.W.	X				
Cont. 4	11-30-06	1853	D.I. Water	1	Imps 1, 2, 3 DI Rines + Hot line		X	X	X	770 961
Cont. 5	11-30-06	1858	—	1	Imps 1, 2, 3 MeCl Rinse + Hot line		X	X	X	243 961

Special Instructions: ASAI retain Cont Nos. 1 & 2 / Western retain Cont Nos. 4 & 5 / Cont 3 not recovered

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hefley	11-30-06	1908	1. Relinquished By: Bill Hefley	12/3/06	0900
2. Received By: Billy J. Mullins, Jr	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Raylance	12/3/06	1330	3. Relinquished By: Alan D. Raylance	12/4/06	0820

Comments: [illegible] 12/4/06 0820

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES			Project No.: 06-057			Page 2 of 4					
Address: 8100 Southpark Way			Unit No.: Hardin Stack			Lab: ASAI / Western					
City: Littleton	State: CO	Zip Code: 80120	Project Manager: Bill Mullins			Lab Contact: Bill Hefley / Lonnie Bull					
Run No.: 2			Test Method: 5/202			Lab Phone No.: 972-492-1400 /					
Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	CPM	Sulfates	Chlorides	Volume	Beaker
Cont. 1	12-1-06	1734	(SH) —	1	Filter No. A115	X					
Cont. 2	12-1-06	1809, 1750	—	1	ACE F.W.	X					
Cont. 4	12-1-06	~~1853~~	D.I. Water	1	D.I. Rinse Imps 1, 2, 3 + Hot Line		X	X	X	760	961
Cont. 5	12-1-06	1752	—	1	MeCl Rinse Imps 1, 2, 3 + Hot Line		X	X	X	952	961

Special Instructions: ASAI retain Cont. Nos. 1 & 2 / Western retain Cont. Nos. 4 & 5 / Cont. 3 not recovered

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hefley	12-1-06	1809	1. Relinquished By: Bill Hefley	12/3/06	0900
2. Received By: Billy J. Mullins, Jr	12/3/06	0900	2. Relinquished By: Billy J. Mullins Jr	12/3/06	1330
3. Received By: Alan D. Raylance	12/3/06	1330	3. Relinquished By: Alan D. Raylance	12/4/06	0820

Comments: [illegible] 12/4/06 0820

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 3 of 4	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: ASAI / Western	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Bill Hefley / Lonnie Bull	
Run No.: 3	Test Method: 5/202	Lab Phone No.: 972/492-1400 /	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	CPM	Sulfates	Chlorides	Volume Reading
Cont. 1	12-2-06	1542	—	1	Filter No. A116	X				
Cont. 2	12-2-06	1545	—	1	ACE F.W.	X				
Cont. 4	12-2-06	1611	D.I. Water	1	Imps 1, 2, 3 + Hot Line (D.I. Rinse)		X	X	X	760 961
Cont. 5	12-2-06	1645	—	1	Imps 1, 2, 3 + Hot Line (Meth Rinse)		X	X	X	249 961
	~~12-2-~~									

Special Instructions: ASAI retain Cont. Nos. 1 & 2 / Western retain Cont Nos. 4 & 5 / Cont. 3 not recovered

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hefley	12-2-06	1645	1. Relinquished By: Bill Hefley	12/3/06	0900
2. Received By: Billy J. Mullins, Jr	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: Lonnie Bull 12/4/06 0820

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 2 of 4
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: ASAI / Western
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Bill Hefley / Lonnie Bull
Run No.: Reagent Blanks	Test Method: 5/202	Lab Phone No.: 972-492-1400 /

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	CPM	Sulfates	Chlorides	Volume	Broker
Cont. No. 6	12-2-06	1003	—	1	HPLC D.I. Water Blank - 500ml		X	X	X	598	961
Cont. No. 7	12-2-06	1001	—	1	MeCl Blank		X	X	X	266	961
Cont. No. 8	12-2-06	0959	—	1	ACE Blank - 200 ml	X					

Special Instructions: ASAI retain Cont. No. 8 / Western retain Cont. Nos. 6 and 7

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill [illegible]	12-2-06	1003	1. Relinquished By: Bill [illegible]	12/3/06	0900
2. Received By: Billy J. Mullins Jr.	12/3/06	0900	2. Relinquished By: Billy J. Mullins Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [illegible] Bull 12/4/06 0820

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WESTERN ENVIRONMENTAL SERVICES AND TESTING, INC.
☐ 913 Foster Road, Casper, WY 82601 (307)234-5511 FAX (307)234-8324
☐ P.O. Box 1626, San Marcos, TX 78667-1626 (512)392-7788 FAX (512)392-7790
☐ PO Box 754, Evanston, WY 82935 (307)789-6420 FAX (307)789-6446

CHAIN OF CUSTODY RECORD

PROJECT NO.: 06-4108 CONTACT NAME Lonnie Bull TELEPHONE NO. 307-234-5511

Recovered By: Print Name | Signature

SAMPLE ID	SAMPLE LOCATION	RUN	RECOVERY DATE	RECOVERY TIME	SOLUTION / FILTER #	No. of Containers	ANALYSIS: Sulphates								REMARKS
4108 - 1	Hardin stack	1	11/30/06		H_2O	1	X								
-2	↓	2	12/1/06		↓	1	X								
-3	↓	3	12/2/06		↓	1	X								
-4	Blank	B	12/2/06		↓	1	X								

COMMENTS:

Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
[signature]	WEST	12/6/06	1000	Fedex			
Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
Dispatched by: (Signature)	Company	Date	Time	Received for Laboratory by:	Company	Date	Time
Method of Shipment:							

WHITE COPY—WEST YELLOW COPY—CUSTOMER PINK COPY—COPY

M00953 11/94

WESTERN ENVIRONMENTAL SERVICES AND TESTING, INC.

☐ 913 Foster Road, Casper, WY 82601 (307)234-5511 FAX (307)234-8324 ☐ P.O. Box 1626, San Marcos, TX 78667-1626 (512)392-7788 FAX (512)392-7790 ☐ PO Box 754, Evanston, WY 82935 (307)789-6420 FAX (307)789-6446

CHAIN OF CUSTODY RECORD

PROJECT NO.: 06-4108 CONTACT NAME Lonnie Bull TELEPHONE NO. 307-234-5511

Recovered By: Print Name | Signature

SAMPLE ID	SAMPLE LOCATION	RUN	RECOVERY DATE	RECOVERY TIME	SOLUTION / FILTER #	No. of Containers	ANALYSIS: Chlorides								REMARKS
9610	Hardin Stock	B				1	X								
9612	↓	1				1	X								
9614		2				1	X								
9616		3				1	X								
9609															
9611															
9613															
9615															

did not receive

COMMENTS:

Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
Lonnie Bull	WEST	12/12/06	1300	Fedex			
Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
Dispatched by: (Signature)	Company	Date	Time	Received for Laboratory by:	Company	Date	Time
					Enthalpy	12.13.06	10:00
Method of Shipment:					T=Ambient		

WHITE COPY—WEST YELLOW COPY—CUSTOMER PINK COPY—COPY

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J-7

HGL110106

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 4
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville
City: Littleton; State: Co; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Waomund
Run No.: 1	Test Method: EPA 17 / 26A / CTM027	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Hydrogen Halides	Halogens	
Cont. No. 1	11-30-06	1715	—	1	Thimble No. 59	X				
Cont. No. 2	11-30-06	1718	—	1	ACE F.W.	X				
Cont. No. 3	11-30-06	1640	0.1N H_2SO_4	1	Imps 1 & 2 + Rinse		X	X		
Cont. No. 4	11-30-06	1646	0.1N NaOH	1	Imps 3 & 4 + Rinse				X	
Rec'd temp. Ambient, No custody Seals										
MFH 12-6-06, 9 containers Fedex # 696769459203		9199								
		9214								
		9133								
		9177								
		9166								
		9188								
		9225								

Special Instructions: Cont No. 1 & No. 2 retained by ASAI. Split Container No. 3 for IC analysis to determine NH_3. HF and HBr are primary analytes for the 26A analysis.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☐ Archive For ~~X~~ 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	11-30-06	1718	1. Relinquished By: Bill Mullins	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

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Rec'd BY: Matthew T. Howard, 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

HGL110106

Chain of Custody Record

Client	Project No.	Page 2 of 4
ADA-ES	06-057	
Address: 8100 Southpark Way	Unit No.: Hardis SDA Inlet Duct	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund
Run No.: 2	Test Method: EPA 17/26A/CTM027	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Halogen+Halids	Halogens
Cont. No. 1	12-1-06	1556	—	1	Thimble No. 60	X			
Cont. No. 2	12-1-06	1558	—	1	ACE F.W.	X			
Cont. No. 3	12-1-06	1540	0.1N H_2SO_4	1	Imps 1 & 2 + Rinse		X	X	
Cont. No. 4	12-1-06	1542	0.1N NaOH	1	Imps 3 & 4 + Rinse			X	

Special Instructions: Cont. Nos. 1 and 2 retained by ASAI. Split Cont. No. 3 for IC analysis to determine NH_3. HF and HBr are primary analytes for the EPA 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1558	1. Relinquished By: Bill Mullins	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

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Recd By: Matthew F. Howard, 12-6-06, 09:15

HGL 110106

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 3 of 4	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 3	Test Method: EPA 17 / 26A / CTM027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Hydrogen Halide	Halogens	
Cont. 1	12-2-06	0801	—	1	Thimble No. 61	X				
Cont. 2	12-2-06	0807	—	1	ACE F.W.	X				
Cont. 3	12-2-06	0832	0.1N H_2SO_4	1	Imps 1 & 2 + Rinse		X	X		
Cont. 4	12-2-06	0836	0.1N NaOH	1	Imps 3 & 4 + Rinse				X	

Special Instructions: Container No. 1 and 2 retained by ASAI. Split Cont. No. 3 for IC analysis to determine NH_3. HF and HBr are primary analytes for the 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyby	12-2-06	0836	1. Relinquished By: Bill Hyby	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [signature] 12/4/06 0820 [signature] 12/5/06 1400

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Rec'd By: Matthew J. Howard 12-6-06, 09:15

H6L11010 6

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 4 of 4
Address: 8100 Southpark Way	Unit No.: Hardin Stack & SDA Inlet	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund
Run No.: Reagent Blanks	Test Method: EPA 17 / 26A / CTM027	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part.	NH_3	Hydrogen Halides	Halogens	
Cont. No. 6	12-1-06	1553	—	1	0.1 N H_2SO_4 Blank		X	X		
Cont. No. 7	12-1-06	1551	—	1	0.1 N NaOH Blank				X	
Cont. No. 8	12-1-06	1549	—	1	D.I. Water Blank			X	X	
Cont. No. 9	12-1-06	1547	—	1	ACE Blank	X				

Special Instructions: Split Cont. No. 6 for IC analysis to determine NH_3. HF and HBR ~~and~~ are the primary analytes for EPA 26A. Cont. No. 9 retained by ASAI.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1553	1. Relinquished By: Bill Mullins	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [illegible] 12/4/06 0820 [illegible] 12/5/06 1400

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Rec'd By: Matthew F Howard, 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

HGL110105

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 3	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Tony Waomund	
Run No.: 1	Test Method: 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Hydrogen Halide	Halogens		
Cont. 1	11-30-06	1924	—	1	Filter No. A092	X				
Cont. 2	11-30-06	1926	—	1	ACE F.W.	X				
Cont. 3	11-30-06	1928	0.1N H_2SO_4	1	Imp. 1, 2 + Hot Line		X			
Cont. 4	11-30-06	1924	0.1N NaOH	1	Imp. 3, 4			X		
Rec'd temp. Ambient		MFH 12/6/06								
9 coolers Rec'd Fedex # 696769459203		696795 6945 9188 9225								
No custody seals.		9199 9214								
MFH 12-6-06		9144 9133								
		9177 9166								

Special Instructions: Cont. Nos. 1 & 2 retained by ASAI. HF & HBr are primary analytes for the 26A analysis.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	11-30-06	1928	1. Relinquished By: Bill Mullins	12/3/06	0900
2. Received By: Billy J. Mullins, Jr	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Raylance	12/3/06	1330	3. Relinquished By: Alan D. Raylance	12/4/06	0820

Comments: 12/4/06 0820 — 12/5/06 1400

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Rec'd By: Matthew F. Howard 12-6-06, 09:15

HGL 110105

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 2 of 3	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Hydrogen Halide	Halogens		
Cont. 1	12-1-06	1812	—	1	Filter No. A112	X				
Cont. 2	12-1-06	1815	—	1	ACE F.W.	X				
Cont. 3	12-1-06	1823	0.1N H_2SO_4	1	Imps 1 & 2 + Hot Line		X			
Cont. 4	12-1-06	1819	0.1N NaOH	1	Imps 3 & 4			X		

Special Instructions: Cont. Nos 1 & 2 retained by ASAI. HF & HBr are primary analytes for the 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI, ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1823	1. Relinquished By: Bill Mullins	12/3/06	0900
2. Received By: Billy J. Mullins, Jr.	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

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Rec'd By: Matthew J. Howard, 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

H6L110105

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 3 of 3	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Waomund	
Run No.: 3	Test Method: 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Hydrogen Halid	Halogens		
Cont. 1	12-2-06	2219	—	1	Filter No. A113	X				
Cont. 2	12-2-06	2232	—	1	ACE FW	X				
Cont. 3	12-2-06	2235	0.1N H_2SO_4	1	Imps 1, 2 + Hot Line		X			
Cont. 4	12-2-06	2226	0.1N NaOH	1	Imps 3, 4			X		

Special Instructions: Cont. Nos. 1 & 2 retained by ASAI. HF & HBr are primary analytes for the 26A analysis

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-2-06	2235	1. Relinquished By: Bill Mullins	12/3/06	0900
2. Received By: Billy J. Mullins, Jr.	12/3/06	0900	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

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Recd BY: Matthew F Howard 12/6/06, 09:15

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 7	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 1	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample filter)	12-1-06	1358	—	1	Filter No. A117	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-1-06	1450	—	1			X			
Cont. 2A (ACE FW)	12-1-06	1445	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-1-06	1420	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-1-06	1425	5% HNO_3 – 10% H_2O_2	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-1-06	1436	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1ml dichromate				X	
					Rec'd temp. Ambient, No Custody Seals intact MFH 12-6-06					
					9 containers Fedex #'s: 6967 6945 9203 9189 9214 9144 9133 9177 9166		6967	6945	9188 9225	

Special Instructions: MFH 12-6-06

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☐ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyby	12-1-06	1450	1. Relinquished By: Bill Hyby	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments:	12/4/06	0820		12/5/06	1400

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Rec'd By: Matthew J. Howard 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client	Project No.	Page	of
ADA-ES	06-057	2	7

Address	Unit No.	Lab
8100 Southpark Way	Hardin Stack	STL Knoxville

City	State	Zip Code	Project Manager	Lab Contact
Littleton	CO	80120	Bill Mullins	Terry Wasmund

Run No.	Test Method	Lab Phone No.
2	ASTM D6784-2 (Ontario Hydro)	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Part. Bond Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample Filter)	12-2-06	1305	—	1	filter No. A118	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-2-06	1317	—	1			X			
Cont. 2A (ACE FW)	12-2-06	1316	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	1345	1 Mol/L KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-2-06	1325	5% HNO_3 – 10% H_2SO_4	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-2-06	1338	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1ml dichromate				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hopkins	12-2-06	1345	1. Relinquished By: Bill Hopkins	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [illegible] 12/4/06 0820 [illegible] 12/5/06 1400

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AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client	Project No.	Page	of
ADA-ES	06-057	3	7
Address: 8100 Southpark Way	Unit No.: Hardin Stack	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 3	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bond Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample filter)	12-2-06	2114	—	1	filter No. A119	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-2-06	2129	—	1			X			
Cont. 2A (ACE FW)	12-2-06	2124	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	2111	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-2-06	2051	5% HNO_3 – 10% H_2SO_4 – 4% H_2O_2	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-2-06	2104	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1ml dichromate				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☐ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-2-06	2129	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins, Jr	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820
Comments: [illegible]	12/4/06	0820	[illegible]	12/5/06	1400

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Rec'd By: Matthew F Howard 12-6-06, 09:15

H6L070246

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 4 of 7	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 1	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Container 1 (Sample filter)	12-1-06	1253	—	1	Thimble No. 53	X	X			
Cont. 2 (0.1N HNO_3 FW)	12-1-06	1307	—	1			X			
Cont. 2A (ACE FW)	12-1-06	1303	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-1-06	1248	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-1-06	1310	5% HNO_3 – 10% H_2O_2	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-1-06	1323	4% $KMnO_4$ – 10% H_2SO_4	1	Added 1ml dichromate.				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-1-06	1323	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [illegible] 12/4/06 0820 [illegible] ~~12/5/06 1400~~

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Rec'd BY: Matthew F. Hamel 12-6-06 ~~09:2~~ 09:15 MFH 12-6-06

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 5 of 7	Analysis
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet	Lab: STL Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: ASTM D6784-02 (Ontariohydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Cont. 1 (Sample filter)	12-2-06	1228	—	1	Thimble No. 54	X	X			
Cont. 2 (0.1N HNO_3 F.W.)	12-2-06	1234	—	1			X			
Cont. 2A (ACE F.W.)	12-2-06	1235	—	1		X	X			
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	1210	1 Mol/l KCl	1				X		
Cont. 4 (Imp 4 + Rinse)	12-2-06	1151	5% HNO_3 – 10% H_2O_2	1					X	
Cont. 5 (Imps 5,6,7 + Rinse)	12-2-06	1203	4% $KMnO_4$ – 10% H_2SO_4	1					X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	12-2-06	1236	1. Relinquished By: Bill Mullins	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [illegible] 12/4/06 0820 [illegible] 12/5/06 1400

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Rec'd By: Matthew J. Howard 12/6/06, 09:15

AIR SAMPLING ASSOCIATES, INC.

H6L070246

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 6 of 7	
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: STL Knoxville	
City: Littleton, State: CO, Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 3	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part Bound Hg	Oxidized Hg	Elemental Hg
Cont. 1 (Sample filter)	12-2-06	2036	—	1	Thimble No. 55	X	X		
Cont. 2 (0.1N HNO_3 FW)	12-2-06	2040	—	1		~~X~~	X		
Cont. 3A (ACE FW)	12-2-06	2038	—	1	BH Part Bound Only	X	X		
Cont. 3 (Imps 1,2,3 + Rinse)	12-2-06	2018	1 Mol/l KCl	1				X	
Cont. 4 (Imp 4 + Rinse)	12-2-06	2004	5% HNO_3 – 10% H_2O_2	1					X
Cont. 5 (Imps 5,6,7 + Rinse)	12-2-06	2029	4% KMnO4 – 10% H_2SO_4	1	Added 1 ml dichromate				X

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyby	12-2-06	2040	1. Relinquished By: Bill Hyby	12/3/06	0905
2. Received By: Billy J. Mullins, Jr.	12/3/06	0905	2. Relinquished By: Billy J. Mullins, Jr.	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: [illegible] 12/4/06 0820 [illegible] 12/5/06 1400

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Rec'd BY: Matthew J. Howard 12/6/06, 09:15

1+6L070241

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page (BH) ~~6~~ 7 of 7
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet & Stack	Lab: STL Knoxville
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund
Run No.: Reagent Blanks	Test Method: ASTM D6784-02 (Ontario Hydro)	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Cont. 7 (0.1 N HNO_3)	12-1-06	0914	—	1	50 ml			X	X	
Cont. 8 (1 Mol/L KCl)	12-1-06	0917	—	1	50 ml			X		
Cont. 9 (5% HNO_3 – 10% H_2O_2)	12-1-06	0920	—	1	50 ml				X	
Cont. 10 (4% $KMnO_4$ – 10% H_2SO_4)	12-1-06	0922	—	1	50 ml				X	
Cont. 11 (Hydroxylamine 10%)	12-1-06	0926	—	1	100 ml			X	X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyfy	12-1-06	0926	1. Relinquished By: Bill Hyfy	12/3/06	0910
2. Received By: Billy J. Mullins, Jr	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr	12/3/06	1330
3. Received By: Alan D. Roylance	12/3/06	1330	3. Relinquished By: Alan D. Roylance	12/4/06	0820

Comments: 12/4/06 0820 12/5/06 1400

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Rec'd By: Matthew F. Howard 12-6-06, 09:15

AIR SAMPLING ASSOCIATES, INC.

H6L140394

Chain of Custody Record

Client	Project No.	Page	Analysis
ADAES	06-057	1 of 1	
Address: 8100 Southpark Way	Unit No.: SDA Inlet Duct & Stack	Lab: STL - Knoxville	
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Hefley / Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: Reagent Blanks	Test Method: ASTM D6784-02 (OH)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Part. Hg	Oxidized Hg	Elemental Hg		
Cont. 12	12-11-06	1600	—	~~10~~ 6 BM	Filter Blanks	✓				
					NO CUSTODY SEALS					
					RECEIVED AT AMBIENT TEMP					
					DKO 12-12-06					
					1 PACK VRS#					
					12Y492SW019250411 65					

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hefley	12-11-06	1600	1. Relinquished By: Bill Hefley	12-11-06	1600
2. Received By: Bryan Donahue	12-12-06	0930	2. Relinquished By:		
3. Received By:			3. Relinquished By:		

Comments:

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 06-057	Page 1 of 3
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: ASAI
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Bill Hefley
Run No.: 1	Test Method: NCASI 8A	Lab Phone No.: 972-492-1400

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO3
Cont. 1	11-30-06	1451	—	1	Condenser Rinse	X
Cont. 1A	11-30-06	1523	—	1	Probe Rinse	
Cont. 1B	11-30-06	1505	—	1	Thimble Holder Rinse	
Cont. 1C	11-30-06	1504	—	1	Thimble No. 62	
Cont 2	11-30-06	1503	~~DI. H2O~~ 3% H_2O_2	1	Imps. 1 & 2 Rinse	X

Special Instructions: Archive Containers Nos. 1A, 1B, and 1C

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hefley	11-30-06	1523	1. Relinquished By: Bill Hefley	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/5/06	0800
3. Received By: Bill Hefley	12-5-06	0800	3. Relinquished By:		

Comments: Analysis Completed @ 1430 12-14-06 BH

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES			Project No.: 06-057			Page 2 of 3	Analysis			
Address: 8100 Southpark Way			Unit No.: Hardin SDA Inlet Duct			Lab: ASAI				
City: Littleton	State: CO	Zip Code: 80120	Project Manager: Bill Mullins			Lab Contact: Bill Hefley				
Run No.: 2			Test Method: NCASI 8A			Lab Phone No.: 972-492-1400				
Sample I.D.	Date	Time	Absorbing Solution	No. of Containers		Comments	SO_3			
Cont. 1	11-30-06	1804	—	1		Condenser Rinse	X			
Cont. 1A	11-30-06	1814	—	1		Probe Rinse				
Cont. 1B	11-30-06	1807	—	1		Thimble Holder Rinse				
Cont. 1C	11-30-06	1809	—	1		Thimble No. 63				
Cont. 2	11-30-06	1826	~~D.I. H_2O~~ 3% H_2O_2	1		Imps. 1 & 2 & Rinse	X			

Special Instructions: Archive Containers Nos. 1A, 1B, and 1C

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hefley	11-30-06	1826	1. Relinquished By: Bill Hefley	12/3/06	0910
2. Received By: Billy J. Mullins, Jr.	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr	12/5/06	0800
3. Received By: Bill Hefley	12-5-06	0800	3. Relinquished By:		

Comments: Analysis completed @ 1630 12-14-06 SH

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	Project No.	Page	of	Analysis
ADA-ES	06-057	3	3	
Address: 8100 Southpark Way	Unit No.: Hardin SDA Inlet Duct	Lab: ASAI		
City: Littleton; State: CO; Zip Code: 80120	Project Manager: Bill Mullins	Lab Contact: Bill Hefley		
Run No.: 3	Test Method: NCASI 8A	Lab Phone No.: 972-492-1400		

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	SO3				
Cont. 1	12-1-06	1617	—	1	Condenser Rinse	X				
Cont. 1A	12-1-06	1701	—	1	Probe Rinse					
Cont. 1B	12-1-06	1620	—	1	Thimble Holder Rinse					
Cont. 1C	12-1-06	1619	—	1	Thimble No. 44					
Cont. 2	12-1-06	1623	3% H_2O_2	1	Imps 1 & 2 + Rinse	X				

Special Instructions: Archive Cont. Nos. 1A, 1B, and 1C

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hefley	12-1-06	1701	1. Relinquished By: Bill Hefley	12/3/06	0910
2. Received By: Billy J. Mullins, Jr	12/3/06	0910	2. Relinquished By: Billy J. Mullins, Jr.	12/5/06	0800
3. Received By: Bill Hefley	12-5-06	0800	3. Relinquished By:		

Comments: Analysis Completed @ 1630 12-14-06 BH

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AIR SAMPLING ASSOCIATES, INC.

Appendix K:

Resumes of Test Personnel

BILLY J. MULLINS, JR.; President

Education	Post Graduate Study Environmental Engineering at Southern Methodist University; Dallas, Texas 1970. M.S. 1969, New York University; New York, New York, in Civil Engineering (Air Resources). B.S. 1968, Texas Tech University; Lubbock, Texas, in Civil Engineering (Water Resources). Studies in Engineering at the U.S. Naval Academy; Annapolis, Maryland, 1963-1964
Professional Training Courses	Attended Short Course on Air Pollution Engineering at the University of Texas at Austin, February 1970. Attended four-week management course presented by the American Management Association, 1976.
Certification	Registered Professional Engineer Certified Visible Emissions Evaluator Licensed Private Pilot (Multi-Engine-Land, Instrument) Diplomat in the American Academy of Environmental Engineers Inductee into the Stack Sampling Hall of Fame Certified as Qualified Environmental Professional (QEP)
Professional Memberships	**Air & Waste Management Association** – Past Chairman, Past Vice Chairman, and Past Board of Directors of North Texas Chapter and Southwest Section; Past Chairman, Consultants Committee; Past Chairman, Source Measurement Committee **Source Evaluations Society** – Past President, Past Board of Directors **American Management Association**

Publications

Authored "Real World Experience with USEPA's New Sampling and Analytical Methods for Conducting Risk Burn," May 1998.

Co-authored "Sulfur Compound Emissions of the Petroleum Production Industry," December 1974.

Co-authored "Field Procedure for Stabilizing Hydrogen Sulfide Samples to be Analyzed Using Modified Methylene Blue Technique," presented at the Conference on Ambient Air Quality Measurements, Austin, Texas, March 1975.

Co-authored "Atmospheric Emissions Survey of the Sour Gas Industry," October 1975.

Co-authored "Technique for Insuring the Validity of Samples for High Concentrations of Sulfur Dioxide Using the EPA Method 5 Sampling Train," presented at the Third National Conference on Energy and the Environment, College Corner, Ohio, September 1975.

Teaching Experience

Conducted training seminars on sampling methods periodically since 1974 to present.

Conducted a one-day seminar on Part 75 Testing over ten times in 1993 and 1994.

Served as a lecturer in the Environmental Protection Agency's (EPA) training course number 450, "Source Sampling for Particulate Pollutants," for two years from January 1974 to October 1975 and March, 1992.

Conducted a two-day training course entitled "technical Assistance in Source Sampling" at Iowa State University, Ames, Iowa, for the Environmental Protection Agency (EPA), October 1974.

Conducted Environmental Protection Agency's (EPA) training course number 450, "Source Sampling for Particulate Pollutants," at Research Triangle Park, North Carolina, September 1975.

Teaching Experience (Cont'd)

Conducted a two-day short course entitled "Performing and Observing Source Sampling," Dallas, Texas, July 1976, May 1977, October 1977, November 1987 and November 1988; Lake Charles, Louisiana, May 1977; Casper Wyoming, May 1977; Point Comfort, Texas, November 1992.

Served as a lecturer in the Environmental Protection Agency's two-day seminar entitled "Asphalt Industry Environmental Solutions," presented in Dallas, Texas, March 21-22, 1979.

Conducted a two-day short course entitled "Performing and Observing Source Sampling," Phoenix, Arizona, August, 1990, for the State of Arizona, Department of Environmental Quality; Lincoln, Nebraska, March 1980, for the State of Nebraska, Air Quality Control Division.

Technical Experience

Directed and performed stack sampling on over 2000 sources of which over 500 were sampled simultaneously using more than one sampling train at several points in the flue gas stream; 1972-present.

Directed and performed over 200 short-term ambient air studies using mobile sampling vans and various ambient air sampling equipment; 1972-present.

Designed, directed and operated over 20 permanent ambient air networks of various size and duration for a variety of parameters; 1972-present.

Designed surface and underground drainage systems for residential subdivisions, public works projects, and shopping centers; 1969-1972.

Designed several residential subdivisions including lot layout, street design, drainage design, and utility design; 1969-1972.

Research Projects

Supervised and conducted a study made by the Hawaiian Sugar Planters' Association to characterize the emissions for several bagasse-fired boilers, April-May 1976.

Supervised and conducted a study made by the Rio Grande Valley Sugar Growers, Inc. to determine the area affected by the burning of sugarcane fields prior to harvesting, November 1974-April 1975.

Supervised and conducted a study by a lightweight aggregate manufacturer to develop a material balance around the process through sampling and analysis of several parameters, November 1973.

Conducted a study in New York City to attempt to develop a correlation in the ambient air between carbon dioxide and sulfur dioxide to provide a tool for predicting air pollution predicting air pollution episodes, January-May 1969.

Related Projects

Served as Chairman of the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Destin, Florida, 2002, and Santa Barbara, California, 1985.

Served as Co-Chairman of the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Destin, Florida, 2001.

Served as Session Chairman at the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Hershey, Pennsylvania, 1984; San Diego, California, 1993; and in Palm Coast, Florida, 1994.

BILLY L. HEFLEY; Associate

Education	B.S. 1992, East Central University; Ada, Oklahoma, in Environmental Science with a concentration in Environmental Management.
Professional Training	Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, April 1993. Also attended an 8-hour refresher course January 1994, February 1995, January 1996, and May 2004. Attended 8-hour Safe Hazardous Materials Transportation Training Program (HM-126F and HM-181) Dallas, Texas, October 1994. Attended Bill Mullins' Performing and Observing Source Sampling Short Course; Dallas, Texas, January 1995.
Certification	Certified Visible Emissions Evaluator
Professional Memberships	**Air & Waste Management Association** **Source Evaluations Society**
Technical Experience	Participated in the sampling of over 750 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1992-present. Participated in an auditing program for a permanent eight-station sulfur dioxide ambient air network in East Texas, 1992-1993. Participated in a semi-monthly ambient air monitoring survey for organic compounds at a petrochemical facility located in South Texas, 1992-1993. Participated in EPA's Information Collection Request for Mercury conducting more than 46 simultaneous tests for Speciated Mercury using the "Standard Test Method for Elemental, Oxidized, Particle-Bound, and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)." September 1999-May 2000.

Experienced in the analysis of commercial calibration gas cylinders for NO_x, SO_2, CO_2, and O_2.

Experience with calibration techniques for all field testing equipment.

Thoroughly trained in the operation and routine maintenance of the following:

Anarad Model AR50-C Carbon Dioxide Analyzer
Anarad Model AR880 Oxides of Nitrogen Analyzer
Anarad Model AR23 Oxygen Analyzer
Anarad Model AR30C2 Sulfur Dioxide Analyzer
California Analytical Model 300-HFID Total Hydrocarbon Analyzer
Servomex Model 1440 Carbon Dioxide Analyzer
Servomex Model 1440 Oxygen Analyzer
Teledyne Model 326 Oxygen Analyzer
Thermo Environmental Model 10AR & 10S Oxides of Nitrogen Analyzer
Thermo Electron Model 46C Oxides of Nitrogen Analyzer
Thermo Electron Model 48C Oxides of Nitrogen Analyzer
Western Research Model 721A Sulfur Dioxide Analyzer

GARY B. GOLDMAN; Associate

Education	B.S. 1993, University of Texas at Arlington; Arlington, Texas, in Geology.
Certification	Certified Visible Emissions Evaluator
Professional Memberships	**Source Evaluation Society**
Technical Experience	Senior Emissions Evaluator with the Texas Commission on Environmental Quality, responsible for oversight of all source testing activities within the State of Texas, Region 4, which encompasses 19 counties in the North Texas region, 1999-2005. Participated in the sampling of over 750 sources, including several of which were sampled simultaneously utilizing more than one sampling train, 1994-1999. Thoroughly trained in all EPA testing procedures specified in Title 40 of the Code of Federal Regulations, Part 60. Thoroughly trained in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 0010 Through 0100 Series. Participated in EPA's 3-D probe study. May – August 1997. Experienced in the analysis of commercial calibration gas cylinders for NO_x, SO_2, CO_2, and O_2. Experienced with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: Anarad Model AR50-C Carbon Dioxide Analyzer Anarad Model AR880 Oxides of Nitrogen Analyzer Anarad Model AR23 Oxygen Analyzer Anarad Model AR30C2 Sulfur Dioxide Analyzer

California Analytical Model 300-HFID Total Hydrocarbon Analyzer
Servomex Model 1440 Carbon Dioxide Analyzer
Servomex Model 1440 Oxygen Analyzer
Teledyne Model 326 Oxygen Analyzer
Thermo Environmental Model 10AR/S Oxides of Nitrogen Analyzer
Thermo Electron Model 46C Oxides of Nitrogen Analyzer
Thermo Electron Model 48C Oxides of Nitrogen Analyzer
Western Research Model 721A Sulfur Dioxide Analyzer

Professional Training

Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, April 1993.

Attended HAZWOPER 8-hour refresher course, 1994-2005.

Attended the following Environmental Protection Agency (EPA) Courses:

Course 345, Emission Capture and Gas Handling System Inspection
Course 380, Fugitive Source Inspection
Course 400, Introduction to Hazardous Air Pollutants
Course 413, Control of Particulate Emissions
Course 415, Control of Gaseous Emissions
Course 418, Control of Nitrogen Oxide Emissions
Course 427, Combustion Evaluation
Course 444, Air Pollution Field Enforcement
Course 445, Inspection of Particle Control Devices
Course 446, Inspection Safety Procedures
Course 450, Source Sampling for Particulate Pollutants
Course 452, Principles and Practice of Air Pollution Control
Course 455, Inspection of Gas Control Devices and Selected Industries
Course 474, Continuous Emission Monitoring
Course 482, Sources and Control of Volatile Organic Air Pollutants

Attended the following California Air Resources Board (CARB) Courses

Course 221, Continuous Emission Monitoring
Course 233, Solvent Cleaning: Degreasing Operations
Course 242, Hot Mix Asphalt Facilities
Course 245, Cement Plants
Course 270, Incinerators

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PATRICK SELAKOVICH; Associate

Education	B.S.B.A. 1992, University of Arkansas; Fayetteville, Arkansas, in General Business.
Professional Training	Attended 24-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, April 1997. Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) & 'Train the Trainer', Gettysburg, Pennsylvania, July 1998. Also attended an 8-hour refresher course January 2000, January 2001, and May 2004. Attended OSHA General Industry Safety and Health Training, May 1999.
Professional Memberships	**Society For Human Resource Management**
Technical Experience	Participated in the sampling of over 150 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1996-present. Participated in EPA's 3-D probe study. May – August 1997. Experience with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: California Analytical Model 300-HFID Total Hydrocarbon Analyzer Servomex Model 1440 Carbon Dioxide Analyzer Servomex Model 1440 Oxygen Analyzer Thermo Electron Model 46C Oxides of Nitrogen Analyzer Thermo Electron Model 48C Oxides of Nitrogen Analyzer Western Research Model 721A Sulfur Dioxide Analyzer

SCOT JACKSON; Associate

Education	B.S.B.A. May 1978, Mountain View Jr. College, in General Business.
Professional Training	Purchasing Supervisor for METCO Environmental, Inc. in charge of inventory and supplies. January 1995 – April 2005. Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120), Dallas, Texas, May 2000. Attended Fed-Ex Hazardous Goods Shipping Training, June 2004.
Certification	Certified Visible Emissions Evaluator
Technical Experience	Participated in the sampling of over 100 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1995-present. Experience with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: California Analytical Model 300-HFID Total Hydrocarbon Analyzer Servomex Model 1440 Carbon Dioxide Analyzer Servomex Model 1440 Oxygen Analyzer Thermo Electron Model 42C Oxides of Nitrogen Analyzer Thermo Electron Model 48C Oxides of Nitrogen Analyzer Western Research Model 721A Sulfur Dioxide Analyzer

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STACK SAMPLING REPORT
FOR
MERCURY SPECIATION AND HYDROGEN HALIDE & HALOGEN TESTING
ON THE
ROCKY MOUNTAIN POWER
HARDIN POWER PLANT
SDA INLET DUCT AND STACK
HARDIN, MONTANA

PROJECT NO. 07-024

APRIL 2007

PREPARED FOR:
ADA-ES, INC.
8100 SOUTHPARK WAY
LITTLETON, CO 80120

PREPARED BY:
AIR SAMPLING ASSOCIATES, INC.
P.O. BOX 1175
LEWISVILLE, TEXAS 75067

(Total Number of pages including cover: 529)

AIR SAMPLING ASSOCIATES, INC.

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Figure 6: Location of Traverse Points - SDA Inlet Duct A-2
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EXECUTIVE SUMMARY

Air Sampling Associates, Inc. of Lewisville, Texas conducted stack testing at the Rocky Mountain Power, Hardin Power Plant, located in Hardin, Montana. The purpose of the stack testing was to determine the speciated mercury emissions at the SDA Inlet Duct and to determine the speciated mercury emissions and the hydrogen halide and halogen emissions at the Stack. The testing was conducted on April 24 through April 27, 2007.

The sampling team consisted of Mr. Bill Mullins, Mr. Bill Hefley, Mr. Patrick Selakovich, Mr. Scot Jackson, and Mr. Dane Odde. Mr. Mullins was the test team leader.

Mr. Jerry Amrhein of ADA-ES was the project manager.

The procedures set forth in Title 40 of the Code of Federal Regulations, Part 60 (40CFR60), Appendix A, Test Methods 1, 2, 3, 4, 5, 17, 26A, and ASTM D6784-02 (Ontario Hydro) Mercury Speciation Method were followed during the testing.

Triplicate samples for particulate matter collected at the Stack according to EPA Test Method 5, in conjunction with EPA Test Method 26A, indicated an average of 18.34 pounds per hour, based on the 'front half' analysis of the sampling train.

Triplicate samples for speciated mercury collected at the SDA Inlet Duct according to the ASTM D6784-02 (Ontario Hydro) Mercury Speciation Method indicated that the average total mercury was equal to 2.944 lbs/10^{12} Btu. The average total mercury was 22.99% particulate mercury, 13.73% oxidized mercury, and 63.28% elemental mercury. Samples for particulate matter collected using the optional test procedures in the ASTM D6784-02 (Ontario Hydro) Mercury Speciation Method indicated an average of 9184.01 pounds per hour, based on the analysis of the 'front half' of the sampling trains.

Triplicate samples for hydrogen halides & halogens collected at the Stack indicated an average concentration of hydrogen bromide and an average concentration of bromine that were below the detectable limit of the sampling procedure. The sampling results indicated an average concentration of hydrogen chloride that was below the detectable limit of the sampling procedure and an average concentration of chlorine that was below the detectable limit of the sampling procedure. The sampling results indicated an average concentration of hydrogen fluoride and an average concentration of fluoride that were below the detectable limit of the sampling procedure. Samples for particulate matter collected using the optional test procedures in EPA Test Method 26A indicated an average of 18.34 pounds per hour, based on the analysis of the 'front half' of the sampling trains.

Triplicate samples for speciated mercury collected at the Stack according to the ASTM D6784-02 (Ontario Hydro) Mercury Speciation Method indicated that the average total mercury was equal to 3.926 lbs/10^{12} Btu. The average total mercury was 79.66% elemental mercury. Samples for particulate matter collected using the optional test procedures in the ASTM D6784-02 (Ontario Hydro) Mercury Speciation Method indicated an average of 28.29 pounds per hour, based on the analysis of the 'front half' of the sampling trains.

Billy J. Mullins, Jr. P.E., Q.E.P., D.E.E.

SUMMARY OF RESULTS

Table 1: Summary of Sampling Results

Sampling Trains - Parameters	SDA Inlet Duct Average	Stack Average
EPA 5 / 26A		
- Moisture (%)	--	**14.74**
- Flow Rate (DSCFM)	--	**295,494**
- Particulate Matter (lbs/hr – front half)	--	**18.34**
- Chlorine (mg/dscm)	--	**<0.779**
EPA 5 / 17 / ASTM D6784-02		
- Moisture (%)	**10.85**	**15.21**
- Flow Rate (DSCFM)	**305,317**	**310,113**
- Particulate Matter (lbs/hr – front half)	**9,184.01**	**28.29**
- Total Mercury (lbs/10^{12} Btu)	**2.944**	**3.926**

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 2: SDA Inlet Duct Particulate Matter and Speciated Mercury

Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	04/26/07	04/26/07	04/26/07	-----
Test Time	1020-1302	1445-1657	1810-2012	-----
*Flow Rate – DSCFM**	295,561	309,321	311,069	305,317
Stack Temp. - °F	320	324	325	323
O_2 - %Vol. (dry)	6.5	6.6	6.6	6.6
CO_2 - %Vol. (dry)	12.8	12.7	12.7	12.7
Percent Excess Air	43.7	44.6	44.6	44.3
Moisture Content - %	11.13	10.85	10.56	10.85
Percent Isokinetic	96.2	96.2	96.1	96.2
Sample Volume – DSCM	1.392	1.456	1.433	1.427
Particulate Matter				
– gr/dscf (Front Half)	4.0495	3.1221	3.3829	3.518
– lbs/hr (Front Half)	10,257.30	8,276.37	9,018.37	9,184.01
Particle Bound Mercury				
– µg	1.3000	0.9700	0.9800	1.0833
– µg/dscm	0.9339	0.6662	0.6839	0.7613
*– lbs/10^{12} Btu***	0.828	0.595	0.610	0.678
Oxidized Mercury				
– µg	0.6500	0.5700	0.7200	0.6467
– µg/dscm	0.4670	0.3915	0.5024	0.4536
*– lbs/10^{12} Btu***	0.414	0.349	0.449	0.404
Elemental Mercury				
– µg	2.7300	3.2600	2.9700	2.9867
– µg/dscm	1.9612	2.2390	2.0726	2.0909
*– lbs/10^{12} Btu***	1.738	1.999	1.850	1.862
Total Mercury				
– µg	4.6800	4.8000	4.6700	4.7167
– µg/dscm	3.3621	3.2967	3.2589	3.3059
*– lbs/10^{12} Btu***	2.980	2.943	2.909	2.944

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

** Calculated using an F_d Factor of 9,780

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 3: Stack Particulate Matter and Hydrogen Halides & Halogens

Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	04/27/07	04/27/07	04/27/07	-----
Test Time	0900-1017	1110-1227	1407-1523	-----
*Flow Rate – DSCFM**	306,890	279,393	300,200	295,494
Stack Temp. - °F	223	220	228	224
O_2 - %Vol. (dry)	6.6	6.7	6.7	6.7
CO_2 - %Vol. (dry)	12.7	12.6	12.6	12.6
Percent Excess Air	44.6	45.6	45.6	45.3
Moisture Content - %	15.16	14.63	14.43	14.74
Percent Isokinetic	101.0	98.6	99.0	99.5
Sample Volume – DSCM	1.252	1.113	1.200	1.188
Particulate Matter				
– gr/dscf (Front Half)	0.0086	0.0056	0.0074	0.0072
– lbs/hr (Front Half)	22.53	13.41	19.07	18.34
Hydrogen Bromide				
– mg	<0.496	<0.425	<0.481	<0.467
– mg/dscm	<0.396	<0.382	<0.401	<0.393
Bromine				
– mg	<0.275	<0.250	<0.290	<0.272
– mg/dscm	<0.220	<0.225	<0.242	<0.229
Hydrogen Chloride				
– mg	<1.010	<0.864	<0.977	<0.950
– mg/dscm	<0.807	<0.776	<0.814	<0.799
Chlorine				
– mg	<0.550	<0.500	1.740	<0.930
– mg/dscm	<0.439	<0.449	1.450	<0.779
Hydrogen Fluoride				
– mg	<0.516	<0.442	<0.500	<0.486
– mg/dscm	<0.412	<0.397	<0.417	<0.409
Fluorine				
– mg	<0.290	<0.263	<0.305	<0.286
– mg/dscm	<0.232	<0.236	<0.254	<0.241

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 4: Stack Particulate Matter and Speciated Mercury

Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	04/26/07	04/26/07	04/26/07	-----
Test Time	1020-1305	1445-1650	1810-2015	-----
*Flow Rate – DSCFM**	304,308	310,931	315,099	310,113
Stack Temp. - °F	214	215	216	215
O_2 - %Vol. (dry)	6.8	6.9	6.8	6.8
CO_2 - %Vol. (dry)	12.7	12.6	12.7	12.7
Percent Excess Air	46.8	47.8	46.8	47.1
Moisture Content - %	15.19	15.38	15.06	15.21
Percent Isokinetic	98.5	97.4	98.0	98.0
Sample Volume – DSCM	2.018	2.040	2.079	2.046
Particulate Matter				
– gr/dscf (Front Half)	0.0094	0.0071	0.0154	0.0106
– lbs/hr (Front Half)	24.57	18.85	41.46	28.29
Particle Bound Mercury				
- µg	0.0110	0.0580	0.0290	0.0327
- µg/dscm	0.0055	0.0284	0.0139	0.0159
*- lbs/10^{12} Btu***	0.005	0.026	0.013	0.014
Oxidized Mercury				
- µg	1.8000	1.800	1.7000	1.7667
- µg/dscm	0.8920	0.8824	0.8177	0.8640
*- lbs/10^{12} Btu***	0.807	0.804	0.740	0.784
Elemental Mercury				
- µg	6.8500	7.4900	6.8100	7.0500
- µg/dscm	3.3944	3.6716	3.2756	3.4472
*- lbs/10^{12} Btu***	3.072	3.347	2.965	3.128
Total Mercury				
- µg	8.6610	9.3480	8.539	8.8493
- µg/dscm	4.2919	4.5824	4.1072	4.3272
*- lbs/10^{12} Btu***	3.884	4.177	3.718	3.926

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

** Calculated using an F_d Factor of 9,780

DISCUSSION OF SAMPLING RESULTS

SDA Inlet Duct

Particulate Matter and Speciated Mercury

The three tests for particulate matter and speciated mercury taken at the SDA Inlet Duct appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the sampling train and the pitot tubes indicated no leaks before or after each test. The indicative parameters calculated from the field data were in reasonable agreement. The measured moisture contents for the three runs were within 2.6% of the mean value. The measured flow rates (DSCFM) for the tests were within 3.2% of the mean value. The rates of sampling for the three tests were within the specified limits (90 to 110 percent isokinetic). The greatest deviation from 100% isokinetic was 3.9%.

The concentrations (gr/dscf – Front Half) of particulate matter for the three tests showed a range of -11.26 percent to +15.10 percent variation from the mean value of 3.518 gr/dscf – front half.

The calculated emissions (lbs/10^{12} Btu) of total mercury for the three tests showed a range of -1.19% to +1.22% deviation from the mean value of 2.944 lbs/10^{12} Btu.

Stack

Particulate Matter and Hydrogen Halides & Halogens

The three tests for particulate matter and hydrogen halides & halogens taken at the Stack appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train and pitot tubes showed no leaks before or after testing. The indicative parameters of the tests were in close agreement. The measured moisture contents (%M) were within 2.8% of the mean value. The measured flow rates (DSCFM) were within 5.4% of the mean value. The rates of sampling for the tests were within the specified limits (90% to 110% isokinetic). The greatest deviation from 100% isokinetic was 1.4%.

The concentrations (gr/dscf – Front Half) of particulate matter for the three tests showed a range of -22.2 percent to +19.4 percent deviation from the mean value of 0.0072 gr/dscf – front half. The large variation is due the lower emissions during the second test when a coal mill was stopped.

The concentrations (mg/dscm) of hydrogen bromide and bromine for the three tests were below the minimum reporting limit of the reference method.

The concentrations (mg/dscm) of hydrogen chloride and chlorine for the three tests were below the minimum reporting limit of the reference method. A small amount of chlorine was detected during the third test that was approximately three times the minimum reporting limit of the reference method.

The concentrations (mg/dscm) of hydrogen fluoride and fluorine for the three tests were below the minimum reporting limit of the reference method.

Particulate Matter and Speciated Mercury

The three tests for particulate matter and speciated mercury on the Stack appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the sampling train and the pitot tubes indicated no leaks before or after each test. The indicative parameters calculated from the field data were in reasonable agreement. The measured moisture contents for the three runs were within 1.1% of the mean value. The measured flow rates (DSCFM) for the tests were within 1.9% of the mean value. The rates of sampling for the three tests were within the specified limits (90 to 110 percent isokinetic). The greatest deviation from 100% isokinetic was 2.6%.

The concentrations (gr/dscf – Front Half) of particulate matter for the three tests showed a range of -33.2 percent to +44.8 percent variation from the mean value of 0.0106 gr/dscf – front half. The large variation is due to significantly higher emissions during the third test.

The calculated emissions (lbs/10^{12} Btu) of total mercury for the three tests showed a range of -5.31% to +6.38% deviation from the mean value of 3.926 lbs/10^{12} Btu.

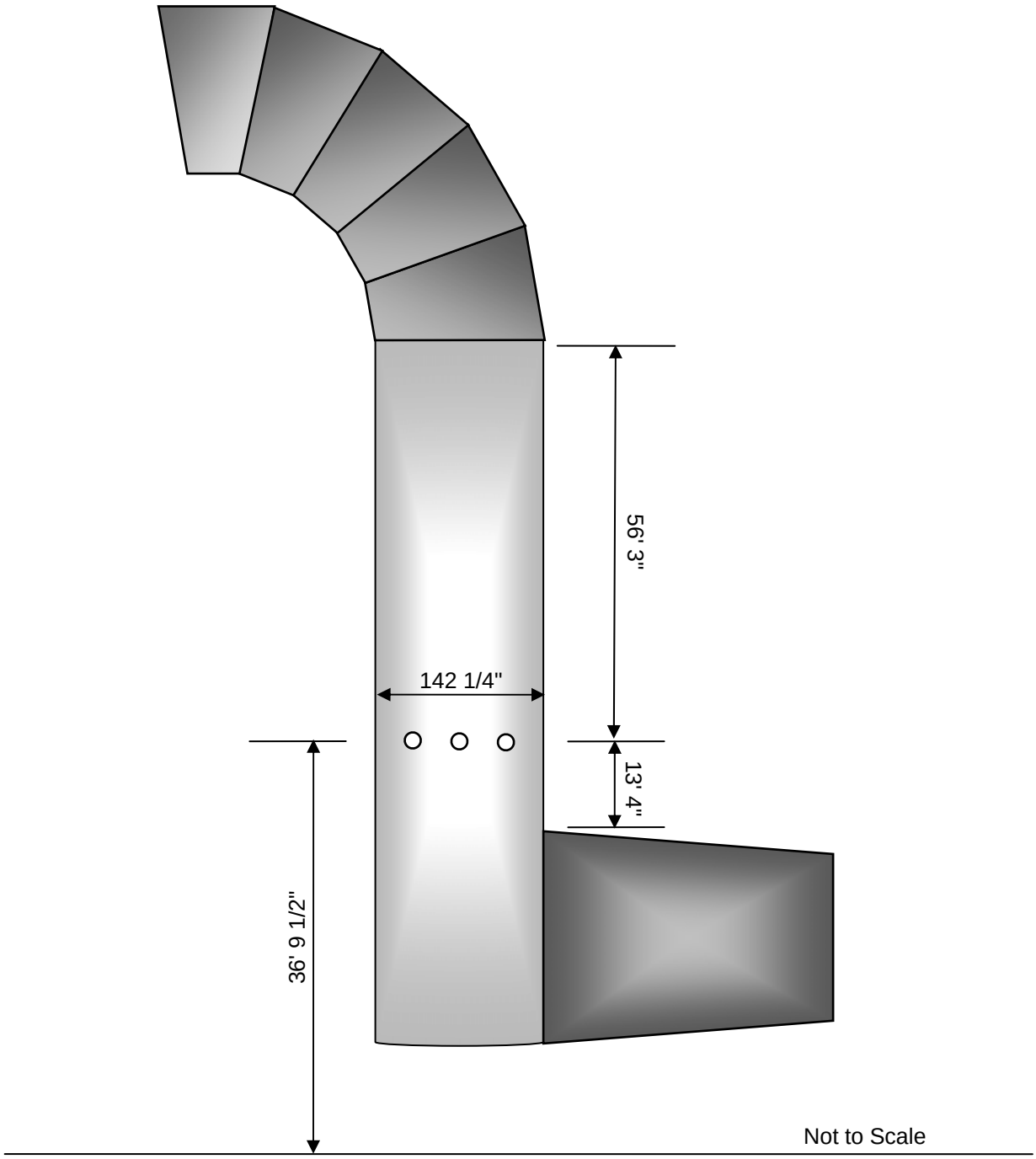
DESCRIPTION OF SAMPLING LOCATIONS

The sampling ports on the SDA Inlet Duct are approximately 36 feet 9 1/2 inches above the ground. The sampling ports are located 13 feet 4 inches (1.12 equivalent duct diameters) downstream from a bend in the duct and 56 feet 3 inches (4.75 equivalent duct diameters) upstream from a bend in the duct.

The sampling ports on the Stack are approximately 123 feet 1 1/2 inches above the ground. The sampling ports are located 33 feet 1 1/2 inches (3.64 stack diameters) downstream from a constriction in the stack and > 18 feet 2 3/8 inches (> 2.00 stack diameters) upstream from the outlet to the stack.

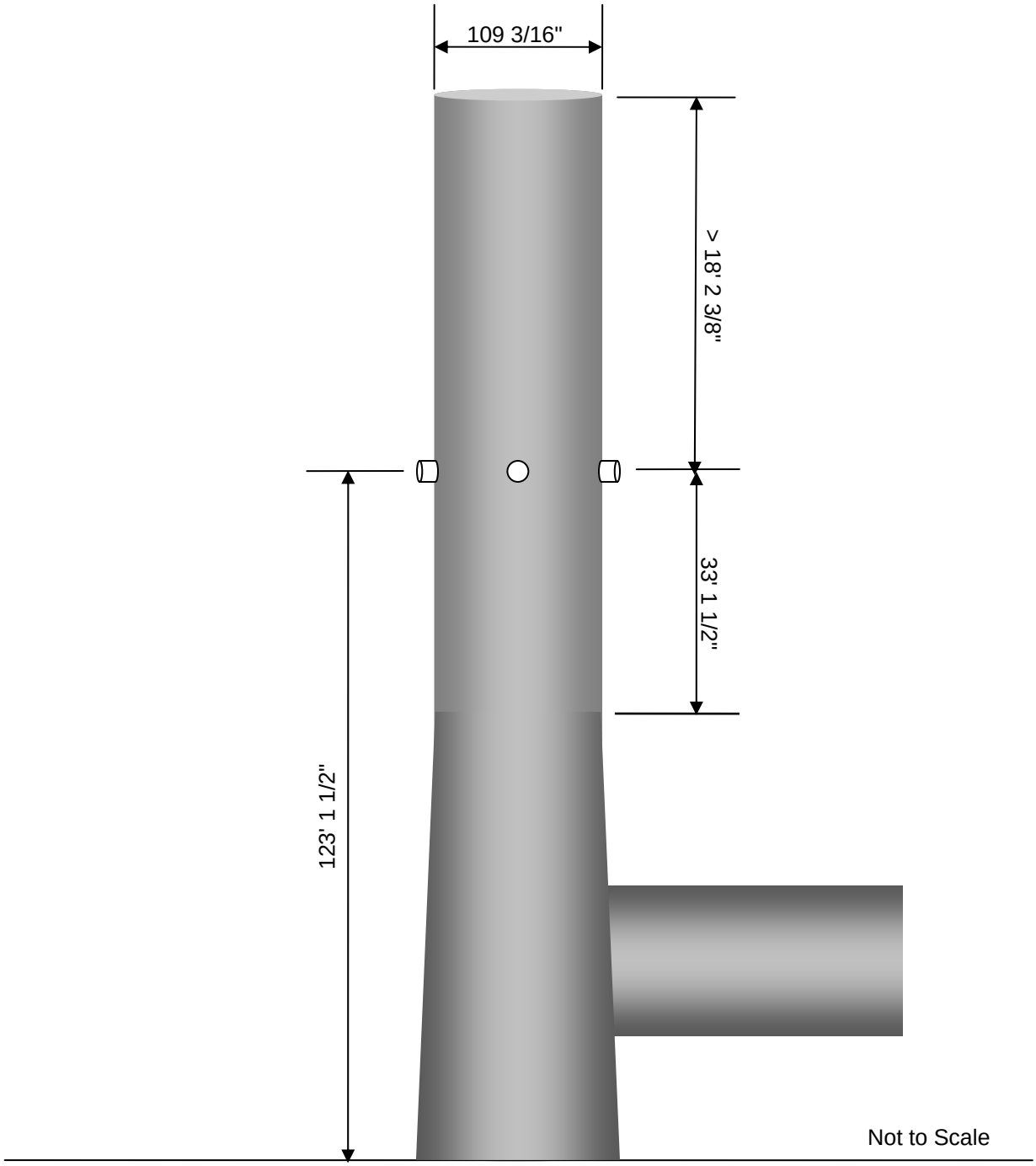
SAMPLING LOCATION

Figure 1: SDA Inlet Duct



SAMPLING LOCATION

Figure 2: Stack



SAMPLING AND ANALYTICAL PROCEDURES

The procedures set forth in 40CFR60, Appendix A, Test Methods 1, 2, 3, 4, 5, 17, 26A, and ASTM D6784-02 (Ontario Hydro) Mercury Speciation Test Method were followed during testing.

Four Traverse points were sampled from three ports on the SDA Inlet Duct for a total of twelve traverse points. All traverse points were checked for cyclonic flow and the average angle was equal to 2.4 degrees. The pitot tube lines were checked for leaks before and after each test under a vacuum and a pressure. The lines were also checked for clearance and the manometer was zeroed before each test.

Twelve traverse points were sampled from two ports on the Stack for a total of twenty-four traverse points. All traverse points were checked for cyclonic flow and the average angle was equal to 6.0 degrees. The pitot tube lines were checked for leaks before and after each test under a vacuum and a pressure. The lines were also checked for clearance and the manometer was zeroed before each test.

Particulate Matter and Hydrogen Halides & Halogens

Particulate matter and hydrogen halides & halogens samples were taken at the Stack sampling location according to EPA Test Methods 1, 2, 3, 4, 5, and 26A. For each run at the Stack, samples of three minute duration were taken at each of twenty-four traverse points for a total test time of 72 minutes. Data was recorded at three minute intervals.

The sampling train was leak checked at the end of the sampling probe at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest

vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The 'front half' of the sampling train at the Stack contained the following components:

Glass nozzle
Heated glass lined probe @ 248°F ± 25°F
Heated fiberglass filter @ 248°F ± 25°F
Heated Teflon line @ 248°F ± 25°F

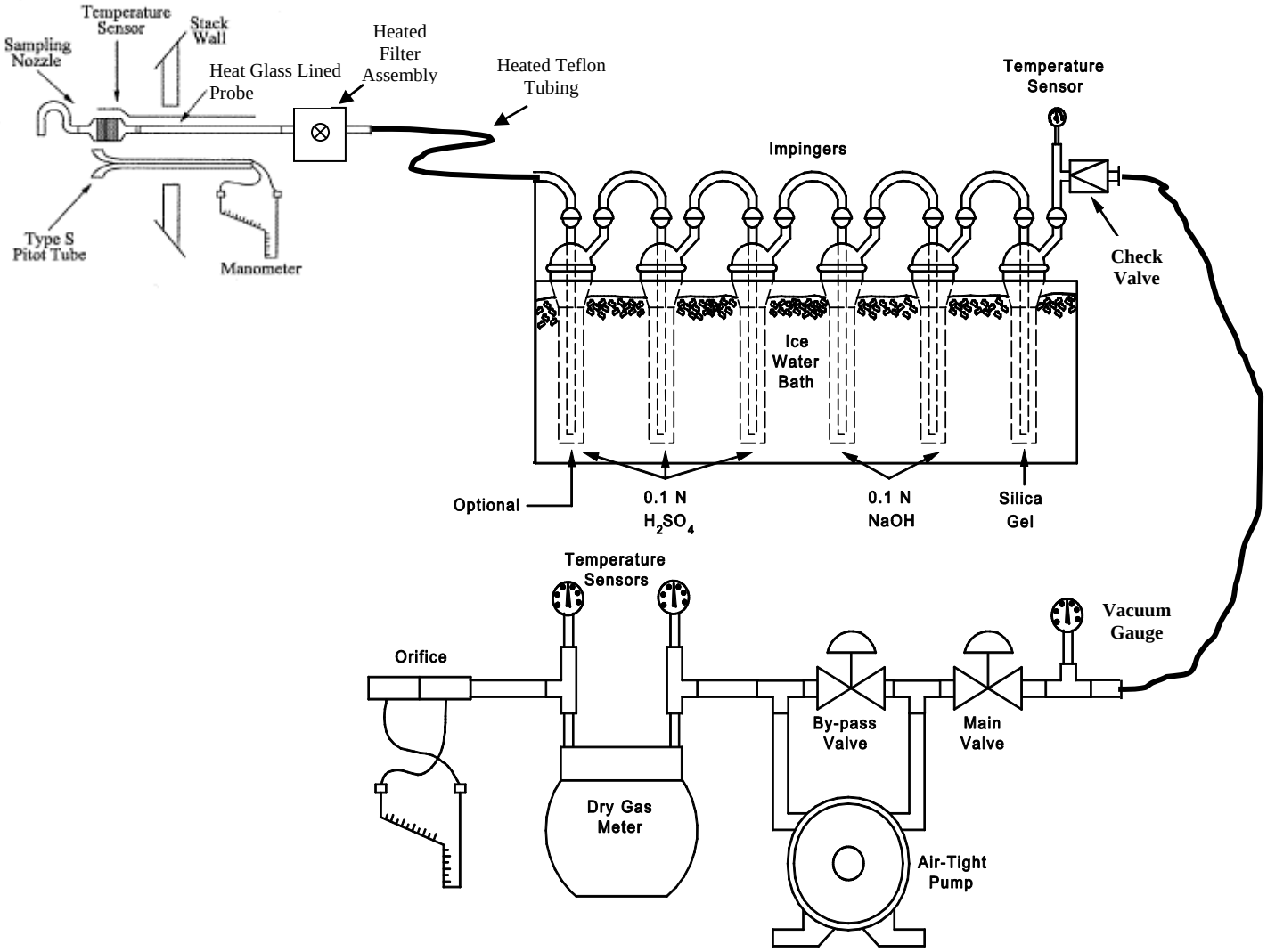
The 'back half' of the sampling train at the Stack sampling location contained the following components:

Table 5: EPA Test Method 26A Condenser/Absorbing System

Impinger No.	Impinger Type	Absorbing Solution
1	Greenburg-Smith	100 ml 0.1N H_2SO_4
2	Greenburg-Smith	100 ml 0.1N H_2SO_4
3	Modified	100 ml 0.1N NaOH
4	Modified	100 ml 0.1N NaOH
5	Modified	~200 g silica gel

Integrated Orsat samples were collected during each test. The samples were analyzed according to EPA Method 3 to determine the stack gas molecular weight.

Figure 3: EPA Test Methods 5 and 26A Stack Sampling Train



Particulate Matter and Speciated Mercury

Speciated mercury and particulate matter samples were taken at the SDA Inlet Duct and at the Stack sampling locations according to EPA Test Methods 1, 2, 3, 4, 5, and 17; and ASTM D6784-02 (Ontario Hydro) Mercury Speciation Test Method. For each run at the SDA Inlet Duct, samples of ten minute duration were taken at each of twelve traverse points for a total test time of 120 minutes. Data was recorded at five minute intervals. For each run at the Stack, samples of five minute duration were taken at each of twenty-four traverse points for a total test time of 120 minutes. Data was recorded at five minute intervals.

The sampling trains were leak checked at the end of the sampling probeS at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The ‘front half’ of the sampling train at the SDA Inlet Duct contained the following components:

Glass nozzle
Fiberglass Thimble
Heated glass lined probe @ 248°F ± 25°F
Heated glass back-up filter @ 248°F ± 25°F

The ‘front half’ of the sampling train at the Stack contained the following components:

Glass nozzle
Heated glass lined probe @ 248°F ± 25°F
Heated fiberglass filter @ 248°F ± 25°F
Heated Teflon line @ 248°F ± 25°F

The ‘back half’ of the sampling trains, contained the following components:

Table 6: ASTM D6784-02 (Ontario Hydro) Speciated Mercury Test Method Condenser/Absorbing System

Impinger No.	Impinger Type	Absorbing Solution
1	Modified	100 ml 1 N KCl
2	Modified	100 ml 1 N KCl
3	Greenburg-Smith	100 ml 1 N KCl
4	Modified	100 ml 5% $^{v}/_{v}$ HNO_3, 10% $^{v}/_{v}$ H_2O_2
5	Modified	100 ml 4% $^{w}/_{v}$ H_2SO_4, 10% $^{v}/_{v}$ KM_nO_4
6	Modified	100 ml 4% $^{w}/_{v}$ H_2SO_4, 10% $^{v}/_{v}$ KM_nO_4
7	Greenburg-Smith	100 ml 4% $^{w}/_{v}$ H_2SO_4, 10% $^{v}/_{v}$ KM_nO_4
8	Modified	~200 g silica gel

Integrated Orsat samples were collected at each sampling location during each test. The samples were analyzed according to EPA Method 3 to determine the stack gas molecular weight.

Figure 4: ASTM D6784-02 (Ontario Hydro) Mercury Speciation Test Method Sampling Train - SDA Inlet Duct

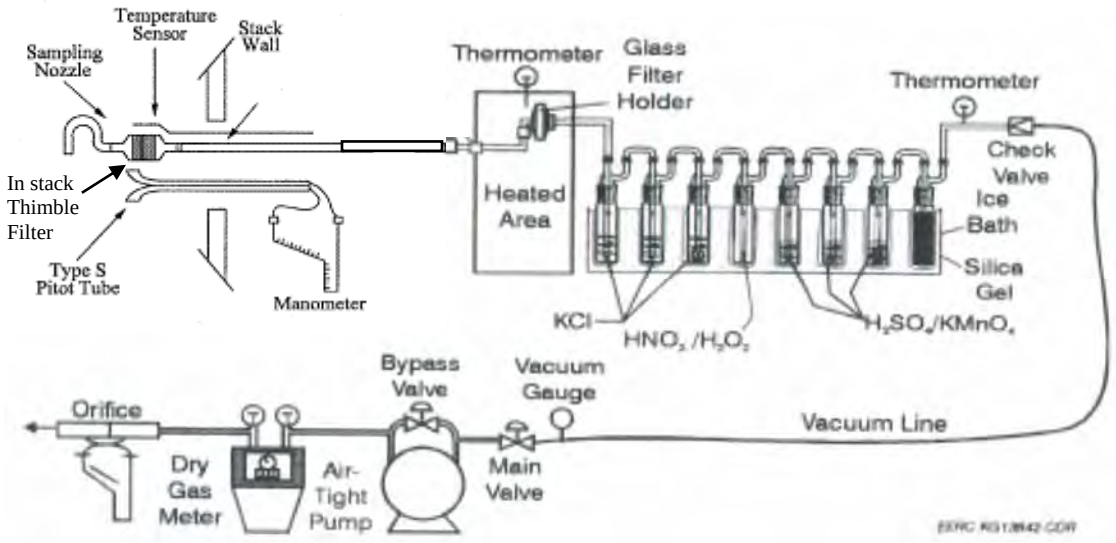
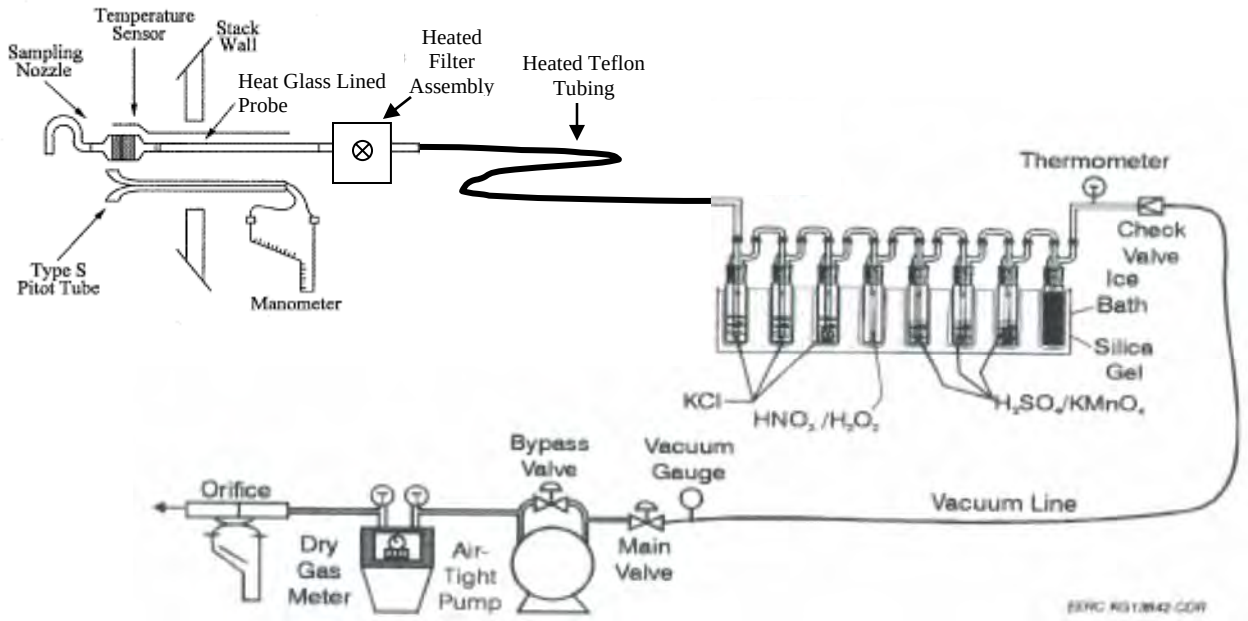


Figure 5: ASTM D6784-02 (Ontario Hydro) Mercury Speciation Test Method Sampling Train - Stack



TEST NARRATIVE

Personnel from Air Sampling Associates, Inc. arrived at the Rocky Mountain Power, Hardin Power Plant, located in Hardin, Montana at 8:00 a.m. on Tuesday, April 24, 2007. The sampling trailer was placed into position and electrical power was established. The sampling equipment was moved onto the SDA Inlet Duct and the Stack before securing the equipment for the night at 5:00 p.m.

On Wednesday, April 25, 2007, personnel returned to the plant at 8:00 a.m. More sampling equipment was moved onto the SDA Inlet Duct and the sample recovery area was established. Personnel prepared for the next day's testing before departing the plant at 11:30 a.m.

On Thursday, April 26, 2007, personnel returned to the plant at 6:45 a.m. The sampling equipment was prepared for testing and the first simultaneous test on the Stack and on the SDA Inlet Duct for mercury speciation began at 10:20 a.m. The test continued until 11:41 a.m. when the test was stopped due to plant operational problems. The first test resumed at 12:20 p.m. and continued until its completion at 1:05 p.m. The second simultaneous test for speciated mercury was taken from 2:45 p.m. until 4:57 p.m. The third simultaneous test for speciated mercury was taken from 6:10 p.m. until 8:15 p.m. The samples were recovered and the sampling equipment was moved off of the SDA Inlet Duct before personnel departed the plant at 11:00 p.m.

On Friday, April 27, 2007, personnel returned to the plant at 7:00 a.m. The sampling equipment was prepared for testing and the first test on the Stack using EPA Method 26A began at 9:00 a.m. Testing continued until the completion of the third test at 3:23 p.m.

The sampling equipment was moved off of the Stack and loaded into the sampling trailer. The samples were taken to Air Sampling Associates, Inc.'s office in Lewisville, Texas for analysis and shipment to the subcontracted laboratories.

Operations at the Rocky Mountain Power, Hardin Power Plant, SDA Inlet Duct and Stack, located in Hardin, Montana, were completed at 5:30 p.m. on Friday, April 27, 2007.

APPENDICES

Appendix A:	**Location of Traverse Points**
Appendix B:	**Nomenclature and Equations for Calculation of Source Emissions**
Appendix C:	**Calibration Data**
Appendix D:	**Field Data**
Appendix E:	**EPA Test Methods 5 and 26A (Particulate Matter and Hydrogen Halides & Halogens) Analytical Data – Stack**
Appendix F:	**EPA Test Methods 5, 17 (Particulate Matter), and ASTM D6784-02 (Ontario Hydro) Mercury Speciation Test Method Analytical Data**
Appendix G:	**Chain of Custodies**
Appendix H:	**Resumes of Test Personnel**

AIR SAMPLING ASSOCIATES, INC.

Appendix A:

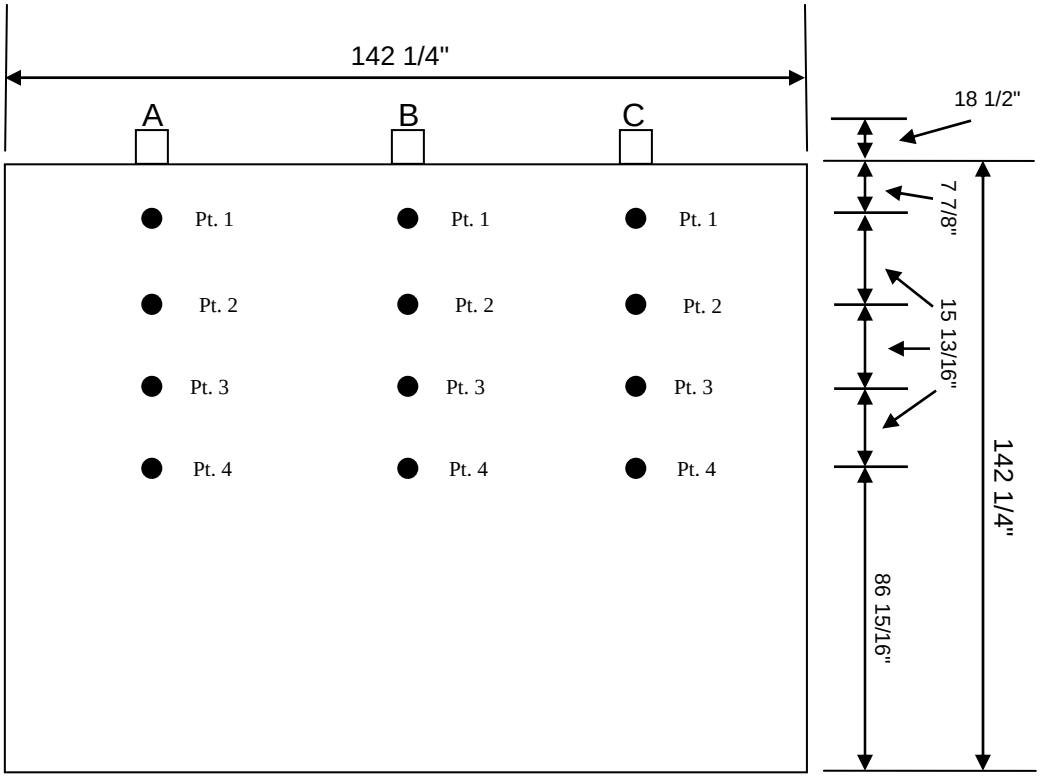
Location of Traverse Points

Appendix A

Location of Traverse Points SDA Inlet Duct

The sampling ports are located 13 feet 4 inches (1.12 equivalent duct diameters) downstream from a bend in the bend in the duct and 56 feet 3 inches (4.75 equivalent duct diameters) upstream from a bend in the duct. The locations of the traverse points were calculated as follows:

Figure 6: Location of Traverse Points - SDA Inlet Duct



Note: Physical limitations prevented the complete traversing of the SDA Inlet Duct.

Appendix A

Location of Traverse Points Stack

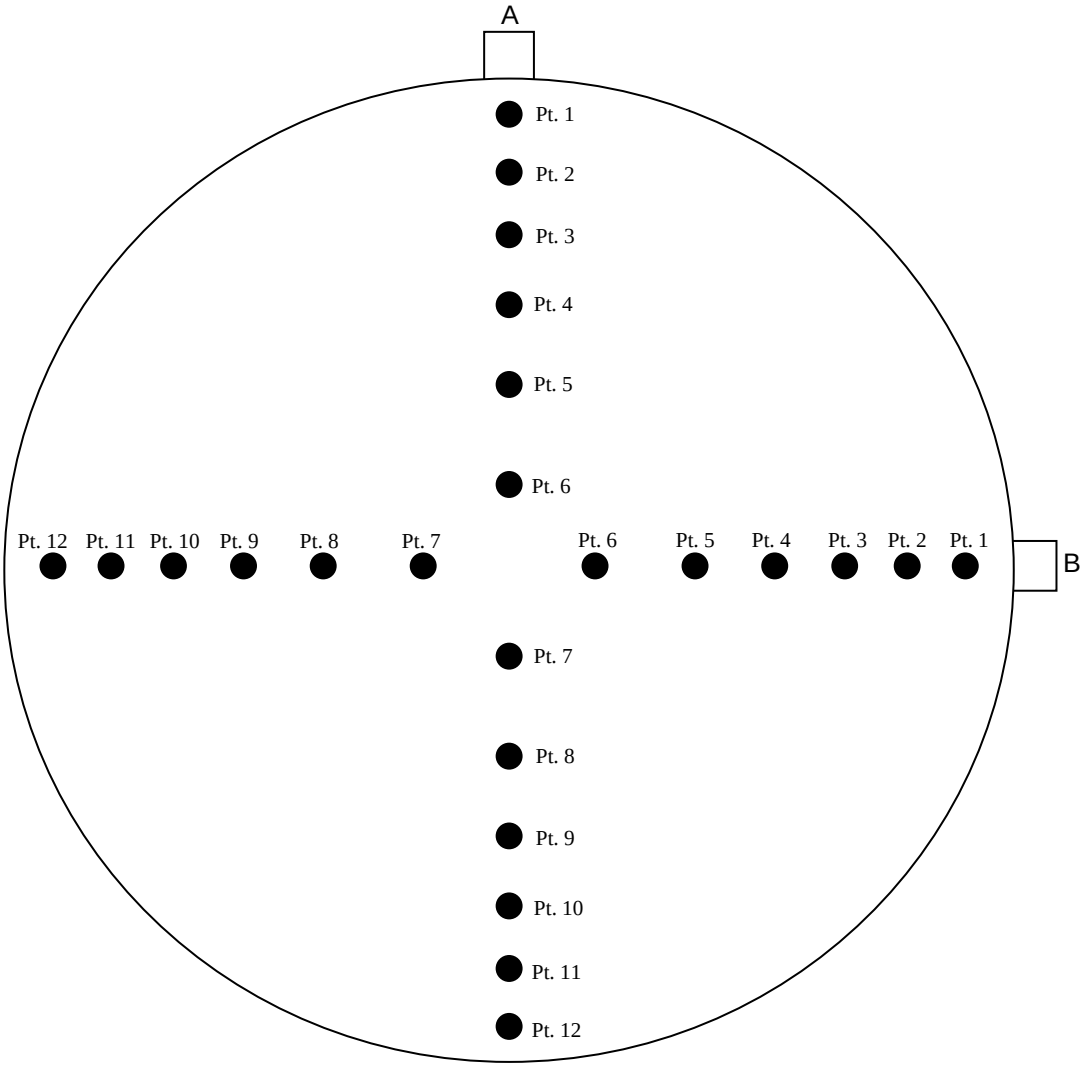
The sampling ports are located 33 feet 1 1/2 inches (3.64 stack diameters) downstream from a constriction in the stack and > 18 feet 2 3/8 inches (> 2.00 stack diameters) upstream from the outlet to the stack. The locations of the traverse points were calculated as follows:

Table 7: Location of Traverse Points - Stack

Port & Wall Thickness = 15 1/8 inches		
Inside Stack Diameter = 109 3/16 inches		
Point Number	**Percent of Stack Diameter**	**Distance from Wall**
1	2.1	2 5/16"
2	6.7	7 5/16"
3	11.8	12 7/8"
4	17.7	19 5/16"
5	25.0	27 5/16"
6	35.6	38 7/8"
7	64.4	70 5/16"
8	75.0	81 7/8"
9	82.3	89 7/8"
10	88.2	96 5/16"
11	93.3	101 7/8"
12	97.9	106 7/8"

Appendix A

Figure 7: Location of Traverse Points - Stack



Not to scale.

AIR SAMPLING ASSOCIATES, INC.

Appendix B:

Nomenclature and Equations for Calculation of Source Emissions

AIR SAMPLING ASSOCIATES, INC.

Nomenclature For Flow Rate and Moisture Calculations

Symbol	English Units	Metric Units	Description
A_s	in.^{2}	m^2	Stack Area
C_{an}	gr/dscf*	g/dscm*	Particulate – probe, cyclone, and filter
C_{ao}	gr/dscf*	g/dscm*	Particulate –total
C_{at}	gr/CF @ stack conditions	g/m3	Particulate – probe, cyclone, and filter
C_{au}	gr/CF @ stack conditions	g/m3	Particulate – total
C_{aw}	lbs/hr	kg/hr	Particulate – probe, cyclone, and filter
C_{ax}	lbs/hr	kg/hr	Particulate - total
C_p			Pitot Tube Calibration Factor
D_n	in.	m	Sampling Nozzle Diameter
%EA			Percent Excess Air at Sampling Point
g	32.2 ft/sec^2		Acceleration of gravity
%I			Percent Isokinetic
%M			Percent Moisture in the Stack Gas by Volume
M_d			Mole Fraction of Dry Gas
m_f	mg	mg	Particulate – probe, cyclone, and filter
mt	mg	mg	Particulate -total
M_{water}	18 lb/lb-mole		Molecular Weight of Water
MW	lb/lb-mole	g/g-mole	Molecular Weight of Stack Gas
MW_{air}	28.84 lb/lb-mole		Molecular Weight of Air
MW_d	lb/lb-mole	g/g-mole	Molecular Weight of Dry Stack Gas

Symbol	English Units	Metric Units	Description
P_b	"Hg Absolute	mm Hg	Barometric Pressure
P_m	"H_2O	mm H_2O	Orifice Pressure drop
Ps	"Hg Absolute	mm Hg	Stack Pressure
ΔP	"H_2O	mm H_2O	Velocity Head of Stack Gas
P_{std}	29.92" Hg	760 mm Hg	Standard Barometric Pressure
Q_a	ACFM	m^3/hr	Stack Gas Volume at Actual Stack Conditions
Q_s	DSCFM*	dscm/hr*	Stack Gas Volume at 29.92" Hg, 528° R, dry
R	21.83" Hg-ft^3/lb-mole °R		Universal Gas Constant
T_m	°F	°C	Average Gas Meter Temperature
T_t	min	min	Net Time of Test
T_s	°F	°C	Stack Temperature
T_{std}	528 °R	293 °K	Standard Temperature
V_m	ft^3	m^3	Volume of Dry Gas Sampled @ Meter Conditions
Vm_{std}	dscf*	dscm*	Volume of Dry Gas Sampled @ Standard Conditions
V_s	fpm	m/sec	Stack Velocity @ Stack Conditions
V_w	ml	ml	Total Water Collected in Impingers and Silica Gel
Vw_{gas}	scf*	scm*	Volume of Water Vapor Collected @ Standard Conditions

Symbol	English Units	Metric Units	Description
ρ_{air}	0.0748 lbs/ft^3		Density of Air
ρ_{water}	1 g/ml		Density of Water
ρ_{man}	62.32 lbs/ft^3		Density of Manometer Oil (Inches of Water)

Standard Conditions: 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

EXAMPLE CALCULATIONS

1. Volume of dry gas sampled at standard conditions. *

$$V_{m_{std}} = V_m \left(\frac{T_{std}}{T_m + 460} \right) \left[\frac{P_b + \frac{P_m}{13.6}}{P_{std}} \right]$$

$$V_{m_{std}} = 17.65\ V_m \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460} \right] = \text{dscf}$$

$$V_{m_{std}} = \text{dscf} \times 0.028317 = \text{dscm}$$

2. Volume of water vapor collected at standard conditions. *

$$V_{w_{gas}} = \frac{(V_w - gms\ SO_2 - gms\ H_2S)\ \rho_{water}\ RT_{std}}{P_{std}\ M_{water}\ 453.6}$$

$$V_{w_{gas}} = 0.0472\ (V_w - gms\ SO_2 - gms\ H_2S) = scf$$

$$V_{w_{gas}} = scf \times 0.028317 = scm$$

3. Percent moisture in stack gas.

$$\%M = \frac{V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} \times 100 = \%$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

4. Mole fraction of dry gas.

$$M_d = \frac{100 - \%M}{100}$$

5. Average molecular weight of dry stack gas.

$$MW_d = \left[\%CO_2 \times \frac{44}{100}\right] + \left[\%O_2 \times \frac{32}{100}\right] + \left[\%N_2 \times \frac{28}{100}\right] + \left[\%CO \times \frac{28}{100}\right] = lb/lb\text{-}mole$$

$$= g/g\text{-}mole$$

6. Molecular weight of stack gas.

$$MW = MW_d \times M_d + 18\,(1 - M_d) = \frac{lb}{lb\text{-}mole} = g/g\text{-}mole$$

7. Percent excess air at sampling point.

$$\%EA = \frac{100\,[\%O_2 - (0.5\,\%CO)]}{0.265\,(\%N_2) - [\%O_2 - (0.5\,\%CO)]}$$

8. Stack Pressure.

$$P_s = P_b + \frac{Stack\ Pressure\ "H_2O}{13.6} = "Hg\ Absolute$$

$$P_s = "Hg\ Abs. \times 25.4 = mm\ Hg$$

9. Stack velocity at stack conditions.

$$V_s = C_p\,60\left[\frac{2g \times \rho_{man} \times P_{std} \times MW_{air} \times (T_s + 460) \times \Delta P}{12 \times \rho_{air} \times P_s \times MW \times T_{std}}\right]^{1/2}$$

$$V_s = 5{,}123.8\,C_p\left[\frac{(T_s + 460)}{P_s \times MW}\right]^{1/2} \sqrt{\Delta P}\ \text{average} = \text{fpm}$$

$$V_s = \text{fpm} \times 0.00508 = \text{m/sec}$$

10. Dry stack gas volume at standard conditions. *

$$Q_s = \frac{1}{144} V_s \text{ x } A_s \text{ x } M_d \text{ x } \frac{T_{std}}{T_s + 460} \text{ x } \frac{P_s}{P_{std}}$$

$$Q_s = \frac{0.123\, V_s \text{ x } A_s \text{ x } M_d \text{ x } P_s}{T_s + 460} = DSCFM$$

$$Q_s = DSCFM \text{ x } 1.6990 = dscm/hr$$

11. Actual stack gas volume at stack conditions.

$$Q_a = \frac{V_s \text{ x } A_s}{144} = ACFM$$

$$Q_a = ACFM \text{ x } 1.6990 = m^3/hr$$

12. Percent Isokinetic

$$\%I = \frac{V_{mstd} \text{ x } (T_s + 460) \text{ x } P_{std} \text{ x } 100 \text{ x } 144\, in.^2/ft^2}{M_d \text{ x } T_{std} \text{ x } P_s \text{ x } T_t \text{ x } V_s \left(\frac{\Pi \text{ x } D_n^2}{4} \right)}$$

$$\%I = \frac{1039 \text{ x } V_{mstd} \text{ x } (T_s + 460)}{M_d \text{ x } P_s \text{ x } T_t \text{ x } V_s \text{ x } D_n^2}$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

13. Particulate – Probe, cyclone, and filter.

$$C_{an} = \frac{m_f}{V_{m_{std}}} x \frac{1\,gr}{64.8\,mg}$$

$$C_{an} = 0.0154 \text{ x } \frac{mf}{V_{m_{std}}} \text{ gr/dscf } *$$

$$C_{an} = \text{gr/dscf x } 2.290 = \text{g/dscm } *$$

14. Particulate total.

$$C_{ao} = 0.0154 \text{ x } \frac{m_t}{V_{m_{std}}} = gr\,/\,dscf\ *$$

$$C_{ao} = \text{gr/dscf x } 2.290 = \text{g/dscm } *$$

15. Particulate – probe, cyclone, and filter at stack conditions.

$$C_{at} = C_{an} \text{ x } \frac{P_s}{P_{std}} \text{ x } \frac{(T_{std})}{(T_s + 460)} \text{ x } M_d$$

$$C_{at} = \frac{17.65 \text{ x } C_{an} \text{ x } Ps \text{ x } Md}{Tx + 460} = \text{gr/CF}$$

$$C_{at} = \text{gr/CF x } 2.290 = \text{g/m}^3$$

16. Particulate – total, at stack conditions.

$$C_{au} = \frac{17.65 \text{ x } C_{ao} \text{ x } P_s \text{ x } M_d}{T_s + 460} = \text{gr/CF}$$

$$C_{au} = \text{gr/CF x } 2.290 = \text{g/m}^3$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

17. Particulate – probe, cyclone, and filter.

$$C_{aw} = C_{an} \text{ x } Q_s \text{ x } \frac{60 \text{ min.}}{1 \text{hr}} x \frac{1 \text{lb}}{7{,}000 \text{ gr}}$$

$$C_{aw} = 0.00857 \text{ x } C_{an} \text{ x } Q_s = \text{lbs/hr}$$

$$C_{aw} = \text{lbs/hr x } 0.4536 = \text{kg/hr}$$

18. Particulate – total.

$$C_{ax} = 0.00857 \text{ x } C_{ao} \text{ x } Q_s = \text{lbs/hr}$$

$$C_{ax} = \text{lbs/hr x } 0.4536 = \text{kg/hr}$$

19. Mercury - µg/dscm

µg/dscm = µg ÷ (V_{mstd} x 0.028317 m^3/ft^3)

*29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

Summary of Results
Mercury Speciation Results
Rocky Mountain Power - Hardin Power Plant
SDA Inlet Duct

Run No.	**1**	**2**	**3**	
Test Date:	**4/26/2007**	**4/26/2007**	**4/26/2007**	
Test Time:	**1020-1302**	**1445-1657**	**1810-2012**	**Average**
Volume of Dry Gas Sampled @ Standard Conditions				
dscm	1.392	1.456	1.433	1.427
dscf	49.156	51.407	50.596	50.386
Oxygen				
% volume	6.5	6.6	6.6	6.6
Particulate Mercury				
µg	1.3000	0.9700	0.9800	1.0833
µg/dscf	0.0264	0.0189	0.0194	0.0216
µg/dscm	0.9339	0.6662	0.6839	0.7613
lbs/10^{12} Btu	0.828	0.595	0.610	0.678
% of total Hg	27.78%	20.21%	20.99%	22.99%
Oxidized Mercury				
µg	0.6500	0.5700	0.7200	0.6467
µg/dscf	0.0132	0.0111	0.0142	0.0128
µg/dscm	0.4670	0.3915	0.5024	0.4536
lbs/10^{12} Btu	0.414	0.349	0.449	0.404
% of total Hg	13.89%	11.88%	15.42%	13.73%
Elemental Mercury				
µg	2.7300	3.2600	2.9700	2.9867
µg/dscf	0.0555	0.0634	0.0587	0.0592
µg/dscm	1.9612	2.2390	2.0726	2.0909
lbs/10^{12} Btu	1.738	1.999	1.850	1.862
% of total Hg	58.33%	67.92%	63.60%	63.28%
Total Mercury				
µg	4.6800	4.8000	4.6700	4.7167
µg/dscf	0.0952	0.0934	0.0923	0.0936
µg/dscm	3.3621	3.2967	3.2589	3.3059
lbs/10^{12} Btu	2.980	2.943	2.909	2.944
Oxygen based F factor	9,780	9,780	9,780	9,780

AIR SAMPLING ASSOCIATES, INC.

Summary of Results
Mercury Speciation Results
Rocky Mountain Power - Hardin Power Plant
Stack

Run No.	**1**	**2**	**3**	
Test Date:	**4/26/2007**	**4/26/2007**	**4/26/2007**	
Test Time:	**1020-1305**	**1445-1650**	**1810-2015**	**Average**
Volume of Dry Gas Sampled @ Standard Conditions				
dscm	2.018	2.04	2.079	2.046
dscf	71.281	72.049	73.417	72.249
Oxygen				
% volume	6.8	6.9	6.8	6.8
Particulate Mercury				
µg	0.0110	0.0580	0.0290	0.0327
µg/dscf	0.0002	0.0008	0.0004	0.0005
µg/dscm	0.0055	0.0284	0.0139	0.0159
lbs/10^{12} Btu	0.005	0.026	0.013	0.014
% of total Hg	0.13%	0.62%	0.34%	0.36%
Oxidized Mercury				
µg	1.8000	1.8000	1.7000	1.7667
µg/dscf	0.0253	0.0250	0.0232	0.0245
µg/dscm	0.8920	0.8824	0.8177	0.8640
lbs/10^{12} Btu	0.807	0.804	0.740	0.784
% of total Hg	20.78%	19.26%	19.91%	19.98%
Elemental Mercury				
µg	6.8500	7.4900	6.8100	7.0500
µg/dscf	0.0961	0.1040	0.0928	0.0976
µg/dscm	3.3944	3.6716	3.2756	3.4472
lbs/10^{12} Btu	3.072	3.347	2.965	3.128
% of total Hg	79.09%	80.12%	79.75%	79.66%
Total Mercury				
µg	8.6610	9.3480	8.5390	8.8493
µg/dscf	0.1215	0.1297	0.1163	0.1225
µg/dscm	4.2919	4.5824	4.1073	4.3272
lbs/10^{12} Btu	3.884	4.177	3.718	3.926
Oxygen based F factor	9,780	9,780	9,780	9,780

SOURCE EMISSION SURVEY

JOB NUMBER: 07-024
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: SDA Inlet Ontario Hydro

SOURCE EMISSION CALCULATIONS

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
DATE			04/26/07	04/26/07	04/26/07
BEGIN TIME			1020	1445	1810
END TIME			1302	1657	2012
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	26.96	26.93	26.93
		(mm Hg)	(685.00)	(684.00)	(684.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	0.577	0.631	0.626
		(mm H2O)	(14.700)	(16.000)	(15.900)
	DGM CALIBRATION FACTOR		1.004	1.004	1.004
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	55.077	58.194	58.127
	@ METER CONDITIONS	(m^3)	(1.560)	(1.648)	(1.646)
	LEAK CHECK VOLUME	ft.^3	0.000	0.406	0.000
T(m)	AVERAGE GAS METER	DEG.F	74	79	87
	TEMPERATURE	(DEG.C)	(23)	(26)	(31)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	49.156	51.407	50.596
	@ STANDARD CONDITIONS*	(DSCM)	(1.392)	(1.456)	(1.433)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	130.4	132.5	126.5
V(w[gas])	VOLUME WATER VAPOR	SCF	6.155	6.254	5.971
	COLLECTED @ STANDARD	(SCM)	(0.174)	(0.177)	(0.169)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS BY VOLUME	%	11.13	10.85	10.56
Md	MOL FRACTION OF DRY GAS		0.8887	0.8915	0.8944
Tt	NET TIME OF TEST	MINUTES	120	120	120

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 07-024
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: SDA Inlet Ontario Hydro

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
CO2		%	12.8	12.7	12.7
O2		%	6.5	6.6	6.6
CO		%	0.0	0.0	0.0
N2		%	80.7	80.7	80.7
%EA	EXCESS AIR @ SAMPLING POINT	%	43.7	44.6	44.6
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.31 (30.31)	30.30 (30.30)	30.30 (30.30)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.94 (28.94)	28.96 (28.96)	29.00 (29.00)
Cp	PITOT TUBE CALIBRATION		0.824	0.822	0.824
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	0.906 (23.000)	0.995 (25.300)	0.986 (25.000)
DELTA P ^(1/2)		"H2O	0.939	0.987	0.984
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	320 (160)	324 (162)	325 (163)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg) "H20	25.64 (651.00) -18.00	25.53 (648.00) -19.00	25.75 (654.00) -16.00
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	4,065 (21)	4,281 (22)	4,260 (22)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	20,235 (13)	20,235 (13)	20,235 (13)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	295,561 (502,158)	309,321 (525,536)	311,069 (528,506)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	571,169 (970,416)	601,527 (1,021,994)	598,553 (1,016,942)
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.193 (0.005)	0.193 (0.005)	0.191 (0.005)
%I	PERCENT ISOKINETIC	%	96.2	96.2	96.1

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 07-024
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: SDA Inlet Ontario Hydro

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
Mf	PARTICULATE - PROBE, CYCLONE AND FILTER	mg	12,925.9	10,422.0	11,114.4
Mt	PARTICULATE - TOTAL	mg	----	----	----
Can	PARTICULATE - PROBE, CYCLONE AND FILTER	gr/DSCF* (g/DSCM)	4.0495 (9.2734)	3.1221 (7.1497)	3.3829 (7.7469)
Cao	PARTICULATE - TOTAL	gr/DSCF* (g/DSCM)	---- ----	---- ----	---- ----
Cat	PARTIC.-PROBE, CYCLONE AND FILTER @ STACK COND.	gr/CF (g/m3)	2.0880 (4.7815)	1.5997 (3.6633)	1.7518 (4.0116)
Cau	PARTICULATE - TOTAL @ STACK CONDITIONS	gr/CF (g/m3)	---- ----	---- ----	---- ----
Caw	PARTICULATE - PROBE, CYCLONE AND FILTER	LBS/HR (Kg/HR)	10,257.30 (4,652.71)	8,276.37 (3,754.16)	9,018.37 (4,090.73)
Cax	PARTICULATE - TOTAL	LBS/HR (Kg/HR)	---- ----	---- ----	---- ----

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION SURVEY

JOB NUMBER: 07-024
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack EPA Method 26A

SOURCE EMISSION CALCULATIONS

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
DATE			04/27/07	04/27/07	04/27/07
BEGIN TIME			0900	1110	1407
END TIME			1017	1227	1523
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	27.05	27.05	26.99
		(mm Hg)	(687.00)	(687.00)	(686.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	1.313	1.086	1.252
		(mm H2O)	(33.400)	(27.600)	(31.800)
	DGM CALIBRATION FACTOR		0.998	0.998	0.998
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	48.359	44.009	47.712
	@ METER CONDITIONS	(m^3)	(1.369)	(1.246)	(1.351)
	LEAK CHECK VOLUME	ft.^3	0.000	0.000	0.000
T(m)	AVERAGE GAS METER	DEG.F	64	76	78
	TEMPERATURE	(DEG.C)	(18)	(24)	(26)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	44.219	39.316	42.391
	@ STANDARD CONDITIONS*	(DSCM)	(1.252)	(1.113)	(1.200)
V(w)	TOTAL WATER COLLECTED,	ml	167.4	142.7	151.4
	IMPINGERS & SILICA GEL				
V(w[gas])	VOLUME WATER VAPOR	SCF	7.901	6.735	7.146
	COLLECTED @ STANDARD	(SCM)	(0.224)	(0.191)	(0.202)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS	%	15.16	14.63	14.43
	BY VOLUME				
Md	MOL FRACTION OF DRY GAS		0.8484	0.8537	0.8557
Tt	NET TIME OF TEST	MINUTES	72	72	72

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 07-024
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack EPA Method 26A

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
CO2		%	12.7	12.6	12.6
O2		%	6.6	6.7	6.7
CO		%	0.0	0.0	0.0
N2		%	80.7	80.7	80.7
%EA	EXCESS AIR @ SAMPLING POINT	%	44.6	45.6	45.6
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.30 (30.30)	30.28 (30.28)	30.28 (30.28)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.43 (28.43)	28.49 (28.49)	28.51 (28.51)
Cp	PITOT TUBE CALIBRATION		0.826	0.824	0.824
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	3.983 (101.200)	3.304 (83.900)	3.810 (96.800)
DELTA P ^(1/2)		"H2O	1.994	1.805	1.949
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	223 (106)	220 (104)	228 (109)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg) "H20	26.90 (683.00) -2.05	26.94 (684.00) -1.45	26.88 (683.00) -1.50
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	7,975 (41)	7,173 (36)	7,797 (40)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	9,363 (6)	9,363 (6)	9,363 (6)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	306,890 (521,406)	279,393 (474,689)	300,200 (510,040)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	518,556 (881,027)	466,400 (792,414)	506,950 (861,308)
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.154 (0.004)	0.154 (0.004)	0.154 (0.004)
%I	PERCENT ISOKINETIC	%	101.0	98.6	99.0

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 07-024
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack EPA Method 26A

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
Mf	PARTICULATE - PROBE, CYCLONE AND FILTER	mg	24.6	14.3	20.4
Mt	PARTICULATE - TOTAL	mg	---	---	---
Can	PARTICULATE - PROBE, CYCLONE AND FILTER	gr/DSCF* (g/DSCM)	0.0086 (0.0196)	0.0056 (0.0128)	0.0074 (0.0170)
Cao	PARTICULATE - TOTAL	gr/DSCF* (g/DSCM)	--- ---	--- ---	--- ---
Cat	PARTIC.-PROBE, CYCLONE AND FILTER @ STACK COND.	gr/CF (g/m3)	0.0051 (0.0117)	0.0033 (0.0076)	0.0044 (0.0101)
Cau	PARTICULATE - TOTAL @ STACK CONDITIONS	gr/CF (g/m3)	--- ---	--- ---	--- ---
Caw	PARTICULATE - PROBE, CYCLONE AND FILTER	LBS/HR (Kg/HR)	22.53 (10.22)	13.41 (6.08)	19.07 (8.65)
Cax	PARTICULATE - TOTAL	LBS/HR (Kg/HR)	--- ---	--- ---	--- ---

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION SURVEY

JOB NUMBER: 07-024
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack Ontario-Hydro

SOURCE EMISSION CALCULATIONS

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
DATE			04/26/07	04/26/07	04/26/07
BEGIN TIME			1020	1445	1810
END TIME			1305	1650	2015
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	26.96	26.93	26.93
		(mm Hg)	(685.00)	(684.00)	(684.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	1.286	1.343	1.369
		(mm H2O)	(32.700)	(34.100)	(34.800)
	DGM CALIBRATION FACTOR		0.998	0.998	0.998
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	79.415	81.555	83.098
	@ METER CONDITIONS	(m^3)	(2.249)	(2.309)	(2.353)
	LEAK CHECK VOLUME	ft.^3	0.000	0.000	0.000
T(m)	AVERAGE GAS METER	DEG.F	72	80	80
	TEMPERATURE	(DEG.C)	(22)	(27)	(27)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	71.281	72.049	73.417
	@ STANDARD CONDITIONS*	(DSCM)	(2.018)	(2.040)	(2.079)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	270.5	277.4	275.8
V(w[gas])	VOLUME WATER VAPOR	SCF	12.768	13.093	13.018
	COLLECTED @ STANDARD	(SCM)	(0.362)	(0.371)	(0.369)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS BY VOLUME	%	15.19	15.38	15.06
Md	MOL FRACTION OF DRY GAS		0.8481	0.8462	0.8494
Tt	NET TIME OF TEST	MINUTES	120	120	120

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 07-024
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack Ontario-Hydro

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
CO2		%	12.7	12.6	12.7
O2		%	6.8	6.9	6.8
CO		%	0.0	0.0	0.0
N2		%	80.5	80.5	80.5
%EA	EXCESS AIR @ SAMPLING POINT	%	46.8	47.8	46.8
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.30 (30.30)	30.29 (30.29)	30.30 (30.30)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.44 (28.44)	28.40 (28.40)	28.45 (28.45)
Cp	PITOT TUBE CALIBRATION		0.826	0.824	0.826
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	3.888 (98.800)	4.098 (104.100)	4.158 (105.600)
DELTA P ^(1/2)		"H2O	1.967	2.022	2.038
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	214 (101)	215 (102)	216 (102)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg) "H20	26.85 (682.00) -1.45	26.78 (680.00) -2.05	26.82 (681.00) -1.50
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	7,821 (40)	8,042 (41)	8,119 (41)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	9,363 (6)	9,363 (6)	9,363 (6)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	304,308 (517,019)	310,931 (528,272)	315,099 (535,353)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	508,536 (864,003)	522,926 (888,451)	527,876 (896,861)
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.154 (0.004)	0.154 (0.004)	0.154 (0.004)
%I	PERCENT ISOKINETIC	%	98.5	97.4	98.0

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 07-024
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack Ontario-Hydro

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
Mf	PARTICULATE - PROBE, CYCLONE AND FILTER	mg	43.6	33.1	73.2
Mt	PARTICULATE - TOTAL	mg	----	----	----
Can	PARTICULATE - PROBE, CYCLONE AND FILTER	gr/DSCF*	0.0094	0.0071	0.0154
		(g/DSCM)	(0.0216)	(0.0162)	(0.0352)
Cao	PARTICULATE - TOTAL	gr/DSCF*	----	----	----
		(g/DSCM)	----	----	----
Cat	PARTIC.-PROBE, CYCLONE AND FILTER @ STACK COND.	gr/CF	0.0056	0.0042	0.0091
		(g/m3)	(0.0128)	(0.0096)	(0.0208)
Cau	PARTICULATE - TOTAL @ STACK CONDITIONS	gr/CF	----	----	----
		(g/m3)	----	----	----
Caw	PARTICULATE - PROBE, CYCLONE AND FILTER	LBS/HR	24.57	18.85	41.46
		(Kg/HR)	(11.14)	(8.55)	(18.81)
Cax	PARTICULATE - TOTAL	LBS/HR	----	----	----
		(Kg/HR)	----	----	----

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

Appendix C:

Calibration Data

AIR SAMPLING ASSOCIATES, INC.

Appendix C

Table 8: Calibration Data

Pre-Test Calibrations:

Equipment	Calibration Factor	Calibration Date
Dry Gas Meter 1-1	0.998	04/03/07
Digital Temperature Indicator 1-1		04/03/07
Dry Gas Meter 1-1 Orifice		04/03/07
Dry Gas Meter 1-2	1.004	04/03/07
Digital Temperature Indicator 1-2		04/03/07
Dry Gas Meter 1-2 Orifice		04/03/07
Pitot Tube 2-1	0.826	03/29/07
Pitot Tube 2-2	0.824	04/03/07
Pitot Tube 2-3	0.824	01/02/07
Pitot Tube 2-4	0.822	04/02/07
Nozzle 5-1	0.154	04/04/07
Nozzle 6-2	0.191	04/04/07
Nozzle 7-2	0.193	04/04/07

AIR SAMPLING ASSOCIATES, INC.

Post-Test Calibrations:

Equipment	Calibration Factor	Calibration Date
Dry Gas Meter 1-1	0.985	05/18/07
Digital Temperature Indicator 1-1		05/18/07
Dry Gas Meter 1-2	0.991	05/18/07
Digital Temperature Indicator 1-2		05/18/07
Pitot Tube 2-1	0.822	05/21/07
Pitot Tube 2-2	0.823	05/21/07
Pitot Tube 2-3	0.823	05/21/07
Pitot Tube 2-4	0.824	05/21/07
Nozzle 5-1	0.154	05/18/07
Nozzle 6-2	0.191	05/18/07

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

ΔH Setting (" H_2O)	C_{DG}
0.50	1.002
1.00	1.000
1.50	1.002
2.00	1.000
3.00	0.992
4.00	0.991
Average	0.998

Variation +: 0.40%

Variation -: -0.70%

Certified by: Scot Jackson 04/03/07

Calibrator (Signature / Date)

Bill Hefley 04/03/07

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 0.5" ΔH

Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020

Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	11:11	5.367	cf	78	°F	-0.2	" H_2O		147.534	cf	79	°F	76	°F	0.50	" H_2O
Start	10:58	0.000	cf	78	°F	-0.2	" H_2O		142.100	cf	75	°F	74	°F	0.50	" H_2O
Average		5.367	cf	78	°F	-0.2	" H_2O		5.434	cf	77	°F	75	°F	0.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.315} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.305} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.002}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 1.0" ΔH Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	11:23	5.099	cf	79	°F	-0.3	" H_2O		153.187	cf	83	°F	78	°F	1.00	" H_2O
Start	11:14	0.000	cf	79	°F	-0.3	" H_2O		148.001	cf	79	°F	77	°F	1.00	" H_2O
Average		5.099	cf	79	°F	-0.3	" H_2O		5.186	cf	81	°F	78	°F	1.00	" H_2O

$$\text{Wet Test Meter } V_{msid} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.039} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{msid} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.039} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{msid}}{\text{Dry Gas Meter } V_{msid}} = \underline{1.000}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 1.5" ΔH Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	11:41	10.248	cf	79	°F	-0.5	" H_2O	164.136	cf	87	°F	80	°F	1.50	" H_2O
Start	11:26	0.000	cf	79	°F	-0.5	" H_2O	153.704	cf	81	°F	78	°F	1.50	" H_2O
Average		10.248	cf	79	°F	-0.5	" H_2O	10.432	cf	84	°F	79	°F	1.50	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.123} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.106} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{1.002}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 2.0" ΔH Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	11:58	10.993	cf	80	°F	-0.7	" H_2O	175.623	cf	89	°F	82	°F	2.00	" H_2O
Start	11:44	0.000	cf	80	°F	-0.7	" H_2O	164.402	cf	84	°F	81	°F	2.00	" H_2O
Average		10.993	cf	80	°F	-0.7	" H_2O	11.221	cf	87	°F	82	°F	2.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.833} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.833} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.000}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 3.0" ΔH Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	13:24	10.681	cf	84	°F	-1.0	" H_2O		186.989	cf	87	°F	84	°F	3.00	" H_2O
Start	13:13	0.000	cf	84	°F	-1.0	" H_2O		176.100	cf	84	°F	84	°F	3.00	" H_2O
Average		10.681	cf	84	°F	-1.0	" H_2O		10.889	cf	86	°F	84	°F	3.00	" H_2O

$$\text{Wet Test Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.440} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.524} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{msd}}{\text{Dry Gas Meter } V_{msd}} = \underline{0.992}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 4.0" ΔH Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	13:39	11.105	cf	84	°F	-1.3	" H_2O		199.982	cf	91	°F	85	°F	4.00	" H_2O
Start	13:29	0.000	cf	84	°F	-1.3	" H_2O		188.648	cf	87	°F	84	°F	4.00	" H_2O
Average		11.105	cf	84	°F	-1.3	" H_2O		11.334	cf	89	°F	85	°F	4.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.847} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.941} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.991}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 1-1

Date Calibration Performed: 04/03/07

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	11:00	32° F	32° F
Ambient Air	11:01	68° F	68° F
Boiling Water	11:02	212° F	216° F
Oven	11:03	250° F	255° F
Oven	11:04	300° F	306° F
Oven	11:05	350° F	356° F
Oven	11:06	400° F	407° F

Meter Adjusted? No

ASTM Reference Thermometer: SN: 06000047 Range: -0.1°C to 1360.6°C

Range:

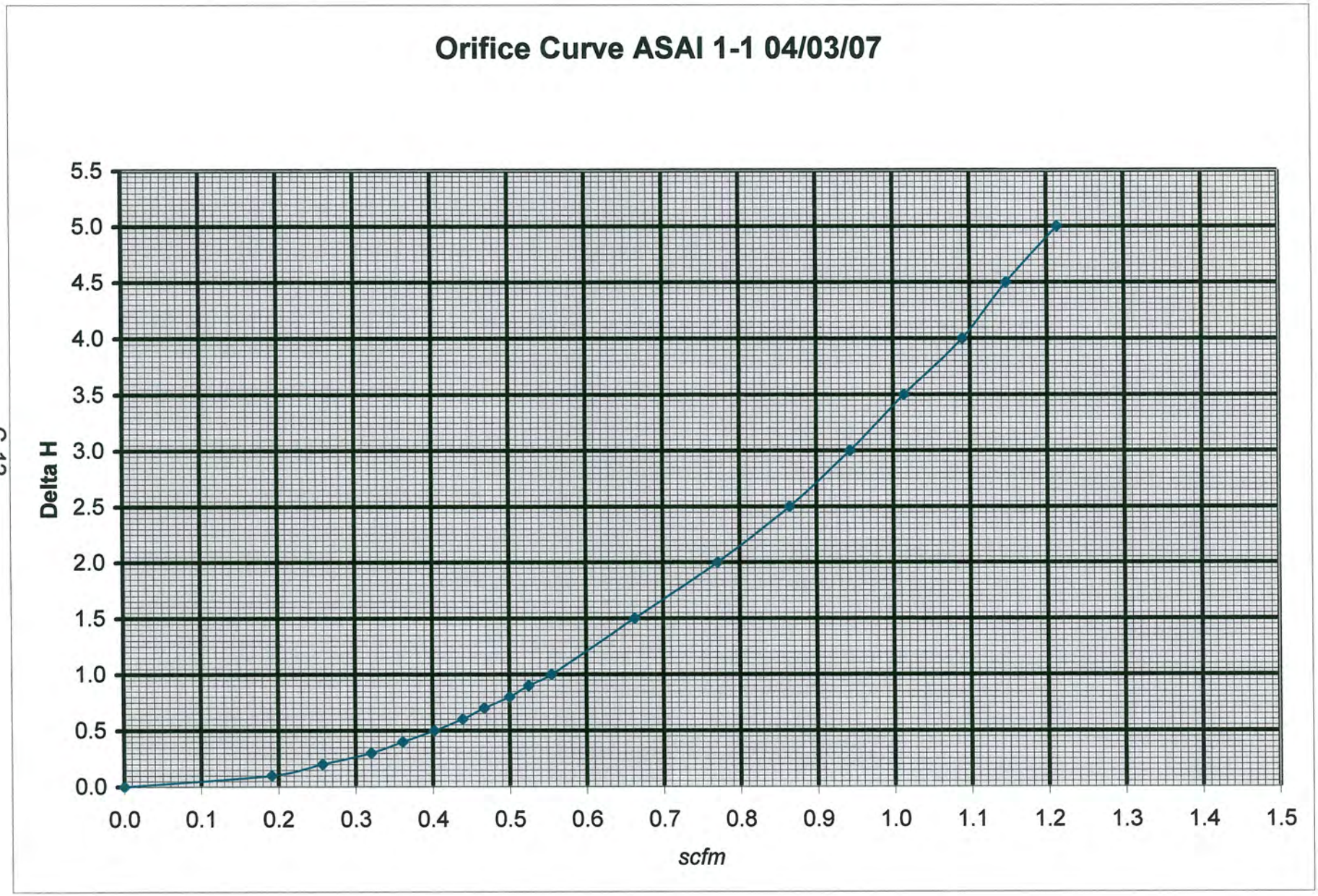
Range:

Certified by: Scot Jackson 04/03/07

Calibrator (Signature / Date)

Bill Hefley 04/03/07

QA Officer (Signature / Date)


Orifice Curve ASAI 1-1 04/03/07
Delta H
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
scfm

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

ΔH Setting (" H_2O)	C_{DG}
0.50	1.007
1.00	1.008
1.50	1.002
2.00	1.001
3.00	1.001
4.00	1.002
Average	1.004

Variation +: 0.40%

Variation -: -0.30%

Certified by: Scot Jackson 4/03/07

Calibrator (Signature / Date)

Bill Hefley 4/03/07

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 0.5" ΔH Pb = 29.56 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	9:02	5.005	cf	74	°F	-0.2	" H_2O	165.815	cf	81	°F	78	°F	0.50	" H_2O
Start	8:50	0.000	cf	74	°F	-0.2	" H_2O	160.702	cf	81	°F	78	°F	0.50	" H_2O
Average		5.005	cf	74	°F	-0.2	" H_2O	5.113	cf	81	°F	78	°F	0.50	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{4.985} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{4.951} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{1.007}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 1.0" ΔH Pb = 29.56 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	9:17	5.249	cf	74	°F	-0.4	" H_2O		171.643	cf	81	°F	78	°F	1.00	" H_2O
Start	9:08	0.000	cf	74	°F	-0.4	" H_2O		166.301	cf	79	°F	78	°F	1.00	" H_2O
Average		5.249	cf	74	°F	-0.4	" H_2O		5.342	cf	80	°F	78	°F	1.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.226} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.184} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{1.008}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 1.5" ΔH Pb = 29.57

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	9:40	10.523	cf	75	°F	-0.6	" H_2O		182.845	cf	83	°F	78	°F	1.50	" H_2O
Start	9:25	0.000	cf	75	°F	-0.6	" H_2O		172.100	cf	78	°F	78	°F	1.50	" H_2O
Average		10.523	cf	75	°F	-0.6	" H_2O		10.745	cf	81	°F	78	°F	1.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.455} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.438} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.002}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 2.0" ΔH Pb = 29.57 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	10:02	10.531	cf	75	°F	-0.7	" H_2O	193.955	cf	84	°F	78	°F	2.00	" H_2O
Start	9:49	0.000	cf	75	°F	-0.7	" H_2O	183.203	cf	79	°F	78	°F	2.00	" H_2O
Average		10.531	cf	75	°F	-0.7	" H_2O	10.752	cf	82	°F	78	°F	2.00	" H_2O

$$\text{Wet Test Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.461} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.448} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{msd}}{\text{Dry Gas Meter } V_{msd}} = \underline{1.001}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 3.0" ΔH Pb = 29.57 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	10:18	10.922	cf	76	°F	-1.0	" H_2O		205.838	cf	87	°F	79	°F	3.00	" H_2O
Start	10:07	0.000	cf	76	°F	-1.0	" H_2O		194.706	cf	81	°F	79	°F	3.00	" H_2O
Average		10.922	cf	76	°F	-1.0	" H_2O		11.132	cf	84	°F	79	°F	3.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.821} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.809} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.001}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 4.0" ΔH Pb = 29.58 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	10:30	10.229	cf	76	°F	-1.3	" H_2O		216.832	cf	89	°F	80	°F	4.00	" H_2O
Start	10:21	0.000	cf	76	°F	-1.3	" H_2O		206.408	cf	86	°F	79	°F	4.00	" H_2O
Average		10.229	cf	76	°F	-1.3	" H_2O		10.424	cf	88	°F	80	°F	4.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.130} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.113} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.002}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 1-2

Date Calibration Performed: 04/03/07

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	10:56	32° F	32° F
Ambient Air	10:57	68° F	68° F
Boiling Water	10:58	212° F	214° F
Oven	10:59	250° F	253° F
Oven	11:00	300° F	303° F
Oven	11:01	350° F	352° F
Oven	11:02	400° F	403° F

Meter Adjusted? No

ASTM Reference Thermometer: SN: 06000047 Range: -0.1°C to 1360.6°C

Range:

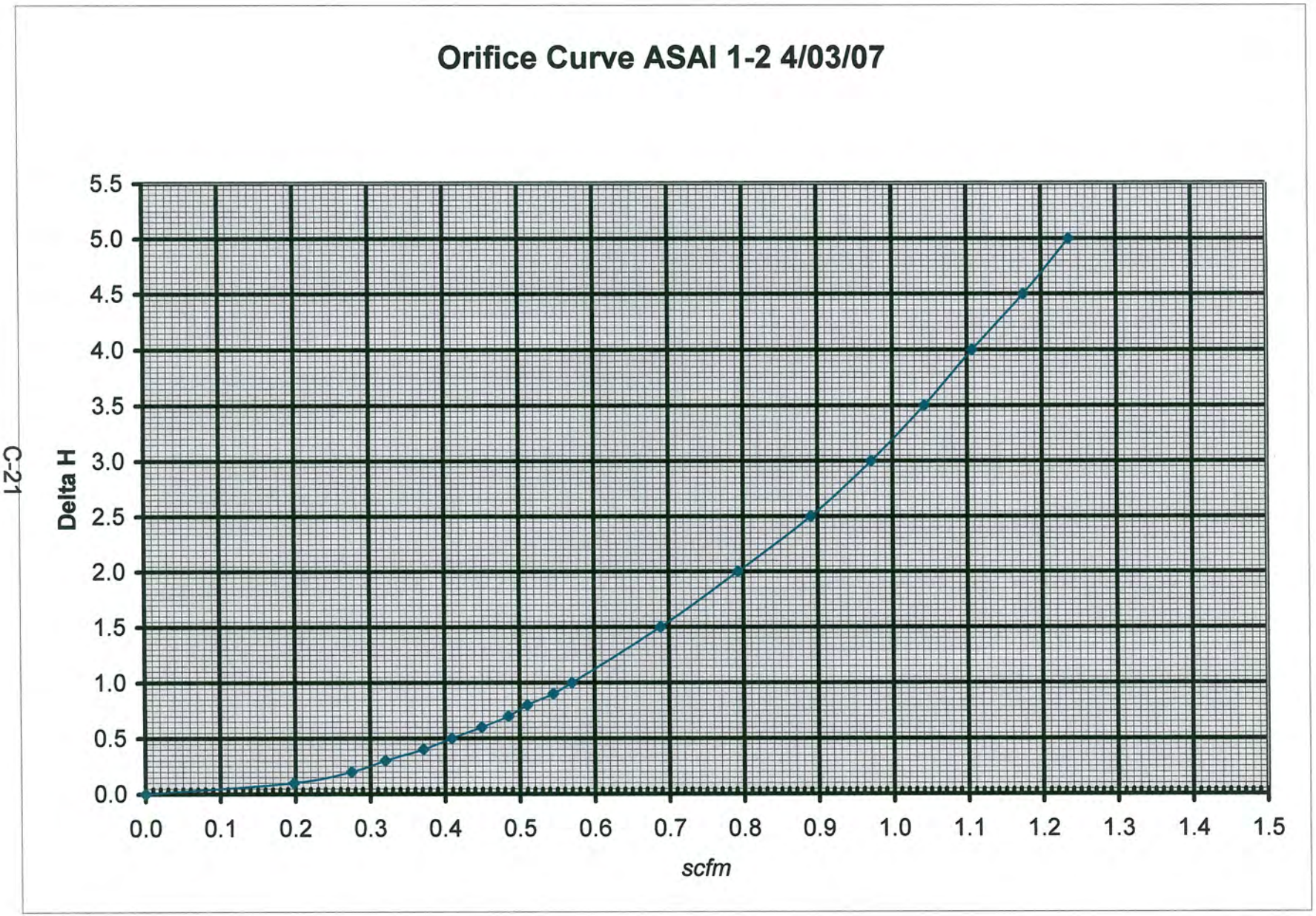
Range:

Certified by: Scot Jackson 4/03/07

Calibrator (Signature / Date)

Bill Hefley 4/03/07

QA Officer (Signature / Date)


Orifice Curve ASAI 1-2 4/03/07
Delta H
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
scfm

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 03/29/07
I.D. # ASAI 2-1
C_{pstd}: 0.990

Time: 11:00
T_s: 74 °F
Pb: 29.65 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.36	0.36	0.36	0.600	0.52	0.721	0.824	0.52	0.721	0.824
50	0.56	0.56	0.56	0.748	0.80	0.894	0.828	0.81	0.900	0.823
60	0.81	0.81	0.81	0.900	1.15	1.072	0.831	1.15	1.072	0.831
70	1.10	1.10	1.10	1.049	1.55	1.245	0.834	1.60	1.265	0.821
80	1.43	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.81	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.56	0.56	0.56	0.748	0.80	0.894	0.828	0.80	0.894	0.828
50	0.56	0.56	0.56	0.748	0.80	0.894	0.828	0.80	0.894	0.828
Average							0.826			0.824

Summary of Results:

Normal high side calibraiton factor: 0.826
variation +: 0.97%
variation -: -0.48%
Normal low side calibration factor: 0.824
variation +: 0.85%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.826

Certified by: Scot Jackson 3/29/07
Calibrator (Signature/Date)

Bill Hefley 3/29/07
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 04/03/07
I.D. # ASAI 2-2
C_{pstd}: 0.990

Time: 8:30
T_s: 73 °F
Pb: 29.56 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.36	0.36	0.36	0.600	0.52	0.721	0.824	0.52	0.721	0.824
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
60	0.81	0.81	0.81	0.900	1.15	1.072	0.831	1.15	1.072	0.831
70	1.10	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.43	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.81	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
Average							0.824			0.824

Summary of Results:

Normal high side calibraiton factor: 0.824
variation +: 0.85%
variation -: -0.36%
Normal low side calibration factor: 0.824
variation +: 0.85%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.824

Certified by: Scot Jackson 4/3/07
Calibrator (Signature/Date)

Bill Hefley 4/3/07
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 01/02/07
I.D. # ASAI 2-3
C_{pstd}: 0.990

Time: 15:40
T_s: 66 °F
Pb: 29.92 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.21	0.21	0.21	0.458	0.30	0.548	0.828	0.30	0.548	0.828
40	0.37	0.37	0.37	0.608	0.54	0.735	0.819	0.53	0.728	0.827
50	0.57	0.57	0.57	0.755	0.82	0.906	0.825	0.82	0.906	0.825
60	0.83	0.83	0.83	0.911	1.20	1.095	0.823	1.20	1.095	0.823
70	1.12	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.47	1.50	1.50	1.225	2.15	1.466	0.827	2.15	1.466	0.827
90	1.86	1.85	1.85	1.360	2.65	1.628	0.827	2.65	1.628	0.827
50	0.57	0.57	0.57	0.755	0.82	0.906	0.825	0.82	0.906	0.825
50	0.57	0.57	0.57	0.755	0.82	0.906	0.825	0.82	0.906	0.825
Average							0.824			0.825

Summary of Results:

Normal high side calibraiton factor: 0.824
variation +: 0.49%
variation -: -0.61%
Normal low side calibration factor: 0.825
variation +: 0.36%
variation -: -0.48%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.824

Certified by: Patrick Selakovich 01/02/07
Calibrator (Signature/Date)

Bill Hefley 01/02/07
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 04/02/07
I.D. # ASAI 2-4
C_{pstd}: 0.990

Time: 14:30
T_s: 80 °F
Pb: 29.62 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.35	0.35	0.35	0.592	0.51	0.714	0.820	0.50	0.707	0.828
50	0.55	0.55	0.55	0.742	0.81	0.900	0.816	0.80	0.894	0.821
60	0.80	0.80	0.80	0.894	1.15	1.072	0.826	1.15	1.072	0.826
70	1.08	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.42	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.79	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.55	0.55	0.55	0.742	0.81	0.900	0.816	0.80	0.894	0.821
50	0.55	0.55	0.55	0.742	0.81	0.900	0.816	0.80	0.894	0.821
Average							0.822			0.824

Summary of Results:

Normal high side calibraiton factor: 0.822
variation +: 0.49%
variation -: -0.73%
Normal low side calibration factor: 0.824
variation +: 0.49%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.822

Certified by: Scot Jackson 4/02/07
Calibrator (Signature/Date)

Bill Hefley 4/02/07
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 5
Date Calibration Performed: 04/04/07

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.154		0.251	0.309	0.371	0.438	0.489	0.258
Measurement 2	0.154		0.251	0.307	0.372	0.437	0.488	0.257
Measurement 3	0.154		0.252	0.309	0.372	0.439	0.489	0.258
Measurement 4	0.154		0.252	0.307	0.372	0.438	0.489	0.259
Measurement 5	0.154		0.251	0.308	0.372	0.437	0.490	0.258
Measurement 6	0.153		0.252	0.309	0.371	0.437	0.489	0.258
Measurement 7	0.154		0.252	0.308	0.371	0.438	0.490	0.259
Measurement 8	0.153		0.253	0.307	0.371	0.437	0.488	0.258
Measurement 9	0.154		0.252	0.308	0.372	0.438	0.490	0.258
Measurement 10	0.154		0.252	0.307	0.372	0.439	0.489	0.258
Average	0.154	#####	0.252	0.308	0.372	0.438	0.489	0.258

Scot Jackson 4/04/07
Calibrator (Signature / Date)

Bill Hefley 4/04/07
QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 6
Date Calibration Performed: 04/04/07

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.114	0.192	0.253	0.307	0.371	0.425	0.485	0.259
Measurement 2	0.115	0.191	0.254	0.309	0.371	0.425	0.487	0.259
Measurement 3	0.115	0.191	0.254	0.308	0.372	0.424	0.484	0.258
Measurement 4	0.114	0.191	0.255	0.309	0.372	0.425	0.487	0.259
Measurement 5	0.114	0.192	0.253	0.309	0.371	0.425	0.486	0.260
Measurement 6	0.115	0.191	0.254	0.308	0.371	0.425	0.484	0.259
Measurement 7	0.115	0.191	0.255	0.309	0.372	0.426	0.486	0.259
Measurement 8	0.115	0.191	0.253	0.307	0.371	0.425	0.484	0.258
Measurement 9	0.114	0.192	0.253	0.309	0.372	0.424	0.484	0.260
Measurement 10	0.115	0.191	0.254	0.308	0.372	0.425	0.485	0.259
Average	0.115	0.191	0.254	0.308	0.372	0.425	0.485	0.259

Scot Jackson 4/04/07

Calibrator (Signature / Date)

Bill Hefley 4/04/07

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 7
Date Calibration Performed: 04/04/07

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.113	0.194	0.259	0.308	0.376	0.424	0.484	0.257
Measurement 2	0.114	0.194	0.258	0.308	0.376	0.425	0.487	0.258
Measurement 3	0.115	0.193	0.259	0.308	0.377	0.424	0.484	0.257
Measurement 4	0.115	0.193	0.258	0.309	0.378	0.425	0.486	0.258
Measurement 5	0.115	0.192	0.258	0.308	0.376	0.424	0.485	0.258
Measurement 6	0.114	0.192	0.259	0.309	0.376	0.426	0.485	0.258
Measurement 7	0.113	0.193	0.259	0.308	0.378	0.426	0.486	0.257
Measurement 8	0.114	0.193	0.258	0.308	0.377	0.424	0.486	0.258
Measurement 9	0.113	0.192	0.258	0.309	0.376	0.425	0.485	0.258
Measurement 10	0.114	0.192	0.259	0.308	0.377	0.426	0.484	0.257
Average	0.114	0.193	0.259	0.308	0.377	0.425	0.485	0.258

Scot Jackson 4/04/07
Calibrator (Signature / Date)

Bill Hefley 4/04/07
QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Post-test Calibration Data

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the **GREEN** cells, YELLOW cells are calculated.

Quality - Service - Reliability

ENVIRONMENTAL SUPPLY COMPANY

ASAI 1-1 05-18-2007

DATE: 5/18/2007

METER PART #: C-5000-SO

METER SERIAL #: 1508

CRITICAL ORIFICE SET SERIAL #: 1426s

BAROMETRIC PRESSURE (in Hg):	INITIAL	FINAL	AVG (P_{bar})
	29.86	29.86	29.86

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	TEMPERATURES °F DGM INLET INITIAL	TEMPERATURES °F DGM INLET FINAL	TEMPERATURES °F DGM OUTLET INITIAL	TEMPERATURES °F DGM OUTLET FINAL	TEMPERATURES °F DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
17	1	0.4656	19	684.726	690.255	5.529	80	79	79	74	75	76.75	9.00	1.20	5.4450	5.3861	0.989		1.86
	2	0.4656	19	690.255	695.785	5.530	80	79	79	75	76	77.25	9.00	1.20	5.4409	5.3861	0.990		1.85
	3	0.4656	19	695.785	701.340	5.555	80	79	80	76	77	78	9.00	1.20	5.4579	5.3861	0.987		1.85
																AVG =	0.989	0.36	
19	1	0.5066	19	701.340	706.740	5.40	83	81	81	81	81	81	8.00	1.40	5.2787	5.1948	0.984		1.83
	2	0.5066	19	706.740	712.160	5.420	83	81	82	81	81	81.25	8.00	1.40	5.2958	5.1948	0.981		1.82
	3	0.5066	19	712.160	717.588	5.428	83	82	82	81	81	81.5	8.00	1.40	5.3012	5.1948	0.980		1.82
																AVG =	0.982	-0.36	
	1					.0						0							
	2					.0						0							
	3					.0						0							
																AVG =			

C-30

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.985

AVERAGE $\Delta H_@$ = 1.84

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H \left(\frac{V_m(std)}{V_m}\right)$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 1-1

Date Calibration Performed: 05/18/07

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	10:45	32° F	31° F
Ambient Air	10:46	80° F	79° F
Boiling Water	10:47	212° F	214° F
Oven	10:48	250° F	253° F
Oven	10:49	300° F	303° F
Oven	10:50	350° F	353° F
Oven	10:51	400° F	404° F

Meter Adjusted? No

NIST Reference Calibrator: SN: 06000047 Range: -0.2°C to 1,360.6°

Range:

Range:

Certified by: Scot Jackson 5/18/07

Calibrator (Signature / Date)

Bill Hefley 5/18/07

QA Officer (Signature / Date)

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Quality - Service - Reliability

ENVIRONMENTAL SUPPLY COMPANY

ASAI 1 - 2 5-18-2007

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the **GREEN** cells, YELLOW cells are calculated.

DATE: 5/18/2007

METER PART #: C-5000-SO

METER SERIAL #: 1501

CRITICAL ORIFICE SET SERIAL #: 1426S

BAROMETRIC PRESSURE (in Hg):	INITIAL	FINAL	AVG (P_{bar})
	29.85	29.84	29.845

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	TEMPERATURES °F DGM INLET INITIAL	TEMPERATURES °F DGM INLET FINAL	TEMPERATURES °F DGM OUTLET INITIAL	TEMPERATURES °F DGM OUTLET FINAL	TEMPERATURES °F DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
12	1	0.3209	19	467.297	472.420	5.123	83	81	84	79	80	81	12.00	0.51	4.9945	4.9334	0.988		1.65
	2	0.3209	19	472.420	477.555	5.135	83	84	84	80	81	82.25	12.00	0.51	4.9946	4.9334	0.988		1.65
	3	0.3209	19	477.555	482.694	5.139	83	84	83	81	82	82.5	12.00	0.51	4.9962	4.9334	0.987		1.65
																AVG =	0.988	-0.32	
17	1	0.4656	16	482.907	488.460	5.553	83	83	84	82	83	83	9.00	1.1	5.4016	5.3685	0.994		1.69
	2	0.4656	16	488.460	494.005	5.545	83	84	84	83	83	83.5	9.00	1.1	5.3888	5.3685	0.996		1.69
	3	0.4656	16	494.005	499.577	5.572	83	84	85	83	83	83.75	9.00	1.1	5.4126	5.3685	0.992		1.69
																AVG =	0.994	0.32	
	1					.0						0							
	2					.0						0							
	3					.0						0							
																AVG =			

C-32

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.991

AVERAGE $\Delta H_@$ = 1.67

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H \left(\frac{V_m(std)}{V_m}\right)$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 1-2

Date Calibration Performed: 05/18/07

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	14:00	32° F	32° F
Ambient Air	14:01	83° F	83° F
Boiling Water	14:02	212° F	213° F
Oven	14:03	250° F	252° F
Oven	14:04	300° F	302° F
Oven	14:05	350° F	352° F
Oven	14:06	400° F	401° F

Meter Adjusted? No

ASTM Reference Thermometer: SN: 06000047 Range: -0.1°C to 1,360.6°

Range:

Range:

Certified by: Scot Jackson 5/18/07

Calibrator (Signature / Date)

Bill Hefley 5/18/07

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 05/21/07
I.D. # ASAI 2-1
C_{pstd}: 0.990

Time: 8:30
T_s: 75 °F
Pb: 29.64 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.36	0.36	0.36	0.600	0.52	0.721	0.824	0.52	0.721	0.824
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
60	0.80	0.81	0.81	0.900	1.20	1.095	0.813	1.20	1.095	0.813
70	1.10	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.43	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.81	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.56	0.56	0.56	0.748	0.80	0.894	0.828	0.81	0.900	0.823
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
Average							0.822			0.822

Summary of Results:

Normal high side calibraiton factor: 0.822
variation +: 0.24%
variation -: -1.09%
Normal low side calibration factor: 0.822
variation +: 0.24%
variation -: -1.09%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.822

Certified by: Scot Jackson 5/21/07
Calibrator (Signature/Date)

Bill Hefley 5/21/07
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 05/21/07 Time: 8:30
I.D. # ASAI 2-2 T_s: 75 °F
C_{pstd}: 0.990 Pb: 29.64 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.36	0.36	0.36	0.600	0.52	0.721	0.824	0.52	0.721	0.824
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
60	0.80	0.80	0.80	0.894	1.15	1.072	0.826	1.15	1.072	0.826
70	1.10	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.43	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.81	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
Average							0.823			0.823

Summary of Results:

Normal high side calibraiton factor: 0.823
variation +: 0.36%
variation -: -0.24%
Normal low side calibration factor: 0.823
variation +: 0.36%
variation -: -0.24%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.823

Certified by: Scot Jackson 5/21/07 — Calibrator (Signature/Date)
Bill Hefley 5/21/07 — QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 05/21/07
I.D. # ASAI 2-3
C_{pstd}: 0.990

Time: 15:40
T_s: 74 °F
Pb: 29.64 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.36	0.36	0.36	0.600	0.52	0.721	0.824	0.52	0.721	0.824
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
60	0.81	0.80	0.80	0.894	1.15	1.072	0.826	1.15	1.072	0.826
70	1.10	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.43	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.81	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
Average							0.823			0.823

Summary of Results:

Normal high side calibraiton factor: 0.823
variation +: 0.36%
variation -: -0.24%
Normal low side calibration factor: 0.823
variation +: 0.36%
variation -: -0.24%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.823

Certified by: Scot Jackson 05/21/07
Calibrator (Signature/Date)

Bill Hefley 05/21/07
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 05/21/07 Time: 9:45
I.D. # ASAI 2-4 T_s: 74 °F
C_{pstd}: 0.990 Pb: 29.63 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.36	0.36	0.36	0.600	0.52	0.721	0.824	0.52	0.721	0.824
50	0.56	0.56	0.56	0.748	0.80	0.894	0.828	0.80	0.894	0.828
60	0.81	0.80	0.80	0.894	1.15	1.072	0.826	1.15	1.072	0.826
70	1.10	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.43	1.45	1.45	1.204	2.10	1.449	0.823	2.10	1.449	0.823
90	1.81	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.56	0.56	0.56	0.748	0.80	0.894	0.828	0.80	0.894	0.828
50	0.56	0.56	0.56	0.748	0.80	0.894	0.828	0.80	0.894	0.828
Average							0.824			0.824

Summary of Results:

Normal high side calibraiton factor: 0.824
variation +: 0.49%
variation -: -0.36%
Normal low side calibration factor: 0.824
variation +: 0.49%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.824

Certified by: Scot Jackson 5/21/07 — Calibrator (Signature/Date)
Bill Hefley 5/21/07 — QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 5
Date Calibration Performed: 05/18/07

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.153	0.194						
Measurement 2	0.154	0.194						
Measurement 3	0.154	0.194						
Measurement 4	0.154	0.194						
Measurement 5	0.154	0.195						
Measurement 6	0.153	0.194						
Measurement 7	0.154	0.194						
Measurement 8	0.153	0.194						
Measurement 9	0.154	0.194						
Measurement 10	0.154	0.194						
Average	0.154	0.194	#####	#####	#####	#####	#####	#####

Scot Jackson 5/18/07
Calibrator (Signature / Date)

Bill Hefley 5/18/07
QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 6
Date Calibration Performed: 05/18/07

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1		0.192						
Measurement 2		0.191						
Measurement 3		0.191						
Measurement 4		0.192						
Measurement 5		0.192						
Measurement 6		0.191						
Measurement 7		0.191						
Measurement 8		0.192						
Measurement 9		0.191						
Measurement 10		0.191						
Average	#####	0.191	#####	#####	#####	#####	#####	#####

Scot Jackson 5/18/07

Calibrator (Signature / Date)

Bill Hefley 5/18/07

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Appendix D:

Field Data

Job Number 07-024
Job Name ADA-ES, Hardin, MT
Run Number 1
Unit Stack
Date 26 April 2007
Operator Mullins, Jackson
Sample Box No. M-3 Meter Box No. 1-1

Ontario-Hydro Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 56
Assumed Moisture % 15
Probe Length 9'
C Factor 3.3 to reference
Initial Leak @ 15.0 "Hg = 0.002 cfm
Final Leak @ 6.0 "Hg = 0.003 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet (T_m)	Heated Line °F	Remarks
A-10	1020	273.306	3.95	1.30	1.30	5.0	215	248	251	49	63	62	217	
9	1025	276.64	4.00	1.35	1.35	5.0	217	261	251	48	64	63	221	
8	1030	280.00	3.90	1.30	1.30	5.0	217	265	251	46	66	63	224	
7	1035	283.31	4.00	1.35	1.35	5.0	215	273	248	46	68	63	225	
6	1040	286.67	4.05	1.35	1.35	5.0	215	272	250	46	70	64	228	
5	1045	290.01	4.10	1.35	1.35	5.0	215	272	249	47	71	65	230	
4	1050	293.39	4.50	1.50	1.50	5.5	216	268	249	48	73	66	236	
3	1055	296.93	4.40	1.45	1.45	6.0	217	268	256	49	74	67	240	
2	1100	300.46	3.95	1.30	1.30	5.5	217	267	254	50	75	68	241	
2	1105	303.85	3.95	1.30	1.30	5.5	217	267	254	51	76	69	240	
1	1110	307.25	3.30	1.10	1.10	5.0	216	266	253	52	77	70	236	
1	1115	310.37	3.50	1.15	1.15	5.0	215	266	255	52	78	71	234	
End	1120	313.481	—	—	—	—	—	—	—	—	—	—	—	
B-10	1126	313.481	2.80	0.92	0.92	4.5	217	260	256	53	76	73	234	
9	1131	316.36	2.40	0.79	0.79	4.0	210	262	253	53	76	73	233	
8	1136	319.05	3.70	1.20	1.20	5.0	206	262	258	54	77	73	234	
7	1141/1220	322.163	4.40	1.45	1.45	5.5	210	265	253	51	73	73	229	Pump off
6	1146/1225	325.64	4.20	1.40	1.40	5.5	212	266	252	49	73	73	231	Pump on 1220

Pitot Tube Calibration Factor C_p 0.826
Volume Collected V_m 79.415 ft³
Water Collected V_w 270.5 ml
Time of Test T_t 120 min.
Stack Pressure P_s −1.45 "H₂O

Pitot Tube No. 2-1
Baro. Press. P_b 26.96 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 12.7 % CO 0.0
% O_2 6.8 % N_2 80.5
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 5-1
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.998 X 79.574

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. M-3

Impinger 1	Final Weight	956.1
	Initial Weight	743.6
	Increase	212.5
Impinger 2	Final Weight	767.1
	Initial Weight	736.3
	Increase	30.8
Impinger 3	Final Weight	758.1
	Initial Weight	754.0
	Increase	4.1
Impinger 4	Final Weight	755.5
	Initial Weight	753.3
	Increase	2.2
Impinger 5	Final Weight	740.7
	Initial Weight	739.9
	Increase	0.8
Impinger 6	Final Weight	745.9
	Initial Weight	745.6
	Increase	0.3
Impinger 7	Final Weight	737.1
	Initial Weight	737.8
	Increase	-0.7
~~Imp~~	~~FW~~ ~~Init. wt~~	

Water Weight Gain

Impinger 1	212.5
Impinger 2	30.8
Impinger 3	4.1
Impinger 4	2.2
Impinger 5	0.8
Impinger 6	0.3
Impinger 7	-0.7
Imp. 8	20.5
Total	270.5 = V_w

Imp 8 FW 973.7
IW 953.2
Increase 20.5

V_w =
g SO_2 = _____
V_w =

Filter No. A176

P_b =	26.96	%CO_2 =	12.7
V_m =	79.415	%O_2 =	6.8
V_w =	270.5	%CO =	0.0
P_m =	1.286	%N_2 =	80.5
Avg ΔP =	3.888	A_s =	9363
		D_n =	0.154
Avg$\sqrt{\Delta P}$ =	1.967	T_1 =	120
C_p =	0.826		
P_s =	-1.45 "H_2O		26.85 "Hg
T_m =	72 °F		532 °R
T_s =	214 °F		674 °R

Moisture Content: %M = 15.19 M_d = 0.8481 MW_c = 30.304 MW = 28.44

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 79.415 \left[\frac{26.96 + \frac{1.286}{13.6}}{72 + 460}\right] = 71.281\ sft^3 = 0.594\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 270.5 = ~~3.328~~ 12.768 (BH) sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = ~~3.328~~ 12.768 (BH) / (71.281 + ~~3.328~~ 12.768) x 100 = 15.19 %

V_s = 5123.8 x 0.826 $\sqrt{\frac{674}{26.85 \times 28.44}}$ x 1.967 = 7821 fpm

ACFM: 508,536

SCFM: 304,308

%I = $\frac{1.039 \times 71.281 \times 674}{0.8481 \times 26.85 \times 7821 \times 120 \times (0.154)^2}$ = 98.5 % (B) 5/10/07

%EA: 46.8

Run Number 07-024 P

Unit Stack

Date 26 April 2007

Ontario-Hydro FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
5	1230	329.13	4.40	1.45	1.45	6.0	212	263	254	49	74	73	228	
4	1235	332.69	4.10	1.35	1.35	6.0	213	264	255	50	76	73	227	
3	1240	336.12	4.50	1.50	1.50	6.0	213	264	254	51	78	73	226	
2	1245	339.68	3.90	1.30	1.30	6.0	213	263	252	53	79	74	228	
2	1250	343.10	4.10	1.35	1.35	6.0	213	264	255	54	80	74	230	
1	1255	346.52	3.50	1.15	1.15	5.5	212	264	254	54	81	75	230	
1	1300	349.72	3.70	1.20	1.20	5.5	212	264	254	55	81	76	236	
End	1305	352.880	—	—	—	—	—	—	—	—	—	—	—	
All														

Job Number 07-024
Job Name ADA-ES Hardin, MT
Run Number 2
Unit Stack
Date 26 April 2007
Operator Mullins, Jackson
Sample Box No. M-3 Meter Box No. 1-1

Ontario Hydro Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 60
Assumed Moisture % 15
Probe Length 9'
C Factor 3.3 to reference
Initial Leak @ 15.0 "Hg = 0.003 cfm
Final Leak @ 7.5 "Hg = 0.003 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
B-10	1445	353.756	4.40	1.45	1.45	5.5	215	260	254	49	72	72	261	
9	1450	356.93	4.40	1.45	1.45	5.5	215	261	255	46	72	72	263	
8	1455	360.44	4.25	1.40	1.40	5.5	216	265	253	46	74	72	266	
7	1500	363.94	4.45	1.45	1.45	6.0	216	266	256	46	76	73	270	
6	1505	367.45	4.10	1.35	1.35	6.0	215	263	254	47	78	73	247	
5	1510	370.85	4.40	1.45	1.45	6.5	215	261	253	44	79	74	234	
4	1515	374.38	4.50	1.50	1.50	6.5	215	259	256	44	81	75	227	
3	1520	378.01	4.50	1.50	1.50	6.5	215	259	255	45	82	75	228	
2	1525	381.58	4.15	1.35	1.35	6.5	215	261	257	46	83	76	232	
2	1530	385.01	4.00	1.30	1.30	6.0	215	261	256	47	84	77	233	
1	1535	388.42	3.50	1.15	1.15	5.5	213	262	255	46	84	78	233	
1	1540	391.59	3.55	1.15	1.15	5.5	214	262	254	46	84	79	237	
End	1545	394.718	—	—	—	—	—	—	—	—	—	—	—	
A-10	1550	394.718	4.30	1.40	1.40	6.0	216	262	253	49	83	80	239	
9	1555	398.15	4.15	1.35	1.35	6.5	215	264	254	49	83	79	242	
8	1600	401.59	4.25	1.40	1.40	6.5	215	265	255	49	83	79	246	
7	1605	405.07	4.40	1.45	1.45	6.5	217	265	254	50	84	79	253	
6	1610	408.59	4.10	1.35	1.35	6.5	216	265	254	51	85	80	257	

Pitot Tube Calibration Factor C_p 0.82 ~~0.84~~ BJM 4/26/07
Volume Collected V_m 81.555 ft^3
Water Collected V_w 277.4 ml
Time of Test T_t 120 min.
Stack Pressure P_s -2.05 "H_2O

Pitot Tube No. 2-2
Baro. Press. P_b 26.93 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 12.6 % CO 0.0
% O_2 6.9 % N_2 80.5
Area Stack A. 9363 in^2

Barometer No. —
Probe Tip No. 5-1
Total Volume of Leak Checks After Start: 0 ft^3
V_m X Dry Gas Meter Calibration Factor 0.998 X 81.718

[Dry Gas Meter Reading ___ ft^3 - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. M-3

Impinger 1	Final Weight	971.3	Water Weight Gain	Impinger 1	223.5
	Initial Weight	747.8	Imp 8 99.7		
	Increase	223.5	Int wt. 973.7	Impinger 2	29.1
			Inc. 18.0		
Impinger 2	Final Weight	786.3		Impinger 3	3.9
	Initial Weight	757.2			
	Increase	29.1		Impinger 4	2.4
			V_w =		
Impinger 3	Final Weight	770.0	g SO_2 =	Impinger 5	0.7
	Initial Weight	766.1	V_w =		
	Increase	3.9		Impinger 6	0.4
Impinger 4	Final Weight	760.0	Filter # A177	Impinger 7	-0.6
	Initial Weight	757.6		Impinger 8	18.0
	Increase	2.4		Total	277.4 = V_w
Impinger 5	Final Weight	740.3	P_b = 26.93	$\%CO_2$ =	12.6
	Initial Weight	739.6	V_m = 81.555	$\%O_2$ =	6.9
	Increase	0.7	V_w = 277.4	%CO =	0.0
			P_m = 1.343	$\%N_2$ =	80.5
Impinger 6	Final Weight	752.8	Avg ΔP = 4.098	A_n =	9363
	Initial Weight	752.4		D_n =	0.154
	Increase	0.4	Avg$\sqrt{\Delta P}$ = 2.022	T_1 =	120
			C_p = 0.824		
Impinger 7	Final Weight	737.1	P_s = -2.05 "H_2O	26.78	"Hg
	Initial Weight	737.7	T_m = 80 °F	540	°R
	Increase	-0.6	T_s = 215 °F	675	°R

Moisture Content: %M = 15.38 M_d = 0.8462 MW_c = 30.292 MW = 28.40

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 81.555 \left[\frac{26.93 + \frac{1.343}{13.6}}{80 + 460}\right] = \frac{72.049}{0.600}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 277.4 = 13.093 sft^3

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{13.093}{72.049 + 13.093} \times 100 = 15.38\ \%$$

$$V_s = 5123.8 \times 0.824 \sqrt{\frac{675}{26.78 \times 28.40}} \times 2.022 = 8042\ fpm$$

ACFM: 522,926

SCFM: 310,931

$$\%I = \frac{1.039 \times 72.049 \times 675}{0.8462 \times 26.78 \times 8042 \times 120 \times (0.154)^2} = 97.4\ \%$$

(15) 5/10/07

%EA: 47.8

Run Number 2

Unit stack

Date 26 April 2007

Ontario-Hydro FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
A-5	1615	412.10	4.20	1.35	1.35	6.5	215	264	255	52	85	80	260	
4	1620	415.48	4.20	1.35	1.35	6.5	215	264	255	53	86	81	261	
3	1625	418.93	4.40	1.45	1.45	7.0	215	263	254	54	86	81	261	
2	1630	422.47	4.10	1.35	1.35	7.0	216	263	253	55	87	81	261	
2	1635	425.97	3.80	1.25	1.25	6.5	217	263	255	57	87	82	260	
1	1640	429.34	3.25	1.05	1.05	6.0	216	263	254	57	87	82	260	
1	1645	432.44	3.00	0.98	0.98	5.5	215	264	253	56	87	83	261	
End	1650	435.474	—	—	—	—	—	—	—	—	—	—	—	
All														

Job Number 07-024
Job Name ADA-ES Hardin, MT
Run Number 3
Unit Stack
Date 26 April 2007
Operator Mullins, Jackson
Sample Box No. M-3 Meter Box No. 1-1

Ontario-Hydro Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 61
Assumed Moisture % 15
Probe Length 9"
C Factor 3.3 to reference
Initial Leak @ 15.0 "Hg = 0.003 cfm
Final Leak @ 8.0 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
A-10	1810	435.872	4.10	1.35	1.35	5.5	212	267	254	59	73	74	244	
9	1815	439.36	4.20	1.40	1.40	5.5	213	266	255	51	73	74	247	
8	1820	442.90	4.25	1.40	1.40	6.0	214	268	254	47	74	74	248	
7	1825	446.43	4.25	1.40	1.40	6.0	214	269	255	47	76	73	248	
6	1830	449.95	4.30	1.40	1.40	6.0	214	268	253	45	78	74	250	
5	1835	453.46	4.45	1.45	1.45	6.0	215	269	254	46	79	74	256	
4	1840	456.98	4.45	1.45	1.45	6.0	215	268	255	47	80	75	260	
3	1845	460.51	4.55	1.50	1.50	6.5	215	268	254	48	81	75	265	
2	1850	464.10	4.25	1.40	1.40	6.5	215	269	256	49	82	76	266	
2	1855	467.63	4.20	1.40	1.40	6.5	215	268	255	50	83	77	267	
1	1900	471.13	3.80	1.25	1.25	6.0	215	269	254	50	83	78	269	
1	1905	474.47	3.65	1.20	1.20	6.0	216	269	253	49	84	78	269	
End	1910	477.716	—	—	—	—	—	—	—	—	—	—	—	
B-10	1915	477.716	4.35	1.45	1.45	6.0	217	269	255	51	82	79	276	
9	1920	481.20	4.60	1.50	1.50	6.5	217	268	254	49	82	79	277	
8	1925	484.81	4.40	1.45	1.45	6.5	218	269	253	50	83	79	280	
7	1930	488.42	4.25	1.40	1.40	6.5	218	270	254	50	84	79	279	
6	1935	491.97	4.20	1.40	1.40	6.5	217	270	255	52	84	79	280	

Pitot Tube Calibration Factor C_p 0.826
Volume Collected V_m 83.698 ft³
Water Collected V_w 275.8 ml
Time of Test T_t 120 min.
Stack Pressure P_s −1.50 "H₂O

Pitot Tube No. 2-1
Baro. Press. P_b 26.93 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 12.7 % CO 0.0
% O_2 6.8 % N_2 80.5
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 5-1
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.998 X 83.265

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. M-5

Impinger 1	Final Weight	959.0	Water Weight Gain	Impinger 1	210.4
	Initial Weight	748.6	Imp 8 1006.2		
	Increase	210.4	Init. 991.6	Impinger 2	38.6
			Inc. 14.6		
Impinger 2	Final Weight	782.5		Impinger 3	6.8
	Initial Weight	743.9			
	Increase	38.6		Impinger 4	4.7
			V_w =		
Impinger 3	Final Weight	764.4	g SO_2 =	Impinger 5	0.9
	Initial Weight	757.6	V_w =		
	Increase	6.8		Impinger 6	0.9
Impinger 4	Final Weight	763.4		Impinger 7	-1.1
	Initial Weight	758.7			
	Increase	4.7	Filter No. A178	Imp8	14.6
				Total	275.8 = V_w
Impinger 5	Final Weight	745.3	P_b = 26.93	$\%CO_2$ =	12.7
	Initial Weight	744.4	V_m = 83.098	$\%O_2$ =	6.8
	Increase	0.9	V_w = 275.8	%CO =	0.0
			4/26/07 P_m = 1.369	$\%N_2$ =	80.5
Impinger 6	Final Weight	752.0	Avg ΔP = 4.158	A_s =	9363
	Initial Weight	751.1		D_n =	0.154
	Increase	0.9	Avg$\sqrt{\Delta P}$ = 2.038	T_1 =	120
			C_p = 0.826		
Impinger 7	Final Weight	740.6	P_s = -1.50 "H_2O	26.82	"Hg
	Initial Weight	741.7	T_m = 80 °F	540	°R
	Increase	-1.1	T_s = 216 °F	676	°R

Moisture Content: %M = 15.06 M_d = 0.8494 MW_c = 30.304 MW = 28.45

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 83.098 \left[\frac{26.93 + \frac{1.369}{13.6}}{80 + 460}\right] = \frac{73.417\ sft^3}{0.612\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 275.8 = 13.018 sft^3

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{13.018}{73.414 + 13.018} \times 100 = 15.06\ \%$$

$$V_s = 5123.8 \times 0.826 \sqrt{\frac{676}{26.82 \times 28.45}} \times 2.038 = 8119\ fpm$$

ACFM: 527,876

$$\%I = \frac{1.039 \times 73.417 \times 676}{0.8494 \times 26.82 \times 8119 \times 120 \times (0.154)^2} = 98.0\ \%$$

(15) 5/10/07

SCFM: 315,099

%EA: 46.8

Run Number 3
Unit Stack
Date 26 April 2007

Ontario Hydro FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
B-5	1940	495.50	4.15	1.35	1.35	6.5	217	270	255	54	85	80	280	
4	1945	498.97	4.20	1.40	1.40	6.5	217	269	253	56	85	80	278	
3	1950	502.46	4.25	1.40	1.40	6.5	218	269	254	57	86	80	276	
2	1955	505.94	3.95	1.30	1.30	6.5	219	268	254	57	86	81	272	
2	2000	509.35	3.95	1.30	1.30	6.5	219	267	253	56	87	81	271	
1	2005	512.75	3.55	1.15	1.15	6.0	219	266	254	54	87	82	267	
1	2010	515.96	3.50	1.15	1.15	6.0	219	267	255	53	86	82	263	
End	2015	519.137	—	—	—	—	—	—	—	—	—	—	—	
All														

ORSAT ANALYSIS DATA FORM

Job #: 07-024
Job Name: ADA-ES
Location: Hardin, MT
Date: 26 April 2007
Operator: Mullins

Sample Location: Stack
Analytical Method: 3
Sample Type: Single Point (Multi Point) Grab (Integrated)
Leak Check: Time: 24 hrs (≥ 4 minutes) Rate: 0.0
Ambient Air Check:

CO_2 - % Vol.	0.0
O_2 - % Vol.	20.9
N_2 - % Vol.	79.1

Run #: 1
Run Time: 1020-1305

CO_2 - % Vol.	12.7	12.8	12.7	12.7
O_2 - % Vol.	6.8	6.7	6.8	6.8
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

Run #: 2
Run Time: 1445-1650

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	12.6	12.6	12.6	12.6
O_2 - % Vol.	6.9	6.9	6.9	6.9
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

Run #: 3
Run Time: 1810-2015

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	12.7	12.7	12.7	12.7
O_2 - % Vol.	6.8	6.8	6.8	6.8
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

Job Number 07-024
Job Name ADA-ES (HARDIN, MT)
Run Number 1
Unit SDA Inlet
Date 4/26/07
Operator Sakowski / Odde
Sample Box No. M1 Meter Box No. 1-2

Ontario Hydro Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 55
Assumed Moisture % 10
Probe Length 6'
C Factor 6.4 to reference
Initial Leak @ 18.5 "Hg = 0.001 cfm
Final Leak @ 11.0 "Hg = 0.001 cfm

	Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
A-4	~~1020~~	1020 ✓	270.355	0.97	0.63	0.63	5.0	324	235	252	54	64	65	
	A-4	1025	272.68	1.05	0.67	0.67	5.0	328	228	253	50	65	65	
	3	1030	275.12	0.90	0.57	0.57	5.0	323	228	257	43	67	65	
	3	1035	277.44	0.90	0.57	0.57	5.0	320	258	258	41	69	66	
	2	1040	279.72	0.81	0.51	0.51	5.0	320	259	250	40	71	66	
	2	1045	281.92	0.80	0.51	0.51	5.5	320	259	252	40	72	67	
	1	1050	284.09	0.42	0.27	0.27	5.0	320	259	253	41	74	68	
	1	1055	285.83	0.40	0.26	0.26	5.0	320	257	255	42	75	69	
	END	1100	287.453	—	—	—	—	—	—	—	—	—	—	
	B-4	1101	287.453	1.30	0.82	0.82	6.5	323	258	252	41	77	71	
	4	1106	289.97	1.30	0.82	0.82	7.0	324	256	255	41	79	72	
	3	1111	292.70	1.15	0.73	0.73	7.0	320	252	252	41	80	72	
	3	1116	295.30	1.20	0.76	0.76	7.5	323	257	254	43	82	73	
	2	1121	297.94	1.05	0.67	0.67	7.0	319	258	249	42	82	74	
	2	1126	300.45	1.05	0.67	0.67	7.0 (B)	315	258	254	43	83	75	
	1	1131	302.96	0.37	0.24	0.24	~~0.24~~ 6.0	308	257	251	45	83	75	Unit Problems
	1	1136	304.59	0.43	0.27	0.27	6.0	313	258	252	45	82	76	Pumps ↓ @
	END	1141	306.232	—	—	—	—	—	—	—	—	—	—	@ 1141

D-12

Pitot Tube Calibration Factor C_p 0.824
Volume Collected V_m 55.077 ft³
Water Collected V_w 130.40 ml
Time of Test T_t 120 min.
Stack Pressure P_s -18.0 "H₂O

Pitot Tube No. 2-3
Baro. Press. P_b 26.96 "Hg
Probe Tip Dia. D_n 0.193 in.
% CO_2 12.8 % CO 0.0
% O_2 6.5 % N_2 80.7
Area Stack A_s 20,235 in²

Barometer No. —
Probe Tip No. 7-2-3
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 54.858 X 1.004

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. M1

Impinger 1	Final Weight	850.9
	Initial Weight	751.3
	Increase	99.6
Impinger 2	Final Weight	741.0
	Initial Weight	729.4
	Increase	11.6
Impinger 3	Final Weight	758.1
	Initial Weight	754.7
	Increase	3.4
Impinger 4	Final Weight	745.3
	Initial Weight	741.7
	Increase	3.6
Impinger 5	Final Weight	736.9
	Initial Weight	736.3
	Increase	0.6
Impinger 6	Final Weight	749.9
	Initial Weight	749.8
	Increase	0.1
Impinger 7	Final Weight	733.1
	Initial Weight	733.0
	Increase	0.1

Water Weight Gain

Imp. 8
Final 951.0
Initial 939.6
Increase 11.4

V_w =
g SO_2 = ____
V_w =

Thimble #50
Filter #A173

Impinger 1	99.6
Impinger 2	11.6
Impinger 3	3.4
Impinger 4	3.6
Impinger 5	0.6
Impinger 6	0.1
Impinger 7	0.1
Imp 8	11.4
Total	130.4 = V_w

P_b =	26.96	%CO_2 =	12.8
V_m =	55.077	%O_2 =	6.5
V_w =	130.4	%CO =	0.0
P_m =	0.577	%N_2 =	80.7
Avg ΔP =	~~2.718~~ 0.906	A_n =	20.235
		D_n =	0.193
Avg$\sqrt{\Delta P}$ =	0.939	T_s =	120
C_p =	0.824		
P_s =	-18.0 °H_2O		25.64 °Hg
T_m =	74 °F		534 °R
T_s =	320 °F		780 °R

Moisture Content: %M = 11.13 M_d = 0.8887 MW_c = 30.308 MW = 28.94

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 55.077 \left[\frac{26.96 + \frac{0.577}{13.6}}{74 + 460}\right] = \frac{49.156}{0.410}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 130.4 = 6.155 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{6.155}{49.156 + 6.155} \times 100 = 11.13\ \%$$

$$V_s = 5123.8 \times 0.824 \sqrt{\frac{780}{25.64 \times 28.94}} \times 0.939 = 4065\ fpm$$

ACFM: 571,169

SCFM: 295,561

%EA: 43.7

$$\%I = \frac{1.039 \times 780 \times 49.156}{0.8887 \times 25.64 \times 4065 \times 120 \times (0.193)^2} = 96.2\ \%$$

(PS) 5/10/07

Run Number 1
Unit 50A Inlet
Date 4/26/07

Ontario Hydro FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
C-4	1222	306.232	1.00	0.64	0.64	6.5	321	247	256	50	73	73	Pump ↑ @
4	1227	308.57	1.00	0.64	0.64	7.0	322	250	256	45	74	73	1222
3	1232	310.90	1.10	0.70	0.70	8.0	323	248	256	43	75	73	
3	1237	313.53	1.05	0.67	0.67	8.0	320	258	254	43	76	73	
2	1242	316.02	1.10	0.70	0.70	8.5	321	260	256	43	78	73	
2	1247	318.57	1.00	0.64	0.64	8.5	321	259	254	44	80	74	
1	1252	321.00	0.72	0.45	0.45	8.0	322	260	255	44	80	75	
1	1257	323.11	0.67	0.43	0.43	7.5	318	260	256	44	81	75	
END	1302	325.213	—	—	—	—	—	—	—	—	—	—	

Job Number 07-024
Job Name ADA-ES (HARDIN, MT)
Run Number 2
Unit SDA Inlet
Date 4/26/07
Operator Selakovich / Odde
Sample Box No. M2 Meter Box No. 1-2

Ontario Hydro Field Data

Read and record at the start of each test point.

Purge to: –
Purge time: –
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 60
Assumed Moisture % 10
Probe Length 6'
C Factor 6.4 to reference
Initial Leak @ 15.0 "Hg = 0.002 cfm
Final Leak @ 8.5 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
C-4	1445 ✓	325.602	1.10	0.70	0.70	5.0	322	246	250	48	72	72	
4	1450	328.00	1.10	0.70	0.70	5.5	322	241	252	47	72	72	
3	1455	330.56	1.10	0.70	0.70	6.0	323	242	252	45	75	72	
3	1500	333.11	1.15	0.73	0.73	6.5	323	262	249	45	76	72	
2	1505	335.72	1.00	0.64	0.64	6.0	321	260	245	44	79	73	
2	1510	338.20	1.10	0.70	0.70	6.5	322	258	248	42	80	73	
1	1515	340.74	0.72	0.46	0.46	6.0	319	259	245	40	81	74	
1	1520	342.92	0.70	0.44	0.44	6.0	319	259	245	40	82	74	
END	1525	345.080	–	–	–	–	–	–	–	–	–	–	✓ Check
B-4	1536	345.486	1.30	0.82	0.82	7.0	325	252	244	42	79	75	0.000
4	1541	348.10	1.40	0.88	0.88	7.0	327	243	248	41	80	75	Nozzle: (5-2) 0.193
3	1546	350.91	1.30	0.82	0.82	7.0	329	249	245	42	81	75	
3	1551	353.67	1.25	0.80	0.80	7.0	327	262	251	43	82	75	
2	1556	356.38	1.05	0.67	0.67	7.0	326	263	248	43	83	75	
2	1601	358.95	1.15	0.73	0.73	7.5	325	262	250	44	83	76	
1	1606	361.47	0.70	0.44	0.44	6.5	323	262	248	45	84	77	
1	1611	363.60	0.67	0.42	0.42	6.5	323	262	249	46	84	77	
End	1616	365.753	–	–	–	–	–	–	–	–	–	–	

Pitot Tube Calibration Factor C_p 0.822
Volume Collected V_m 58.194 ft³
Water Collected V_w 132.5 ml
Time of Test T_t 120 min.
Stack Pressure P_s -19.0 "H₂O

Pitot Tube No. 2-4
Baro. Press. P_b 26.93 "Hg
Probe Tip Dia. D_n 0.193 in.
% CO_2 12.7 % CO 0.0
% O_2 6.6 % N_2 80.7
Area Stack A. 20.235 in²

Barometer No. –
Probe Tip No. 7-2
Total Volume of Leak Checks After Start: 0.406 ft³
V_m X Dry Gas Meter Calibration Factor 57.962 x 1.004 ✓

[Dry Gas Meter Reading – ft³ - (T_t – min. X Leak Rate – cfm)]

Impinger Box No. M2

Impinger 1	Final Weight	829.9
	Initial Weight	729.8
	Increase	100.1
Impinger 2	Final Weight	773.6
	Initial Weight	761.8
	Increase	11.8
Impinger 3	Final Weight	766.3
	Initial Weight	763.0
	Increase	3.3
Impinger 4	Final Weight	736.7
	Initial Weight	733.0
	Increase	3.7
Impinger 5	Final Weight	756.5
	Initial Weight	754.3
	Increase	0.2
Impinger 6	Final Weight	748.7
	Initial Weight	748.3
	Increase	0.4
Impinger 7	Final Weight	763.1
	Initial Weight	762.6
	Increase	0.5

Water Weight Gain

Final 958.0
Initial 945.5
Increase 12.5

V_w =
g SO_2 = _____
V_w =

Thimble #52
Filter #A 174

Impinger 1	100.1
Impinger 2	11.8
Impinger 3	3.3
Impinger 4	3.7
Impinger 5	0.2
Impinger 6	0.4
Impinger 7	0.5
Imp 8	12.5
Total	132.5 = V_w

P_b =	26.93	%CO_2 =	12.7
V_m =	58.194	%O_2 =	6.6
V_w =	132.5	%CO =	0.0
P_m =	0.631	%N_2 =	80.7
Avg ΔP =	0.995	A_s =	20.235
		D_n =	0.193
Avg$\sqrt{\Delta P}$ =	0.987	T_1 =	120
C_p =	0.822		
P_s =	-18.0 °H_2O		25.53 °Hg
T_m =	79 °F		539 °R
T_s =	324 °F		784 °R

Moisture Content: %M = 10.85 M_d = 0.8915 MW_c = 30.296 MW = 28.96

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 58.194 \left[\frac{26.93 + \frac{0.631}{13.6}}{79 + 460}\right] = 51.407\ sft^3 = 0.428\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 132.5 = 6.254 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{6.254}{51.407 + 6.254}$ x 100 = 10.85 %

V_s = 5123.8 x 0.822 $\sqrt{\frac{784}{25.53 \times 28.96}}$ x 0.987 = 4281 fpm

ACFM: 601,527

SCFM: 309,321

%I = $\frac{1.039 \times 784 \times 51.407}{0.8915 \times 25.53 \times 4281 \times 120 \times (0.193)^2}$ = 96.2 %

5/10/07

%EA: 44.64

Run Number 2
Unit SDA Inlet
Date 4/26/07

Ontario Hydro FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
A-4	1617	365.753	1.15	0.73	0.73	8.0	328	248	247	46	85	78	
4	1622	367.72	1.15	0.73	0.73	8.0	328	248	250	46	86	78	
3	1627	370.32	1.00	0.64	0.64	7.5	327	252	246	47	87	79	
3	1632	372.77	1.10	0.70	0.70	8.0	329	261	248	48	87	79	
2	1637	375.84	0.92	0.58	0.58	8.0	326	263	248	49	87	80	
2	1642	378.22	0.92	0.58	0.58	8.0	325	263	249	49	87	81	
1	1647	380.59	0.42	0.27	0.27	7.0	322	263	251	49	87	81	
1	1652	382.34	0.42	0.27	0.27	6.5	322	262	249	50	87	81	
END	1657	383.970	—	—	—	—	—	—	—	—	—	—	

Job Number 07-024
Job Name ADA-ES (HARDIN, MT)
Run Number 3
Unit SDA Inlet
Date 4/26/07
Operator Selakovich / Odde
Sample Box No. M2 Meter Box No. 1-2

Ontario Hydro Field Data

Read and record at the start of each test point.

Purge lo: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 58
Assumed Moisture % 10
Probe Length 6'
C Factor 6.4 to reference
Initial Leak @ 15.0 "Hg = 0.001 cfm
Final Leak @ 10.0 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
A-4	1810	384.333	1.05	0.67	0.67	5.0	322	255	261	51	76	76	Integrated Coal
4	1815	386.71	1.10	0.70	0.70	5.5	328	244	250	46	77	76	
3	1820	389.26	1.05	0.67	0.67	6.0	326	249	253	43	79	76	
3	1825	391.75	0.99	0.63	0.63	6.0	326	259	252	42	81	77	
2	1830	394.19	0.85	0.54	0.54	6.0	323	260	254	43	83	78	
2	1835	396.46	0.89	0.56	0.56	6.5	326	260	251	44	85	78	
1	1840	398.75	0.44	0.28	0.28	5.5	322	260	252	44	87	79	
1	1845	400.48	0.46	0.29	0.29	5.5	322	260	250	46	88	81	
END	1850	402.203	—	—	—	—	—	—	—	—	—	—	
B-4	1851	402.203	1.40	0.89	0.89	7.5	327	242	255	44	89	82	
4	1856	404.94	1.40	0.89	0.89	8.0	326	244	250	42	92	83	
3	1901	407.77	1.25	0.78	0.78	8.0	327	248	251	41	93	84	
3	1906	410.47	1.20	0.76	0.76	8.0	324	261	251	41	94	85	
2	1911	413.14	1.15	0.73	0.73	8.0	326	261	253	43	94	86	
2	1916	415.76	1.10	0.70	0.70	8.0	324	262	252	43	94	86	
1	1921	418.34	0.74	0.47	0.47	7.5	325	261	257	43	94	87	
1	1926	420.50	0.71	0.45	0.45	7.5	323	261	252	44	93	87	
END	1931	422.625	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p 0.824
Volume Collected V_m 58.127 ft^3
Water Collected V_w 126.5 ml
Time of Test T_t 120 min.
Stack Pressure P_s -16.0 "H_2O

Pitot Tube No. 2-3
Baro. Press. P_b 26.93 "Hg
Probe Tip Dia. D_n 0.191 in.
% CO_2 12.7 % CO 0.0
% O_2 6.6 % N_2 80.7
Area Stack A. 20,235 in^2

Barometer No. —
Probe Tip No. 6-2
Total Volume of Leak Checks After Start: 0 ft^3
V_m X Dry Gas Meter Calibration Factor 57.895 x 1.004 ✓

[Dry Gas Meter Reading ___ ft^3 - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. M 1

			Water Weight Gain		
Impinger 1	Final Weight	850.5		Impinger 1	96.8
	Initial Weight	753.7		Impinger 2	14.5
	Increase	96.8	Final 960.4	Impinger 3	2.2
Impinger 2	Final Weight	743.8	Initial 951.0	Impinger 4	3.4
	Initial Weight	729.3	Increase 9.4	Impinger 5	0.2
	Increase	14.5		Impinger 6	0.1
Impinger 3	Final Weight	762.2	V_w =	Impinger 7	-0.1
	Initial Weight	760.0	g SO_2 =	8	9.4
	Increase	2.2	V_w =	Total	126.5 = V_w
Impinger 4	Final Weight	750.7	Thimble # 51		
	Initial Weight	747.3	Filter # A175		
	Increase	3.4			
Impinger 5	Final Weight	732.4	P_b = 26.93	$\%CO_2$ = 12.7	
	Initial Weight	732.2	V_m = 58.127	$\%O_2$ = 6.6	
	Increase	0.2	V_w = 126.5	%CO = 0.0	
			P_m = 0.626	$\%N_2$ = 80.7	
Impinger 6	Final Weight	764.7	Avg ΔP = 0.986	A_s = 20,235	
	Initial Weight	764.6		D_n = 0.191	
	Increase	0.1	Avg$\sqrt{\Delta P}$ = 0.984	T_1 = 120	
			C_p = 0.824		
Impinger 7	Final Weight	729.1	P_s = -16.0 "H_2O	25.75 "Hg	
	Initial Weight	729.2	T_m = 87 °F	547 °R	
	Increase	-0.1	T_s = 325 °F	785 °R	

Moisture Content: %M = 10.56 M_d = 0.8944 MW_c = 30.296 MW = 28.00

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 58.127 \left[\frac{26.93 + \frac{0.626}{13.6}}{87 + 460}\right] = 50.596\ sft^3 = 0.422\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 126.5 = 5.971 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{5.971}{50.596 + 5.971}$ x 100 = 10.56 %

V_s = 5123.8 x 0.824 $\sqrt{\frac{785}{25.75 \times 28.00}}$ x 0.984 = 4260 fpm

ACFM: 598,553

%I = $\frac{1.039 \times 785 \times 50.596}{0.8944 \times 25.75 \times 4260 \times 120 \times (0.191)^2}$ = 96.1 %

SCFM: 311,069

%EA: 44.6

PS 5/10/07

Run Number ~~07-024~~ 3

Unit SDA Inlet

Date 4/26/07

Ontario Hydro FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Remarks
G-4	1932	422.625	1.05	0.67	0.67	7.5	324	261	278	45	93	88	
4	1937	425.10	1.05	0.67	0.67	7.5	326	248	257	43	93	88	
3	1942	427.61	1.05	0.67	0.67	8.0	325	249	257	43	94	89	
3	1947	430.13	1.05	0.67	0.67	8.0	324	260	256	44	94	89	
2	1952	432.66	1.10	0.70	0.70	8.5	326	261	256	45	94	89	
2	1957	435.31	1.10	0.70	0.70	8.0	329	261	255	44	94	89	
1	2002	437.81	0.73	0.46	0.46	8.0	327	262	261	45	94	90	
1	2007	439.96	0.76	0.48	0.48	8.0	325	261	261	45	94	90	
END	2012	442.228	—	—	—	—	—	—	—	—	—	—	

ORSAT ANALYSIS DATA FORM

Job #: 07-024
Job Name: ADA-ES
Location: Hardin, MT
Date: 26 April 2007
Operator: Mullins

Sample Location: SDA Inlet
Analytical Method: 3
Sample Type: Single Point / Multi Point Grab / Integrated
Leak Check: Time: 24 hrs (≥ 4 minutes) Rate: 0.0
Ambient Air Check:

CO_2 - % Vol.	0.0
O_2 - % Vol.	20.9
N_2 - % Vol.	79.1

Run #: 1
Run Time:

CO_2 - % Vol.	12.8	12.8	12.8	12.8
O_2 - % Vol.	6.5	6.5	6.5	6.5
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.7	80.7	80.7	80.7

Run #: 2
Run Time:

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	12.7	12.7	12.7	12.7
O_2 - % Vol.	6.6	6.6	6.6	6.6
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.7	80.7	80.7	80.7

Run #: 3
Run Time:

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	12.7	12.7	12.7	12.7
O_2 - % Vol.	6.6	6.6	6.6	6.6
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.7	80.7	80.7	80.7

Job Number 07-024 ✓
Job Name ADA-ES Hardin, MT ✓
Run Number 1 ✓
Unit Stack ✓
Date 27 April 2007 ✓
Operator Mullins, Selakovich ✓
Sample Box No. 1-1 Meter Box No. 1-1

26A Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 54
Assumed Moisture % 15
Probe Length 9'
C Factor 3.3 to reference
Initial Leak @ 15.0 "Hg = 0.001 cfm
Final Leak @ 7.5 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
B-10	0900	519.700	4.30	1.40	1.40	6.5	220	259	256	52	55	54	235	
9	0903	521.80	4.20	1.40	1.40	6.5	220	253	255	49	56	54	235	
8	0906	523.91	4.40	1.45	1.45	6.5	221	259	255	47	57	54	236	
7	0909	525.99	4.30	1.40	1.40	6.5	222	264	255	44	58	55	237	
6	0912	528.08	4.25	1.40	1.40	6.5	222	263	256	43	59	55	237	
5	0915	530.14	4.10	1.35	1.35	6.5	222	263	255	43	61	56	238	
4	0918	532.19	4.05	1.35	1.35	6.0	222	264	255	44	62	56	238	
3	0921	534.22	4.00	1.30	1.30	6.0	221	264	255	44	63	57	237	
2	0924	536.22	4.10	1.35	1.35	6.0	221	264	256	44	65	58	238	
2	0927	538.23	4.00	1.30	1.30	6.0	223	264	256	44	66	58	239	
1	0930	540.24	3.60	1.20	1.20	6.0	221	264	255	44	67	59	240	
1	0933	542.21	3.70	1.25	1.25	6.0	222	263	255	44	68	60	239	
End	0936	544.160	—	—	—	—	—	—	—	—	—	—	—	
A-10	0941	544.160	4.05	1.35	1.35	6.5	228	265	248	48	67	62	239	
9	0944	546.16	4.00	1.30	1.30	6.5	228	266	256	45	69	63	239	
8	0947	548.17	4.00	1.30	1.30	6.5	227	267	255	44	69	63	240	
7	0950	550.19	3.90	1.30	1.30	6.5	225	267	255	45	70	63	241	
6	0953	552.22	4.20	1.40	1.40	7.0	225	269	261	45	71	64	246	

Pitot Tube Calibration Factor C_p 0.826
Volume Collected V_m 48.359 ft³
Water Collected V_w 167.4 ml
Time of Test T_t ~~60~~ 72 min. 8:34 4/27/07
Stack Pressure P_s −2.05 "H₂O

Pitot Tube No. 2-1
Baro. Press. P_b 27.05 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 12.7 % CO 0.0
% O_2 6.6 % N_2 80.7
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 5-1
Total Volume of Leak Checks After Start: 0 ✓ ft³
V_m X Dry Gas Meter Calibration Factor 0.998 ✓ X 48.456

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 1-1

Impinger 1	Final Weight	858.4		Impinger 1	127.1
	Initial Weight	731.3			
	Increase	127.1		Impinger 2	22.1
Impinger 2	Final Weight	771.2		Impinger 3	3.9
	Initial Weight	749.1			
	Increase	22.1		Impinger 4	1.9
			V_w =		
Impinger 3	Final Weight	732.4	g SO_2 =	Impinger 5	12.4
	Initial Weight	728.5	V_w =		
	Increase	3.9		Impinger 6	
Impinger 4	Final Weight	735.0	FILTER #:	Impinger 7	
	Initial Weight	733.1	A165		
	Increase	1.9		Total	167.4 = V_w
Impinger 5	Final Weight	968.2	P_b = 27.05	$\%CO_2$ =	12.7
	Initial Weight	955.8	V_m = 48.359	$\%O_2$ =	6.6
	Increase	12.4	V_w = 167.4	%CO =	0.0
			P_m = ~~1.312~~ 1.313	$\%N_2$ =	80.7
Impinger 6	Final Weight		Avg ΔP = 3.983	A_s =	9363
	Initial Weight			D_n =	0.154
	Increase		Avg$\sqrt{\Delta P}$ = 1.994	T_t =	72
			C_p = 0.826		
Impinger 7	Final Weight		P_s = -2.05 "H_2O		26.90 "Hg
	Initial Weight		T_m = 64 °F		524 °R
	Increase		T_s = 223 °F		683 °R

Water Weight Gain

Moisture Content: %M = 15.16 M_d = 0.8484 MW_c = 30.296 MW = 28.43

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 48.359 \left[\frac{27.05 + \frac{1.313}{13.6}}{64 + 460}\right] = 44.218\ sft^3 \quad 0.614\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 167.4 = 7.901 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{7.901}{44.218 + 7.901}$ x 100 = 15.16 %

V_s = 5123.8 x $0.826\sqrt{\frac{683}{26.90 \times 28.43}}$ x 1.994 = 7975 fpm

ACFM: 518,556

SCFM: 306,890

%I = $\frac{1.039 \times 44.218 \times 683}{0.8484 \times 26.90 \times 7975 \times 72 \times (0.154)^2}$ = 101.0 % 5/10/07

%EA: 44.6

Run Number 1

Unit Stack

Date 27 April 2007

26 A FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual	P_m Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
A-5	0956	554.26	4.20	1.40	1.40	7.0	225	268	254	45	72	65	244	
4	0959	556.34	4.15	1.35	1.35	7.0	225	268	255	46	73	66	244	
3	1002	558.42	4.20	1.40	1.40	7.0	225	267	255	47	74	66	244	
2	1005	560.48	3.90	1.30	1.30	7.0	224	266	254	47	75	67	245	
2	1008	562.53	3.80	1.25	1.25	6.5	223	266	254	48	76	68	247	
1	1011	564.53	3.10	1.00	1.00	5.5	221	266	261	48	76	69	248	
1	1014	566.35	3.10	1.00	1.00	5.5	220	266	255	48	76	69	248	
End	1017	568.156	—	—	—	—	—	—	—	—	—	—	—	
All														

Job Number 07-024
Job Name ADA-ES Hardin, MT
Run Number 2
Unit Stack
Date 27 April 2007
Operator Mullins, Selakovich
Sample Box No. 1-2 Meter Box No. 1-1

26A Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 67
Assumed Moisture % 15
Probe Length 9'
C Factor 3.3 to reference
Initial Leak @ 15.0 "Hg = 0.002 cfm
Final Leak @ 8.5 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
A-10	1110	568.538	3.65	1.20	1.20	6.0	223	265	257	65	71	70	251	
9	1113	570.48	3.50	1.15	1.15	5.5	222	265	256	63	71	70	250	
8	1116	572.40	3.70	1.20	1.20	5.5	221	268	257	59	72	70	249	
7	1119	574.30	3.70	1.20	1.20	5.5	220	269	256	56	73	70	250	
6	1122	576.20	3.80	1.25	1.25	6.0	223	268	257	53	74	71	250	
5	1125	578.10	3.90	1.30	1.30	6.5	224	266	253	51	75	71	248	
4	1128	580.09	4.20	1.40	1.40	7.0	226	265	253	50	76	71	248	
3	1131	582.14	4.00	1.30	1.30	7.0	227	264	257	50	77	72	248	
2	1134	584.15	3.50	1.15	1.15	6.0	227	264	254	50	78	72	250	
2	1137	586.07	3.50	1.15	1.15	6.0	224	264	255	50	78	72	251	
1	1140	587.97	3.00	0.98	0.98	5.5	222	263	250	50	79	73	250	
1	1143	589.74	2.90	0.96	0.96	5.5	221	261	250	50	79	74	250	
End	1146	591.479	—	—	—	—	—	—	—	—	—	—	—	
B-10	1151	591.479	4.00	1.30	1.30	7.0	221	262	254	52	78	75	251	
9	1154	593.48	3.70	1.20	1.20	6.5	221	260	255	51	79	75	252	
8	1157	595.43	3.90	1.30	1.30	7.0	220	265	256	50	79	75	257	
7	1200	597.43	4.40	1.45	1.45	7.5	222	265	256	50	80	75	256	
6	1203	599.51	3.90	1.30	1.30	7.5	226	266	255	50	81	75	257	

Pitot Tube Calibration Factor C_p 0.824
Volume Collected V_m 44.009 ft³
Water Collected V_w 142.7 ml
Time of Test T_t 72 min.
Stack Pressure P_s −1.45 "H₂O

Pitot Tube No. 2-2
Baro. Press. P_b 27.05 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 12.6 % CO 0.0
% O_2 6.7 % N_2 80.7
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 5-1
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.998 x 44.097

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 1-2

Impinger 1	Final Weight	871.5		Water Weight Gain	
	Initial Weight	765.0		Impinger 1	106.5
	Increase	106.5		Impinger 2	17.9
Impinger 2	Final Weight	747.9		Impinger 3	3.8
	Initial Weight	730.0		Impinger 4	1.6
	Increase	17.9	V_w =		
Impinger 3	Final Weight	739.9	g SO_2 =	Impinger 5	12.9
	Initial Weight	736.1	V_w =		
	Increase	3.8		Impinger 6	
Impinger 4	Final Weight	731.1		Impinger 7	
	Initial Weight	729.5	FILTER #: A166		
	Increase	1.6		Total	142.7 = V_w
Impinger 5	Final Weight	975.1	P_b = 27.05	$\%CO_2$ = 12.6	
	Initial Weight	962.2	V_m = 44.009	$\%O_2$ = 6.7	
	Increase	12.9	V_w = 142.7	%CO = 0.0	
			P_m = 1.086	$\%N_2$ = 80.7	
Impinger 6	Final Weight		Avg ΔP = 3.304	A_s = 9363	
	Initial Weight			D_n = 0.154	
	Increase		Avg$\sqrt{\Delta P}$ = 1.805	T_t = 72	
			C_p = 0.824		
Impinger 7	Final Weight		P_s = -1.45 "H_2O	26.94 "Hg	
	Initial Weight		T_m = 76 °F	536 °R	
	Increase		T_s = 220 °F	680 °R	

Moisture Content: %M = 14.63 M_d = 0.8537 MW_c = 30.284 MW = 28.49

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 44.009 \left[\frac{27.05 + \frac{1.086}{13.6}}{76 + 460}\right] = \frac{39.316\ sft^3}{0.546\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 142.7 = 6.735 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{6.735}{39.316 + 6.735} \times 100 = 14.63\ \%$$

$$V_s = 5123.8 \times 0.824 \sqrt{\frac{680}{26.94 \times 28.49}} \times 1.805 = 7173\ fpm$$

ACFM: 466,400

SCFM: 278,393

$$\%I = \frac{1.039 \times 39.316 \times 680}{0.8537 \times 26.94 \times 7173 \times 72 \times (0.154)^2} = 98.6\ \%$$

5/10/07

%EA: 45.6

Run Number 2

Unit Stack

Date 27 April 2007

26 A FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
B-5	1206	601.58	2.70	0.89	0.89	5.5	226	266	255	50	81	76	259	
4	1209	603.36	2.30	0.76	0.76	5.0	220	266	255	52	81	76	260	
3	1212	604.97	2.60	0.86	0.86	5.0	213	266	256	53	82	77	259	
2	1215	606.60	2.35	0.77	0.77	5.0	211	265	256	54	82	77	260	
2	1218	608.21	2.30	0.76	0.76	5.0	209	266	256	54	82	77	260	
1	1221	609.76	1.90	0.62	0.62	4.5	207	263	254	54	82	78	256	
1	1224	611.22	1.90	0.62	0.62	4.5	206	264	255	54	82	78	253	
End	1227	612.635	—	—	—	—	—	—	—	—	—	—	—	
All														

Job Number 07-024 ✓
Job Name ADA-ES Hardin, MT ✓
Run Number 3 ✓
Unit Stack ✓
Date 27 April 2007 ✓
Operator Mullins, Selakovich ✓
Sample Box No. 1-3 Meter Box No. 1-1

26A Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 68
Assumed Moisture % 15
Probe Length 9'
C Factor 3.3 to reference
Initial Leak @ 15.0 "Hg = 0.004 cfm
Final Leak @ 8.5 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
B-10	1407	613.046	4.05	1.35	1.35	5.5	229	262	254	51	72	73	230	
9	1410	615.11	3.80	1.25	1.25	5.0	229	261	255	46	72	73	231	
8	1413	617.20	4.00	1.35	1.35	5.5	229	264	253	45	72	73	235	
7	1416	619.18	3.80	1.25	1.25	5.5	229	265	256	45	73	73	238	
6	1419	621.19	3.70	1.20	1.20	5.0	229	265	257	46	74	73	240	
5	1422	623.11	3.70	1.20	1.20	5.0	229	264	256	47	75	73	239	
4	1425	625.08	3.80	1.25	1.25	5.5	229	264	254	48	77	73	239	
3	1428	627.10	3.60	1.20	1.20	5.5	229	264	255	48	78	73	240	
2	1431	629.05	3.40	1.10	1.10	5.0	228	264	256	50	79	74	240	
2	1434	630.93	3.70	1.20	1.20	5.5	229	263	257	51	79	74	239	
1	1437	632.82	3.10	1.00	1.00	5.0	229	263	255	51	80	74	239	
1	1440	634.62	3.00	0.99	0.99	5.0	228	263	257	50	80	75	242	
End	1443	636.382	—	—	—	—	—	—	—	—	—	—	—	
A-10	1447	636.382	3.80	1.25	1.25	5.5	226	265	256	53	80	76	240	
9	1450	638.35	3.60	1.20	1.20	5.5	226	264	255	49	81	76	241	
8	1453	640.32	3.70	1.20	1.20	5.5	225	267	254	48	81	77	242	
7	1456	642.27	3.90	1.30	1.30	6.0	225	267	255	47	82	77	246	
6	1459	644.30	4.30	1.40	1.40	6.5	226	266	256	48	83	77	246	

Pitot Tube Calibration Factor C_p 0.824
Volume Collected V_m 47.712 ft³
Water Collected V_w 151.4 ml
Time of Test T_t 72 min.
Stack Pressure P_s −1.50 "H₂O

Pitot Tube No. 2-2
Baro. Press. P_b 26.99 "Hg
Probe Tip Dia. D_n 0.154 in.
% CO_2 12.6 % CO 0.0
% O_2 6.7 % N_2 80.7
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. 5-1
Total Volume of Leak Checks After Start: 0 ✓ ft³
V_m X Dry Gas Meter Calibration Factor 0.998 ✓ X 47.808

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 1-3

Impinger 1	Final Weight	862.7		Water Weight Gain	
	Initial Weight	745.4		Impinger 1	117.3
	Increase	117.3		Impinger 2	16.7
Impinger 2	Final Weight	753.6		Impinger 3	4.3
	Initial Weight	736.9		Impinger 4	1.9
	Increase	16.7	V_w =		
Impinger 3	Final Weight	756.4	g SO_2 =	Impinger 5	11.2
	Initial Weight	752.1	V_w =		
	Increase	4.3		Impinger 6	
Impinger 4	Final Weight	741.4		Impinger 7	
	Initial Weight	739.5	FILTER # A167		
	Increase	1.9		Total	151.4 = V_w
Impinger 5	Final Weight	930.3	P_b = 26.99	$\%CO_2$ =	12.6
	Initial Weight	919.1	V_m = 47.712	$\%O_2$ =	6.7
	Increase	11.2	V_w = 151.4	%CO =	0.0
			P_m = 1.252	$\%N_2$ =	80.7
Impinger 6	Final Weight		Avg ΔP = 3.810	A_s =	936.3
	Initial Weight			D_n =	0.154
	Increase		Avg$\sqrt{\Delta P}$ = 1.949	T_1 =	72
			C_p = 0.824		
Impinger 7	Final Weight		P_s = -1.50 "H_2O		26.88 "Hg
	Initial Weight		T_m = 78 °F		538 °R
	Increase		T_s = 228 °F		688 °R

Moisture Content: %M = 14.43 M_d = 0.8557 MW_c = 30.284 MW = 28.51

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 47.712 \left[\frac{26.99 + \frac{1.252}{13.6}}{78 + 460}\right] = \frac{42.391\ sft^3}{0.589\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 151.4 = 7.146 sft^3

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{7.146}{42.391 + 7.146} \times 100 = 14.43\ \%$$

$$V_s = 5123.8 \times 0.824 \sqrt{\frac{688}{26.88 \times 28.51}} \times 1.949 = 7797\ fpm$$

ACFM: 506,949 (50)

SCFM: 300,200

$$\%I = \frac{1.039 \times 42.391 \times 688}{0.8557 \times 26.88 \times 7797 \times 72 \times (0.154)^2} = 99.0\ \%$$

(PS) 5/10/07

%EA: 45.6

Run Number 3

Unit Stack

Date 27 April 2007

26A FIELD DATA

Point	Clock Time	Dry Gas Meter, CF	ΔP_s "Pitot" "H_2O	Orifice ΔH "H_2O Desired	P_m Orifice ΔH "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet	Heated Line °F	Remarks
5	1502	646.38	4.30	1.40	1.40	6.5	227	266	256	48	83	78	248	
4	1505	648.48	4.40	1.45	1.45	7.0	227	265	255	50	84	78	249	
3	1508	650.62	4.60	1.50	1.50	7.5	227	265	254	50	85	79	250	
2	1511	652.82	4.30	1.40	1.40	7.0	227	265	256	51	85	79	251	
2	1514	654.94	4.30	1.40	1.40	7.0	227	265	255	52	86	80	249	
1	1517	657.07	3.30	1.10	1.10	6.0	227	265	255	52	86	80	248	
1	1520	659.00	3.30	1.10	1.10	6.0	227	264	255	52	86	81	246	
End	1523	660.854	—	—	—	—	—	—	—	—	—	—	—	
All														

ORSAT ANALYSIS DATA FORM

Job #: 07-024
Job Name: ADA-ES
Location: Hardin, MT
Date: 27 April 2007
Operator: Mullins

Sample Location: Stack
Analytical Method: 3
Sample Type: Single Point / Multi Point Grab / Integrated
Leak Check: Time: 24 hrs (≥ 4 minutes) Rate: 0.0
Ambient Air Check:

CO_2 - % Vol.	0.0
O_2 - % Vol.	20.9
N_2 - % Vol.	79.1

Run #: 1
Run Time: 0900-1017

CO_2 - % Vol.	12.6	12.8	12.8	12.7
O_2 - % Vol.	6.6	6.7	6.5	6.6
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.8	80.5	80.7	80.7

Run #: 2
Run Time: 1110-1227

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	12.6	12.6	12.6	12.6
O_2 - % Vol.	6.7	6.7	6.7	6.7
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.7	80.7	80.7	80.7

Run #: 3
Run Time: 1407-1523

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	12.6	12.6	12.6	12.6
O_2 - % Vol.	6.7	6.7	6.7	6.7
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.7	80.7	80.7	80.7

AIR SAMPLING ASSOCIATES, INC.

Appendix E:

EPA Test Methods 5 and 26A (Particulate Matter and Hydrogen Halides & Halogens) Analytical Data – Stack

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 07-024

Date Analysis Completed: 5/11/07

Project Name: AOA-ES

Unit Tested: Stack (26A)

Project Location: Hardin, MT

Run Number:	1	2	3
Particulate Matter on Filter (mg):	14.9 ✓	10.1 ✓	14.5 ✓
Particulate Matter in Front Wash (mg):	9.7 ✓	4.2 ✓	5.9 ✓
Total Particulate Matter in "Front-Half" – MF (mg):	24.6 ✓	14.3 ✓	20.4 ✓
Particulate Matter in "Back-Half" (mg):	—	—	—
Total Particulate Matter in Sample – MT (mg):	—	—	—

Analyst

Billy J. Mullinax **Date:** 5/18/07

Data Checked By

Version No. 1 5/30/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 26A

Stack Filters

Project No. 07-024
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	0800 5/1/07	0850 5/3/07	08		
Desiccator Time Out	0845 5/3/07	0840 5/4/07			

Run No. 1		Filter No. A165		Sample I.D.	
Filter & Particulate (g)	0.3927	0.3930			

Filter & Particulate Average (g) 0.3930
Initial Filter Weight (g) 0.3781
Total Particulate (mg) 14.9

Run No. 2		Filter No. A166		Sample I.D.	
Filter & Particulate (g)	0.3894	0.3896			

Filter & Particulate Average (g) 0.3896
Initial Filter Weight (g) 0.3795
Total Particulate (mg) 10.1

Run No. 3		Filter No. A167		Sample I.D.	
Filter & Particulate (g)	0.3893	0.3896			

Filter & Particulate Average (g) 0.3896
Initial Filter Weight (g) 0.3751
Total Particulate (mg) 14.5

Bill Irby
Analyst

AIR SAMPLING ASSOCIATES, INC.

Filter Weight Log
EPA Method 5

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
A151		0.3827	0.3829				0.3829
	2/6/07	2/7/07	2/8/07				
	1045	1051	1051				
A152		0.3698	0.3698				0.3698
		2/28/07	3/09/07				
		1648	0915				
A153		0.3702	0.3704				0.3704
		2/28/07	3/09/07				
		1648	0915				
A154		0.3740	0.3741				0.3741
		2/28/07	3/1/07				
		1648	0915				
A155		0.3424	0.3424				0.3424
		2/28/07	3/1/07				
		1649	0916				
A156		0.3441	0.3443				0.3443
		2/28/07	3/1/07				
		1649	0916				
A157		0.3412	0.3414				0.3414
		2/28/07	3/1/07				
		1649	0917				
A158		0.3475	0.3479				0.3479
		2/28/07	3/1/07				
		1650	0917				
A159		0.3447	0.3450				0.3450
		2/28/07	3/1/07				
		1650	0917				
A160		0.3668	0.3672				0.3672
		2/28/07	3/1/07				
		1651	0918				
A161		0.3657	0.3657				0.3657
		2/28/07	3/1/07				
		1651	0918				
A162		0.3633	0.3636				0.3636
		2/28/07	3/1/07				
		1651	0918				
A163		0.3732	0.3734				0.3734
		2/28/07	3/1/07				
		1652	0919				
A164		0.3748	0.3748				0.3748
		2/28/07	3/1/07				
		1652	0919				
A165		0.3783	0.3781				0.3781
		2/28/07	3/01/07				
		1652	0920				

AIR SAMPLING ASSOCIATES, INC.

Filter Weight Log
EPA Method 5

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
A166	4/2/07 0800	0.3795 4/17/07 0810	0.3795 4/17/07 1423				0.3795
A167	4/2/07 0800	0.3752 4/17/07 0815	0.3751 4/17/07 1423	BM 4/17/07			0.3751
A168	4/2/07 0800	0.3880 4/17/07 0815	~~1423~~ 0.3879 4/17/07 1422				0.3879
A169	4/2/07 0800	0.3836 4/17/07 0815	0.3835 4/17/07 1422				0.3835
A170	4/2/07 0800	0.3849 4/17/07 0815	0.3848 4/17/07 1420				0.3848
A171	4/2/07 0800	0.3819 4/17/07 0816	0.3818 4/17/07 1420				0.3818
A172	4/2/07 0800	0.3762 4/17/07 0816	0.3762 4/17/07 1420				0.3762
A173	4/~~20~~19/07 1500	0.3536 4/20/07 1511	0.3537 4/20/07 2230				
A174	4/~~20~~19/07 1500	0.3478 4/20/07 1512	0.3479 4/20/07 2230				
A175	4/~~20~~19/07 1500	0.3603 4/20/07 1513	0.3603 4/20/07 2230				
A176	4/~~20~~19/07 1500	0.3667 4/20/07 1514	0.3668 4/20/07 2230				
A177	4/~~20~~19/07 1500	0.3803 4/20/07 1515	0.3806 4/20/07 2230				
A178	4/~~20~~19/07 1500	0.3820 4/20/07 1516	0.3820 4/20/07 2230				

BM

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 26A

Front Wash

Project No. 07-024
Project Name ADA-ES

Location HARDIN, MT
Unit Tested STACK

Desiccator Time In	0940 5/8/07	1000 5/9/07	1027 5/10/07		
Desiccator Time Out	0950 5/9/07	1020 5/10/07	1005 5/11/07		

Run No. 1		Volume (ml) 285		Sample I.D.	
Final Weight (g)	112.0263	112.0270	112.0275		
Initial Weight (g)			112.0160		
Particulate Weight (g)			0.0115		

Particulate Average (mg) 11.5
Less Acetone Blank (mg) 1.8
Total Particulate (mg) 9.7

Run No. 2		Volume (ml) 320		Sample I.D.	
Final Weight (g)	103.4507	103.4509	103.4513		
Initial Weight (g)			103.4451		
Particulate Weight (g)			0.0062		

Particulate Average (mg) 6.2
Less Acetone Blank (mg) 2.0
Total Particulate (mg) 4.2

Run No. 3		Volume (ml) 340		Sample I.D.	
Final Weight (g)	103.5997	103.6000	103.6002		
Initial Weight (g)			103.5921		
Particulate Weight (g)			0.0081		

Particulate Average (mg) 8.1
Less Acetone Blank (mg) 2.2
Total Particulate (mg) 5.9

Acetone Blank		Volume (ml) 125		Sample I.D.	
Final Weight (g)	104.7587	104.7595	104.7594		
Initial Weight (g)			104.7586		
Particulate Weight (g)			0.0008		

Average (mg) 0.8
* mg/l 6.4

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

E-6 Analyst

Date: 5/11/07

Version No.2 10/22/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 26A

Front Half Tare Weights

Project No. 07-024
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	0800 5/1/07	0850 5/3/07	0850 5/4/07		
Desiccator Time Out	0845 5/3/07	0845 5/4/07	0835 5/7/07		

Run No. 1				Sample I.D.	
Weight (g)	112.0183	112.0161	112.0160 ✓		

Run No. 2				Sample I.D.	
Weight (g)	103.4463	103.4447	103.4451 ✓		

Run No. 3				Sample I.D.	
Weight (g)	103.5925	103.5921 ✓			

Acetone Blank				Sample I.D.	
Weight (g)	104.7597	104.7584	104.7586 ✓		

Bill [illegible]
Analyst

Return to Navigator

H7E040102 Analytical Report 1

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Total Number of Pages 154

STL

STL Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921

Tel: 865 291 3000 Fax: 865 584 4315
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ANALYTICAL REPORT

Hardin Montana - April 2007

Lot #: H7E040102

Bill Hefley

Air Sampling Associates, Inc.
407-2 B Holfords's Prairie Roa
Lewisville, TX 75056

SEVERN TRENT LABORATORIES, INC.

Terry Wasmund
Project Manager

May 21, 2007

ANALYTICAL METHODS SUMMARY

H7E040102

PARAMETER	ANALYTICAL METHOD
Bromine Emissions	KNOX 0050/26A Mod
Chlorine Emissions	KNOX 0050/26A Mod
Hydrogen Bromide Emissions	KNOX 0050/26A Mod
Hydrogen Chloride Emissions	KNOX 0050/26A Mod
Hydrogen Fluoride Emissions	KNOX 0050/26A Mod

References:

KNOX Severn Trent Laboratories Knoxville, Facility Standard Operating Procedure.

SAMPLE SUMMARY

H7E040102

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
JV87E	001	07024 HARDIN STACK RUN 1 0.1N H2SO4	04/27/07	11:55
JV87F	002	07024 HARDIN STACK RUN 1 0.1N NAOH	04/27/07	12:00
JV87G	003	07024 HARDIN STACK RUN 2 0.1N H2SO4	04/27/07	13:55
JV87H	004	07024 HARDIN STACK RUN 2 0.1N NAOH	04/27/07	14:00
JV87J	005	07024 HARDIN STACK RUN 3 0.1N H2SO4	04/27/07	16:40
JV87K	006	07024 HARDIN STACK RUN 3 0.1N NAOH	04/27/07	16:45
JV87L	007	07024 HARDIN STACK BLANK 0.1N H2SO4	04/27/07	14:50
JV87M	008	07024 HARDIN STACK BLANK 0.1N NAOH	04/27/07	14:00
JV87N	009	07024 HARDIN STACK DI WATER	04/27/07	14:55

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

QC DATA ASSOCIATION SUMMARY

H7E040102

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	AIR	KNOX 0050/26A Mod		7135325	7135178
	AIR	KNOX 0050/26A Mod		7135437	7135228
	AIR	KNOX 0050/26A Mod		7135146	7135097
002	AIR	KNOX 0050/26A Mod		7135346	7135190
	AIR	KNOX 0050/26A Mod		7135458	7135244
	AIR	KNOX 0050/26A Mod		7135146	7135097
003	AIR	KNOX 0050/26A Mod		7135325	7135178
	AIR	KNOX 0050/26A Mod		7135437	7135228
	AIR	KNOX 0050/26A Mod		7135146	7135097
004	AIR	KNOX 0050/26A Mod		7135346	7135190
	AIR	KNOX 0050/26A Mod		7135458	7135244
	AIR	KNOX 0050/26A Mod		7135146	7135097
005	AIR	KNOX 0050/26A Mod		7135325	7135178
	AIR	KNOX 0050/26A Mod		7135437	7135228
	AIR	KNOX 0050/26A Mod		7135146	7135097
006	AIR	KNOX 0050/26A Mod		7135346	7135190
	AIR	KNOX 0050/26A Mod		7135458	7135244
	AIR	KNOX 0050/26A Mod		7135146	7135097
007	AIR	KNOX 0050/26A Mod		7135325	7135178
	AIR	KNOX 0050/26A Mod		7135437	7135228
	AIR	KNOX 0050/26A Mod		7135146	7135097
008	AIR	KNOX 0050/26A Mod		7135346	7135190
	AIR	KNOX 0050/26A Mod		7135458	7135244
	AIR	KNOX 0050/26A Mod		7135146	7135097
009	AIR	KNOX 0050/26A Mod		7135325	7135178
	AIR	KNOX 0050/26A Mod		7135407	
	AIR	KNOX 0050/26A Mod		7135146	7135097

PROJECT NARRATIVE
H7E040102

The results reported herein are applicable to the samples submitted for analysis only.

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The original chain of custody documentation is included with this report.

Sample Receipt

Custody seals were not present upon sample receipt at STL Knoxville.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Samples were analyzed for chloride (Cl^-), fluoride (F^-) and bromide (Br^-) by ion chromatography using SOP number KNOX-WC-005 (based on EPA methods 9056, 9057 and 26A). Results for the H_2SO_4 impinger samples were reported as total µg hydrogen chloride (HCl), total µg hydrogen fluoride (HF) and total µg hydrogen bromide (HBr). Results for the NaOH impinger samples were reported as total µg chlorine (Cl_2), total µg hydrogen fluoride (HF) and total µg hydrogen bromine (Br_2).

Please note that the halogen fluorine (F) is not expected to be present in stack gas as diatomic fluorine (F_2). Fluorine reacts with water vapor in a favored reaction that forms HF: $2F_2 + 2H_2O \rightarrow 4HF + O_2$. Therefore, the results from the H_2SO_4 impingers and the NaOH impingers are reported as HF, and no F_2 is expected in the samples.

Results were calculated using the following equations:

$$\text{HX, ug} = (X^-, \text{ug/mL}) * (\text{Sample Volume, mL}) * \left(\frac{\text{Molecular Weight HX}}{\text{Molecular Weight } X^-}\right) * (\text{Bench Dilution})$$

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. #05-043-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. #000687, Indiana DOH Cert. #C-TN-02, Iowa DNR Cert. #375, Kansas DHE Cert. #E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Ohio EPA VAP Cert. #CL0059, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. #68-00576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. # QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, West Virginia DEP Cert. #345, Wisconsin DNR Lab ID #998044300, Naval Facilities Engineering Service Center and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

PROJECT NARRATIVE
H7E040102

$$Cl_2, Br_2\ ug = (X^-, ug/mL) * (\text{Sample Volume}, mL) * (\text{Bench Dilution})$$

NaOH impinger samples were treated with sodium thiosulfate ($Na_2S_2O_3$) prior to the final analysis in order to convert residual hypochlorite (OCl^-) to chloride ion. The presence of hypobromite is also assumed to be converted to bromide under these conditions.

Note: A sample volume of 100 mL was used to convert the results to total µg for the method blanks, laboratory control samples, and client reagent blanks.

For demonstration of analytical method performance on these samples, STL Knoxville analyzed matrix spikes (MS) and matrix spike duplicates (MSD). Acceptable recoveries of these spikes demonstrate that quantitation from this particular stack gas matrix is accurate and acceptable. Impinger samples containing 0.1N H_2SO4 and 0.1N NaOH display matrix interference effects causing poor method performance and possibly giving unreliable data unless the interference is removed. Therefore, the samples were diluted in the lab to remove the interference for a more accurate chloride response. The samples may be analyzed at increasing dilutions along with matrix spikes until matrix spikes recover from the sample within laboratory control limits. The ion chromatograph calibration range used to quantitate the sample results permits a standard ten-fold sample dilution while supporting the reporting limit with the low calibration standard.

The dilution factor reported on the sample result form does not represent the bench dilution factor. It is actually the combination of factors required by the method to convert the anion reporting limit and method detection limit from µg/mL to total µg. It may appear to be elevated because it includes the total sample volume in mL.

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Sample Data Summary

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 1 0.1N H2SO4

General Chemistry

Lot-Sample #...: H7E040102-001 **Work Order #...:** JV87E **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	496	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 4961.81		MDL.....: 248		
Hydrogen chloride	ND	1010	ug	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 10078.61		MDL.....: 423		
Hydrogen fluoride	ND	516	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 5159.95		MDL.....: 258		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 1 0.1N NAOH

General Chemistry

Lot-Sample #...: H7E040102-002 Work Order #...: JV87F Matrix.....: AIR
Date Sampled...: 04/27/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	275	ug	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 2750		MDL.....: 66.0		
Chlorine	ND	550	ug	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 5500		MDL.....: 231		
Hydrogen fluoride	ND	290	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 2895.89		MDL.....: 145		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 2 0.1N H2SO4

General Chemistry

Lot-Sample #...: H7E040102-003 **Work Order #...:** JV87G **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	425	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 4252.98		MDL.....: 213		
Hydrogen chloride	ND	864	ug	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 8638.81		MDL.....: 363		
Hydrogen fluoride	ND	442	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 4422.82		MDL.....: 221		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 2 0.1N NAOH

General Chemistry

Lot-Sample #...: H7E040102-004 **Work Order #...:** JV87H **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	250	ug	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 2500		MDL.....: 60.0		
Chlorine	ND	500	ug	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 5000		MDL.....: 210		
Hydrogen fluoride	ND	263	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 2632.63		MDL.....: 132		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 3 0.1N H2SO4

General Chemistry

Lot-Sample #...: H7E040102-005 **Work Order #...:** JV87J **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	481	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 4809.92		MDL.....: 240		
Hydrogen chloride	ND	977	ug	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 9770.08		MDL.....: 410		
Hydrogen fluoride	ND	500	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 5002		MDL.....: 250		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 3 0.1N NAOH

General Chemistry

Lot-Sample #...: H7E040102-006 **Work Order #...:** JV87K **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	290	ug	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 2900		MDL.....: 69.6		
Chlorine	**1740**	**580**	**ug**	**KNOX 0050/26A Mod**	**05/11/07**	**7135458**
		Dilution Factor: 5800		MDL.....: 244		
Hydrogen fluoride	ND	305	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 3053.85		MDL.....: 153		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK BLANK 0.1N H2SO4

General Chemistry

Lot-Sample #...: H7E040102-007 **Work Order #...:** JV87L **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	101	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 1012.61		MDL.....: 50.6		
Hydrogen chloride	ND	411	ug	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 4113.72		MDL.....: 173		
Hydrogen fluoride	ND	105	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 1053.05		MDL.....: 52.7		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK BLANK 0.1N NAOH

General Chemistry

Lot-Sample #...: H7E040102-008 Work Order #...: JV87M Matrix.....: AIR
Date Sampled...: 04/27/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	100	ug	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 1000		MDL.....: 24.0		
Chlorine	ND	200	ug	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 2000		MDL.....: 84.0		
Hydrogen fluoride	**55.4 B**	**105**	**ug**	**KNOX 0050/26A Mod**	**05/08/07**	**7135146**
		Dilution Factor: 1053.05		MDL.....: 52.7		

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK DI WATER

General Chemistry

Lot-Sample #...: H7E040102-009 **Work Order #...:** JV87N **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	101	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 1012.61		MDL.....: 50.6		
Hydrogen chloride	ND	103	ug	KNOX 0050/26A Mod	05/08/07	7135407
		Dilution Factor: 1028.43		MDL.....: 43.2		
Hydrogen fluoride	ND	105	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 1053.05		MDL.....: 52.7		

METHOD BLANK REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		Work Order #: JW0761AA		MB Lot-Sample #:	H7E150000-346	
	ND	10.0	ug	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 100				
Chlorine		Work Order #: JW1TN1AA		MB Lot-Sample #:	H7E150000-458	
	ND	10.0	ug	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 100				
Hydrogen bromide		Work Order #: JW0691AA		MB Lot-Sample #:	H7E150000-325	
	ND	10.1	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 101.2				
Hydrogen chloride		Work Order #: JW1DJ1AA		MB Lot-Sample #:	H7E150000-407	
	ND	10.3	ug	KNOX 0050/26A Mod	05/08/07	7135407
		Dilution Factor: 102.8				
Hydrogen chloride		Work Order #: JW1MV1AA		MB Lot-Sample #:	H7E150000-437	
	ND	10.3	ug	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 102.8				
Hydrogen fluoride		Work Order #: JW0H11AA		MB Lot-Sample #:	H7E150000-146	
	ND	10.5	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 105.3				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: H7E040102 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#:JW0761AC-LCS/JW0761AD-LCSD				LCS Lot-Sample#: H7E150000-346	
	101	(90 - 110)			KNOX 0050/26A Mod	05/08/07	7135346
	100	(90 - 110)	0.55	(0-20)	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 100					
Chlorine		WO#:JW1TN1AC-LCS/JW1TN1AD-LCSD				LCS Lot-Sample#: H7E150000-458	
	106	(90 - 110)			KNOX 0050/26A Mod	05/11/07	7135458
	105	(90 - 110)	0.36	(0-20)	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 100					
Hydrogen bromide		WO#:JW0691AC-LCS/JW0691AD-LCSD				LCS Lot-Sample#: H7E150000-325	
	101	(90 - 110)			KNOX 0050/26A Mod	05/08/07	7135325
	100	(90 - 110)	0.55	(0-20)	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 101.2					
Hydrogen chloride		WO#:JW1DJ1AC-LCS/JW1DJ1AD-LCSD				LCS Lot-Sample#: H7E150000-407	
	100	(90 - 110)			KNOX 0050/26A Mod	05/08/07	7135407
	102	(90 - 110)	1.5	(0-20)	KNOX 0050/26A Mod	05/08/07	7135407
		Dilution Factor: 102.8					
Hydrogen chloride		WO#:JW1MV1AC-LCS/JW1MV1AD-LCSD				LCS Lot-Sample#: H7E150000-437	
	106	(90 - 110)			KNOX 0050/26A Mod	05/11/07	7135437
	105	(90 - 110)	0.36	(0-20)	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 102.8					
Hydrogen fluoride		WO#:JW0H11AC-LCS/JW0H11AD-LCSD				LCS Lot-Sample#: H7E150000-146	
	103	(90 - 110)			KNOX 0050/26A Mod	05/08/07	7135146
	104	(90 - 110)	1.1	(0-20)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Lot-Sample #...: H7E040102 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#:JW0761AC-LCS/JW0761AD-LCSD			LCS Lot-Sample#: H7E150000-346		
	75.0	75.7	ug	101		KNOX 0050/26A Mod	05/08/07	7135346
	75.0	75.3	ug	100	0.55	KNOX 0050/26A Mod	05/08/07	7135346
			Dilution Factor: 100					
Chlorine			WO#:JW1TN1AC-LCS/JW1TN1AD-LCSD			LCS Lot-Sample#: H7E150000-458		
	75.0	79.3	ug	106		KNOX 0050/26A Mod	05/11/07	7135458
	75.0	79.0	ug	105	0.36	KNOX 0050/26A Mod	05/11/07	7135458
			Dilution Factor: 100					
Hydrogen bromide			WO#:JW0691AC-LCS/JW0691AD-LCSD			LCS Lot-Sample#: H7E150000-325		
	76.0	76.6	ug	101		KNOX 0050/26A Mod	05/08/07	7135325
	76.0	76.2	ug	100	0.55	KNOX 0050/26A Mod	05/08/07	7135325
			Dilution Factor: 101.2					
Hydrogen chloride			WO#:JW1DJ1AC-LCS/JW1DJ1AD-LCSD			LCS Lot-Sample#: H7E150000-407		
	77.1	77.2	ug	100		KNOX 0050/26A Mod	05/08/07	7135407
	77.1	78.4	ug	102	1.5	KNOX 0050/26A Mod	05/08/07	7135407
			Dilution Factor: 102.8					
Hydrogen chloride			WO#:JW1MV1AC-LCS/JW1MV1AD-LCSD			LCS Lot-Sample#: H7E150000-437		
	77.1	81.6	ug	106		KNOX 0050/26A Mod	05/11/07	7135437
	77.1	81.3	ug	105	0.36	KNOX 0050/26A Mod	05/11/07	7135437
			Dilution Factor: 102.8					
Hydrogen fluoride			WO#:JW0H11AC-LCS/JW0H11AD-LCSD			LCS Lot-Sample#: H7E150000-146		
	79.0	81.5	ug	103		KNOX 0050/26A Mod	05/08/07	7135146
	79.0	82.4	ug	104	1.1	KNOX 0050/26A Mod	05/08/07	7135146
			Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		Work Order #: JW0761AC	LCS Lot-Sample#: H7E150000-346		
	101	(90 - 110)	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 100			
Chlorine		Work Order #: JW1TN1AC	LCS Lot-Sample#: H7E150000-458		
	106	(90 - 110)	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 100			
Hydrogen bromide		Work Order #: JW0691AC	LCS Lot-Sample#: H7E150000-325		
	101	(90 - 110)	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 101.2			
Hydrogen chloride		Work Order #: JW1DJ1AC	LCS Lot-Sample#: H7E150000-407		
	100	(90 - 110)	KNOX 0050/26A Mod	05/08/07	7135407
		Dilution Factor: 102.8			
Hydrogen chloride		Work Order #: JW1MV1AC	LCS Lot-Sample#: H7E150000-437		
	106	(90 - 110)	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 102.8			
Hydrogen fluoride		Work Order #: JW0H11AC	LCS Lot-Sample#: H7E150000-146		
	103	(90 - 110)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 105.3			

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			Work Order #: JW0761AC		LCS Lot-Sample#:	H7E150000-346	
	75.0	75.7	ug	101	KNOX 0050/26A Mod	05/08/07	7135346
			Dilution Factor: 100				
Chlorine			Work Order #: JW1TN1AC		LCS Lot-Sample#:	H7E150000-458	
	75.0	79.3	ug	106	KNOX 0050/26A Mod	05/11/07	7135458
			Dilution Factor: 100				
Hydrogen bromide			Work Order #: JW0691AC		LCS Lot-Sample#:	H7E150000-325	
	76.0	76.6	ug	101	KNOX 0050/26A Mod	05/08/07	7135325
			Dilution Factor: 101.2				
Hydrogen chloride			Work Order #: JW1DJ1AC		LCS Lot-Sample#:	H7E150000-407	
	77.1	77.2	ug	100	KNOX 0050/26A Mod	05/08/07	7135407
			Dilution Factor: 102.8				
Hydrogen chloride			Work Order #: JW1MV1AC		LCS Lot-Sample#:	H7E150000-437	
	77.1	81.6	ug	106	KNOX 0050/26A Mod	05/11/07	7135437
			Dilution Factor: 102.8				
Hydrogen fluoride			Work Order #: JW0H11AC		LCS Lot-Sample#:	H7E150000-146	
	79.0	81.5	ug	103	KNOX 0050/26A Mod	05/08/07	7135146
			Dilution Factor: 105.3				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#: JV87H1AF-MS/JV87H1AG-MSD MS Lot-Sample #: H7E040102-004					
	101	(75 - 125)			KNOX 0050/26A Mod	05/08/07	7135346
	112	(75 - 125)	10	(0-20)	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 2500					
Chlorine		WO#: JV87H1AC-MS/JV87H1AD-MSD MS Lot-Sample #: H7E040102-004					
	95	(75 - 125)			KNOX 0050/26A Mod	05/11/07	7135458
	96	(75 - 125)	0.50	(0-20)	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 5000					
Hydrogen bromide		WO#: JV87G1AF-MS/JV87G1AG-MSD MS Lot-Sample #: H7E040102-003					
	102	(75 - 125)			KNOX 0050/26A Mod	05/08/07	7135325
	107	(75 - 125)	4.6	(0-20)	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 4252.					
Hydrogen chloride		WO#: JV87G1AC-MS/JV87G1AD-MSD MS Lot-Sample #: H7E040102-003					
	89	(75 - 125)			KNOX 0050/26A Mod	05/11/07	7135437
	85	(75 - 125)	4.3	(0-20)	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 8638.					
Hydrogen fluoride		WO#: JV87G1AJ-MS/JV87G1AK-MSD MS Lot-Sample #: H7E040102-003					
	104	(75 - 125)			KNOX 0050/26A Mod	05/08/07	7135146
	102	(75 - 125)	1.5	(0-20)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 4422.					
Hydrogen fluoride		WO#: JV87H1AJ-MS/JV87H1AK-MSD MS Lot-Sample #: H7E040102-004					
	114	(75 - 125)			KNOX 0050/26A Mod	05/08/07	7135146
	114	(75 - 125)	0.14	(0-20)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 2632.					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#: JV87H1AF-MS/JV87H1AG-MSD				MS Lot-Sample #: H7E040102-004		
	ND	500	505	ug	101		KNOX 0050/26A	05/08/07	7135346
	ND	500	560	ug	112	10	KNOX 0050/26A	05/08/07	7135346
			Dilution Factor: 2500						
Chlorine			WO#: JV87H1AC-MS/JV87H1AD-MSD				MS Lot-Sample #: H7E040102-004		
	ND	1000	954	ug	95		KNOX 0050/26A	05/11/07	7135458
	ND	1000	959	ug	96	0.50	KNOX 0050/26A	05/11/07	7135458
			Dilution Factor: 5000						
Hydrogen bromide			WO#: JV87G1AF-MS/JV87G1AG-MSD				MS Lot-Sample #: H7E040102-003		
	ND	851	869	ug	102		KNOX 0050/26A	05/08/07	7135325
	ND	851	910	ug	107	4.6	KNOX 0050/26A	05/08/07	7135325
			Dilution Factor: 4252.						
Hydrogen chloride			WO#: JV87G1AC-MS/JV87G1AD-MSD				MS Lot-Sample #: H7E040102-003		
	ND	1730	1530	ug	89		KNOX 0050/26A	05/11/07	7135437
	ND	1730	1470	ug	85	4.3	KNOX 0050/26A	05/11/07	7135437
			Dilution Factor: 8638.						
Hydrogen fluoride			WO#: JV87G1AJ-MS/JV87G1AK-MSD				MS Lot-Sample #: H7E040102-003		
	ND	885	916	ug	104		KNOX 0050/26A	05/08/07	7135146
	ND	885	902	ug	102	1.5	KNOX 0050/26A	05/08/07	7135146
			Dilution Factor: 4422.						
Hydrogen fluoride			WO#: JV87H1AJ-MS/JV87H1AK-MSD				MS Lot-Sample #: H7E040102-004		
	ND	527	601	ug	114		KNOX 0050/26A	05/08/07	7135146
	ND	527	602	ug	114	0.14	KNOX 0050/26A	05/08/07	7135146
			Dilution Factor: 2632.						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		Work Order #...: JV87H1AF		MS Lot-Sample #: H7E040102-004	
	101	(75 - 125)	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 2500			
Chlorine		Work Order #...: JV87H1AC		MS Lot-Sample #: H7E040102-004	
	95	(75 - 125)	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 5000			
Hydrogen bromide		Work Order #...: JV87G1AF		MS Lot-Sample #: H7E040102-003	
	102	(75 - 125)	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 4252.			
Hydrogen chloride		Work Order #...: JV87G1AC		MS Lot-Sample #: H7E040102-003	
	89	(75 - 125)	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 8638.			
Hydrogen fluoride		Work Order #...: JV87G1AJ		MS Lot-Sample #: H7E040102-003	
	104	(75 - 125)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 4422.			
Hydrogen fluoride		Work Order #...: JV87H1AJ		MS Lot-Sample #: H7E040102-004	
	114	(75 - 125)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 2632.			

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			Work Order #...:		JV87H1AF		MS Lot-Sample #:	H7E040102-004
	ND	500	505	ug	101	KNOX 0050/26A	05/08/07	7135346
			Dilution Factor: 2500					
Chlorine			Work Order #...:		JV87H1AC		MS Lot-Sample #:	H7E040102-004
	ND	1000	954	ug	95	KNOX 0050/26A	05/11/07	7135458
			Dilution Factor: 5000					
Hydrogen bromide			Work Order #...:		JV87G1AF		MS Lot-Sample #:	H7E040102-003
	ND	851	869	ug	102	KNOX 0050/26A	05/08/07	7135325
			Dilution Factor: 4252.					
Hydrogen chloride			Work Order #...:		JV87G1AC		MS Lot-Sample #:	H7E040102-003
	ND	1730	1530	ug	89	KNOX 0050/26A	05/11/07	7135437
			Dilution Factor: 8638.					
Hydrogen fluoride			Work Order #...:		JV87G1AJ		MS Lot-Sample #:	H7E040102-003
	ND	885	916	ug	104	KNOX 0050/26A	05/08/07	7135146
			Dilution Factor: 4422.					
Hydrogen fluoride			Work Order #...:		JV87H1AJ		MS Lot-Sample #:	H7E040102-004
	ND	527	601	ug	114	KNOX 0050/26A	05/08/07	7135146
			Dilution Factor: 2632.					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Sample Receipt Documentation

N7E040102

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 1 of 1	
Address:	Unit No.: Stack	Lab: Severn Trent Labs	
City: Hardin; State: MT; Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 1, 2, 3 and Blanks	Test Method: EPA Method 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Hydrogen Halides	Analysis: Halogens
Run1, Container 3	4/27/07	1155	0.1N H_2SO_4	1		X	
Run1, Container 4	4/27/07	1200	0.1N NaOH	1	Rec'd temp. Ambient		X
Run2, Container 3	4/27/07	1355	0.1N H_2SO_4	1	No Custody Seals	X	
Run2, Container 4	4/27/07	1400	0.1N NaOH	1	MFH 5-2-07		X
Run3, Container 3	4/27/07	1640	0.1N H_2SO_4	1	Fedex	X	
Run3, Container 4	4/27/07	1645	0.1N NaOH	1			X
Container 6	4/27/07	1450	0.1N H_2SO_4	1		X	
Container 7	4/27/07	1400	0.1N NaOH	1			X
Container 8	4/27/07	1455	DI Water	1		X	X

ACID

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 6 Months

	Date	Time		Date	Time
1. Recovered By: Billy J. Mullins, Jr.	4/27/07	1730	1. Relinquished By: Billy J. Mullins, Jr.	4/27/07	0815
2. Received By: Scott Jack	4/30/07	0900	2. Relinquished By: Scott Jack	4/30/07	0900
3. Received By: Matthew J. Normand	5-1-07	10:45	3. Relinquished By:		

Comments:
SHIP VIA FEDEX TO STLK 4/30/07

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: Air Sampling **Project:** _____ **Lot Number:** H7E040102

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ **1a** Do not match COC ☐ **1b** Incomplete information ☐ **1c** Marking smeared ☐ **1d** Label torn ☐ **1e** No label ☐ **1f** COC not received ☐ **1g** Other:	4a
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C) MPK 5-2-07	✓		✓	☐ **2a** Temp Blank = _____ ☐ **2b** Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?	✓			☐ **3a** Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ **4a** Not present ☐ **4b** Not intact ☐ **4c** Other:	
5. Were all of the samples listed on the COC received?	✓			☐ **5a** Samples received-not on COC ☐ **5b** Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ **6a** Leaking ☐ **6b** Broken	
7. Were VOA samples received without headspace?			✓	☐ **7a** Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ **8a** Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ **9a** Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ **10a** Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?			✓	If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ **13a** Leaking ☐ **13b** Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ **14a** Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ **15a** Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ **15a** Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ **15a** Incomplete information	
18. Is the client and project name/# identified?	✓			☐ **15a** Incomplete information	
19. Was the sampler identified on the COC? MPK 5-2-07	✓	✓			

Quote #: 75154 PM Instructions: _____

Sample Receiving Associate: Matthew F Howard Date: 5-2-07

QA026R18.doc, 1/30/06

Wet Chemistry

Sample Summary

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 1 0.1N H2SO4

General Chemistry

Lot-Sample #...: H7E040102-001 Work Order #...: JV87E Matrix.....: AIR
Date Sampled...: 04/27/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	496	ug	KNOX 0050/26A Mod	05/08/07	7135325
	Dilution Factor: 4961.81			MDL.....: 248		
Hydrogen chloride	ND	1010	ug	KNOX 0050/26A Mod	05/11/07	7135437
	Dilution Factor: 10078.61			MDL.....: 423		
Hydrogen fluoride	ND	516	ug	KNOX 0050/26A Mod	05/08/07	7135146
	Dilution Factor: 5159.95			MDL.....: 258		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 1 0.1N NAOH

General Chemistry

Lot-Sample #...: H7E040102-002 Work Order #...: JV87F Matrix.....: AIR
Date Sampled...: 04/27/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	275	ug	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 2750		MDL.....: 66.0		
Chlorine	ND	550	ug	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 5500		MDL.....: 231		
Hydrogen fluoride	ND	290	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 2895.89		MDL.....: 145		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 2 0.1N H2SO4

General Chemistry

Lot-Sample #...: H7E040102-003 Work Order #...: JV87G Matrix.....: AIR
Date Sampled...: 04/27/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	425	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 4252.98		MDL.....: 213		
Hydrogen chloride	ND	864	ug	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 8638.81		MDL.....: 363		
Hydrogen fluoride	ND	442	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 4422.82		MDL.....: 221		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 2 0.1N NAOH

General Chemistry

Lot-Sample #...: H7E040102-004 **Work Order #...:** JV87H **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	250	ug	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 2500		MDL.....: 60.0		
Chlorine	ND	500	ug	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 5000		MDL.....: 210		
Hydrogen fluoride	ND	263	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 2632.63		MDL.....: 132		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 3 0.1N H2SO4

General Chemistry

Lot-Sample #...: H7E040102-005 **Work Order #...:** JV87J **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	481	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 4809.92		MDL.....: 240		
Hydrogen chloride	ND	977	ug	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 9770.08		MDL.....: 410		
Hydrogen fluoride	ND	500	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 5002		MDL.....: 250		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK RUN 3 0.1N NAOH

General Chemistry

Lot-Sample #...: H7E040102-006 **Work Order #...:** JV87K **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	290	ug	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 2900		MDL.....: 69.6		
Chlorine	**1740**	**580**	**ug**	**KNOX 0050/26A Mod**	**05/11/07**	**7135458**
		Dilution Factor: 5800		MDL.....: 244		
Hydrogen fluoride	ND	305	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 3053.85		MDL.....: 153		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK BLANK 0.1N H2SO4

General Chemistry

Lot-Sample #...: H7E040102-007 Work Order #...: JV87L Matrix.....: AIR
Date Sampled...: 04/27/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	101	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 1012.61		MDL.....: 50.6		
Hydrogen chloride	ND	411	ug	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 4113.72		MDL.....: 173		
Hydrogen fluoride	ND	105	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 1053.05		MDL.....: 52.7		

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK BLANK 0.1N NAOH

General Chemistry

Lot-Sample #...: H7E040102-008 **Work Order #...:** JV87M **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine	ND	100	ug	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 1000		MDL.....: 24.0		
Chlorine	ND	200	ug	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 2000		MDL.....: 84.0		
Hydrogen fluoride	**55.4 B**	**105**	**ug**	**KNOX 0050/26A Mod**	**05/08/07**	**7135146**
		Dilution Factor: 1053.05		MDL.....: 52.7		

NOTE(S):

RL Reporting Limit

B Estimated result. Result is less than RL.

Air Sampling Associates, Inc.

Client Sample ID: 07024 HARDIN STACK DI WATER

General Chemistry

Lot-Sample #...: H7E040102-009 **Work Order #...:** JV87N **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen bromide	ND	101	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 1012.61		MDL.....: 50.6		
Hydrogen chloride	ND	103	ug	KNOX 0050/26A Mod	05/08/07	7135407
		Dilution Factor: 1028.43		MDL.....: 43.2		
Hydrogen fluoride	ND	105	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 1053.05		MDL.....: 52.7		

QC Summary

METHOD BLANK REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		Work Order #: JW0761AA		MB Lot-Sample #:	H7E150000-346	
	ND	10.0	ug	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 100				
Chlorine		Work Order #: JW1TN1AA		MB Lot-Sample #:	H7E150000-458	
	ND	10.0	ug	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 100				
Hydrogen bromide		Work Order #: JW0691AA		MB Lot-Sample #:	H7E150000-325	
	ND	10.1	ug	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 101.2				
Hydrogen chloride		Work Order #: JW1DJ1AA		MB Lot-Sample #:	H7E150000-407	
	ND	10.3	ug	KNOX 0050/26A Mod	05/08/07	7135407
		Dilution Factor: 102.8				
Hydrogen chloride		Work Order #: JW1MV1AA		MB Lot-Sample #:	H7E150000-437	
	ND	10.3	ug	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 102.8				
Hydrogen fluoride		Work Order #: JW0H11AA		MB Lot-Sample #:	H7E150000-146	
	ND	10.5	ug	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 105.3				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: H7E040102 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#:JW0761AC-LCS/JW0761AD-LCSD			LCS Lot-Sample#: H7E150000-346		
	101	(90 - 110)			KNOX 0050/26A Mod	05/08/07	7135346
	100	(90 - 110)	0.55	(0-20)	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 100					
Chlorine		WO#:JW1TN1AC-LCS/JW1TN1AD-LCSD			LCS Lot-Sample#: H7E150000-458		
	106	(90 - 110)			KNOX 0050/26A Mod	05/11/07	7135458
	105	(90 - 110)	0.36	(0-20)	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 100					
Hydrogen bromide		WO#:JW0691AC-LCS/JW0691AD-LCSD			LCS Lot-Sample#: H7E150000-325		
	101	(90 - 110)			KNOX 0050/26A Mod	05/08/07	7135325
	100	(90 - 110)	0.55	(0-20)	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 101.2					
Hydrogen chloride		WO#:JW1DJ1AC-LCS/JW1DJ1AD-LCSD			LCS Lot-Sample#: H7E150000-407		
	100	(90 - 110)			KNOX 0050/26A Mod	05/08/07	7135407
	102	(90 - 110)	1.5	(0-20)	KNOX 0050/26A Mod	05/08/07	7135407
		Dilution Factor: 102.8					
Hydrogen chloride		WO#:JW1MV1AC-LCS/JW1MV1AD-LCSD			LCS Lot-Sample#: H7E150000-437		
	106	(90 - 110)			KNOX 0050/26A Mod	05/11/07	7135437
	105	(90 - 110)	0.36	(0-20)	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 102.8					
Hydrogen fluoride		WO#:JW0H11AC-LCS/JW0H11AD-LCSD			LCS Lot-Sample#: H7E150000-146		
	103	(90 - 110)			KNOX 0050/26A Mod	05/08/07	7135146
	104	(90 - 110)	1.1	(0-20)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Lot-Sample #...: H7E040102 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#:JW0761AC-LCS/JW0761AD-LCSD			LCS Lot-Sample#: H7E150000-346		
	75.0	75.7	ug	101		KNOX 0050/26A Mod	05/08/07	7135346
	75.0	75.3	ug	100	0.55	KNOX 0050/26A Mod	05/08/07	7135346
			Dilution Factor: 100					
Chlorine			WO#:JW1TN1AC-LCS/JW1TN1AD-LCSD			LCS Lot-Sample#: H7E150000-458		
	75.0	79.3	ug	106		KNOX 0050/26A Mod	05/11/07	7135458
	75.0	79.0	ug	105	0.36	KNOX 0050/26A Mod	05/11/07	7135458
			Dilution Factor: 100					
Hydrogen bromide			WO#:JW0691AC-LCS/JW0691AD-LCSD			LCS Lot-Sample#: H7E150000-325		
	76.0	76.6	ug	101		KNOX 0050/26A Mod	05/08/07	7135325
	76.0	76.2	ug	100	0.55	KNOX 0050/26A Mod	05/08/07	7135325
			Dilution Factor: 101.2					
Hydrogen chloride			WO#:JW1DJ1AC-LCS/JW1DJ1AD-LCSD			LCS Lot-Sample#: H7E150000-407		
	77.1	77.2	ug	100		KNOX 0050/26A Mod	05/08/07	7135407
	77.1	78.4	ug	102	1.5	KNOX 0050/26A Mod	05/08/07	7135407
			Dilution Factor: 102.8					
Hydrogen chloride			WO#:JW1MV1AC-LCS/JW1MV1AD-LCSD			LCS Lot-Sample#: H7E150000-437		
	77.1	81.6	ug	106		KNOX 0050/26A Mod	05/11/07	7135437
	77.1	81.3	ug	105	0.36	KNOX 0050/26A Mod	05/11/07	7135437
			Dilution Factor: 102.8					
Hydrogen fluoride			WO#:JW0H11AC-LCS/JW0H11AD-LCSD			LCS Lot-Sample#: H7E150000-146		
	79.0	81.5	ug	103		KNOX 0050/26A Mod	05/08/07	7135146
	79.0	82.4	ug	104	1.1	KNOX 0050/26A Mod	05/08/07	7135146
			Dilution Factor: 105.3					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		Work Order #: JW0761AC	LCS Lot-Sample#: H7E150000-346		
	101	(90 - 110)	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 100			
Chlorine		Work Order #: JW1TN1AC	LCS Lot-Sample#: H7E150000-458		
	106	(90 - 110)	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 100			
Hydrogen bromide		Work Order #: JW0691AC	LCS Lot-Sample#: H7E150000-325		
	101	(90 - 110)	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 101.2			
Hydrogen chloride		Work Order #: JW1DJ1AC	LCS Lot-Sample#: H7E150000-407		
	100	(90 - 110)	KNOX 0050/26A Mod	05/08/07	7135407
		Dilution Factor: 102.8			
Hydrogen chloride		Work Order #: JW1MV1AC	LCS Lot-Sample#: H7E150000-437		
	106	(90 - 110)	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 102.8			
Hydrogen fluoride		Work Order #: JW0H11AC	LCS Lot-Sample#: H7E150000-146		
	103	(90 - 110)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 105.3			

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			Work Order #: JW0761AC		LCS Lot-Sample#:	H7E150000-346	
	75.0	75.7	ug	101	KNOX 0050/26A Mod	05/08/07	7135346
			Dilution Factor: 100				
Chlorine			Work Order #: JW1TN1AC		LCS Lot-Sample#:	H7E150000-458	
	75.0	79.3	ug	106	KNOX 0050/26A Mod	05/11/07	7135458
			Dilution Factor: 100				
Hydrogen bromide			Work Order #: JW0691AC		LCS Lot-Sample#:	H7E150000-325	
	76.0	76.6	ug	101	KNOX 0050/26A Mod	05/08/07	7135325
			Dilution Factor: 101.2				
Hydrogen chloride			Work Order #: JW1DJ1AC		LCS Lot-Sample#:	H7E150000-407	
	77.1	77.2	ug	100	KNOX 0050/26A Mod	05/08/07	7135407
			Dilution Factor: 102.8				
Hydrogen chloride			Work Order #: JW1MV1AC		LCS Lot-Sample#:	H7E150000-437	
	77.1	81.6	ug	106	KNOX 0050/26A Mod	05/11/07	7135437
			Dilution Factor: 102.8				
Hydrogen fluoride			Work Order #: JW0H11AC		LCS Lot-Sample#:	H7E150000-146	
	79.0	81.5	ug	103	KNOX 0050/26A Mod	05/08/07	7135146
			Dilution Factor: 105.3				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		WO#: JV87H1AF-MS/JV87H1AG-MSD MS Lot-Sample #: H7E040102-004					
	101	(75 - 125)			KNOX 0050/26A Mod	05/08/07	7135346
	112	(75 - 125)	10	(0-20)	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 2500					
Chlorine		WO#: JV87H1AC-MS/JV87H1AD-MSD MS Lot-Sample #: H7E040102-004					
	95	(75 - 125)			KNOX 0050/26A Mod	05/11/07	7135458
	96	(75 - 125)	0.50	(0-20)	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 5000					
Hydrogen bromide		WO#: JV87G1AF-MS/JV87G1AG-MSD MS Lot-Sample #: H7E040102-003					
	102	(75 - 125)			KNOX 0050/26A Mod	05/08/07	7135325
	107	(75 - 125)	4.6	(0-20)	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 4252.					
Hydrogen chloride		WO#: JV87G1AC-MS/JV87G1AD-MSD MS Lot-Sample #: H7E040102-003					
	89	(75 - 125)			KNOX 0050/26A Mod	05/11/07	7135437
	85	(75 - 125)	4.3	(0-20)	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 8638.					
Hydrogen fluoride		WO#: JV87G1AJ-MS/JV87G1AK-MSD MS Lot-Sample #: H7E040102-003					
	104	(75 - 125)			KNOX 0050/26A Mod	05/08/07	7135146
	102	(75 - 125)	1.5	(0-20)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 4422.					
Hydrogen fluoride		WO#: JV87H1AJ-MS/JV87H1AK-MSD MS Lot-Sample #: H7E040102-004					
	114	(75 - 125)			KNOX 0050/26A Mod	05/08/07	7135146
	114	(75 - 125)	0.14	(0-20)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 2632.					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			WO#: JV87H1AF-MS/JV87H1AG-MSD				MS Lot-Sample #: H7E040102-004		
	ND	500	505	ug	101		KNOX 0050/26A	05/08/07	7135346
	ND	500	560	ug	112	10	KNOX 0050/26A	05/08/07	7135346
			Dilution Factor: 2500						
Chlorine			WO#: JV87H1AC-MS/JV87H1AD-MSD				MS Lot-Sample #: H7E040102-004		
	ND	1000	954	ug	95		KNOX 0050/26A	05/11/07	7135458
	ND	1000	959	ug	96	0.50	KNOX 0050/26A	05/11/07	7135458
			Dilution Factor: 5000						
Hydrogen bromide			WO#: JV87G1AF-MS/JV87G1AG-MSD				MS Lot-Sample #: H7E040102-003		
	ND	851	869	ug	102		KNOX 0050/26A	05/08/07	7135325
	ND	851	910	ug	107	4.6	KNOX 0050/26A	05/08/07	7135325
			Dilution Factor: 4252.						
Hydrogen chloride			WO#: JV87G1AC-MS/JV87G1AD-MSD				MS Lot-Sample #: H7E040102-003		
	ND	1730	1530	ug	89		KNOX 0050/26A	05/11/07	7135437
	ND	1730	1470	ug	85	4.3	KNOX 0050/26A	05/11/07	7135437
			Dilution Factor: 8638.						
Hydrogen fluoride			WO#: JV87G1AJ-MS/JV87G1AK-MSD				MS Lot-Sample #: H7E040102-003		
	ND	885	916	ug	104		KNOX 0050/26A	05/08/07	7135146
	ND	885	902	ug	102	1.5	KNOX 0050/26A	05/08/07	7135146
			Dilution Factor: 4422.						
Hydrogen fluoride			WO#: JV87H1AJ-MS/JV87H1AK-MSD				MS Lot-Sample #: H7E040102-004		
	ND	527	601	ug	114		KNOX 0050/26A	05/08/07	7135146
	ND	527	602	ug	114	0.14	KNOX 0050/26A	05/08/07	7135146
			Dilution Factor: 2632.						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine		Work Order #...: JV87H1AF		MS Lot-Sample #: H7E040102-004	
	101	(75 - 125)	KNOX 0050/26A Mod	05/08/07	7135346
		Dilution Factor: 2500			
Chlorine		Work Order #...: JV87H1AC		MS Lot-Sample #: H7E040102-004	
	95	(75 - 125)	KNOX 0050/26A Mod	05/11/07	7135458
		Dilution Factor: 5000			
Hydrogen bromide		Work Order #...: JV87G1AF		MS Lot-Sample #: H7E040102-003	
	102	(75 - 125)	KNOX 0050/26A Mod	05/08/07	7135325
		Dilution Factor: 4252.			
Hydrogen chloride		Work Order #...: JV87G1AC		MS Lot-Sample #: H7E040102-003	
	89	(75 - 125)	KNOX 0050/26A Mod	05/11/07	7135437
		Dilution Factor: 8638.			
Hydrogen fluoride		Work Order #...: JV87G1AJ		MS Lot-Sample #: H7E040102-003	
	104	(75 - 125)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 4422.			
Hydrogen fluoride		Work Order #...: JV87H1AJ		MS Lot-Sample #: H7E040102-004	
	114	(75 - 125)	KNOX 0050/26A Mod	05/08/07	7135146
		Dilution Factor: 2632.			

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H7E040102 **Matrix.....:** AIR
Date Sampled...: 04/27/07 **Date Received..:** 05/01/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Bromine			Work Order #...: JV87H1AF			MS Lot-Sample #: H7E040102-004		
	ND	500	505	ug	101	KNOX 0050/26A	05/08/07	7135346
			Dilution Factor: 2500					
Chlorine			Work Order #...: JV87H1AC			MS Lot-Sample #: H7E040102-004		
	ND	1000	954	ug	95	KNOX 0050/26A	05/11/07	7135458
			Dilution Factor: 5000					
Hydrogen bromide			Work Order #...: JV87G1AF			MS Lot-Sample #: H7E040102-003		
	ND	851	869	ug	102	KNOX 0050/26A	05/08/07	7135325
			Dilution Factor: 4252.					
Hydrogen chloride			Work Order #...: JV87G1AC			MS Lot-Sample #: H7E040102-003		
	ND	1730	1530	ug	89	KNOX 0050/26A	05/11/07	7135437
			Dilution Factor: 8638.					
Hydrogen fluoride			Work Order #...: JV87G1AJ			MS Lot-Sample #: H7E040102-003		
	ND	885	916	ug	104	KNOX 0050/26A	05/08/07	7135146
			Dilution Factor: 4422.					
Hydrogen fluoride			Work Order #...: JV87H1AJ			MS Lot-Sample #: H7E040102-004		
	ND	527	601	ug	114	KNOX 0050/26A	05/08/07	7135146
			Dilution Factor: 2632.					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Raw Data

Hydrogen Chloride / Chlorine

STL Knoxville IC Initial Calibration Data Review / Narrative Checklist
Methods: 300.0, 9056, 9057 and 26A, SOP: KNOX-WC-0005, Rev. 8

(DX600)

Analysis Date:	4/16/07	File ID:	D16A-LOWANIONS-041607-QUAD

Initial Calibration Review Items	N/A	Yes	No	If No, why is data reportable?	2nd √
1. Were at least 5 levels of each analyte analyzed?		✓			✓
2. Is low level standard concentration ≤ RL?		✓			✓
3. Are the correlation coefficients (r) ≥0.995; r^2≥0.990?		✓			✓
4. For method 300.0, was the calibration curve processed using linear reqression?	✓				N/A
5. For manual integrated standards, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system	✓

Analyst: CWK Date: 4/16/07

Comments:

Calibration Range 0.075 - 2.0 mg/L (ppm)

F-, Cl-, NO2-N, Br-, NO3-N peak hgt vs. amount

2nd Level Reviewer: [signature] Date: 4/20/07

Comments:

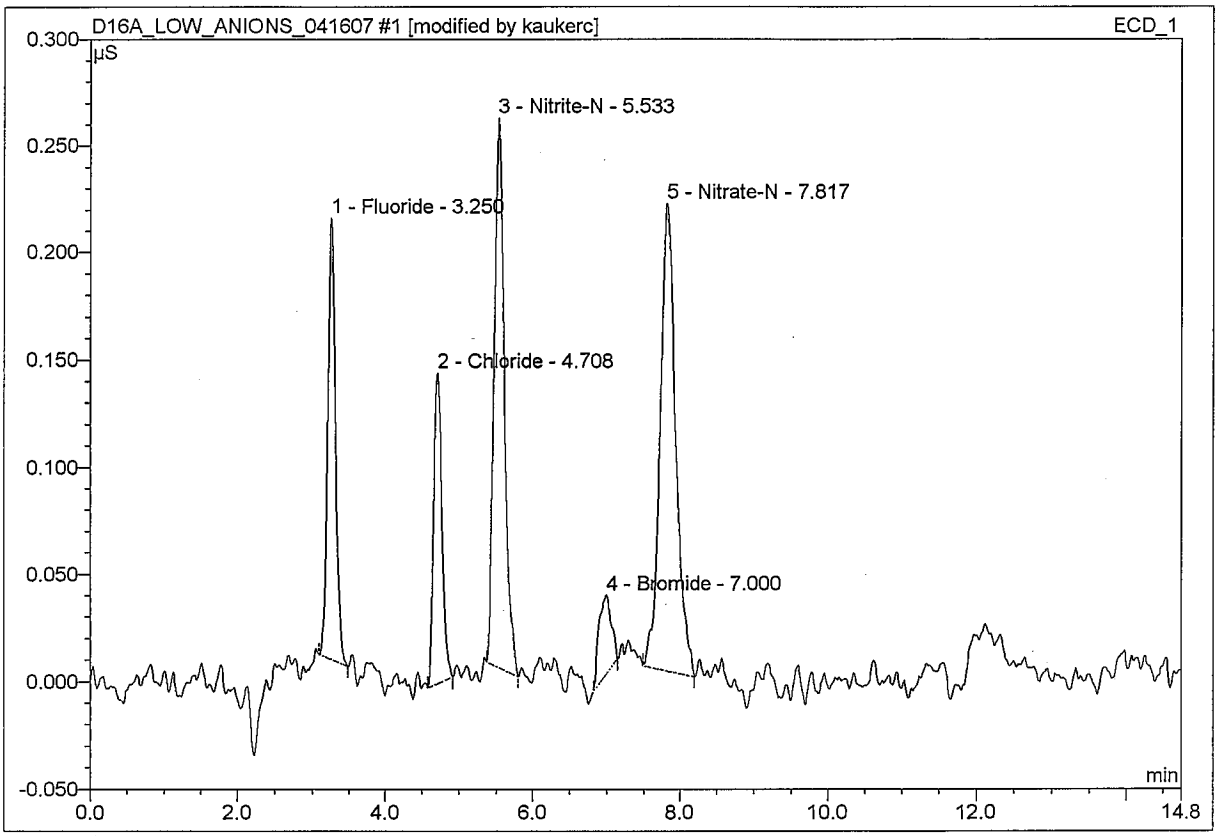
Cal Std #4 ICWS-9427

peak height = Ø + 1.889466(.5021) + Ø.067051 (.5021)²
" " = Ø + Ø.9487 + Ø.0169
" " = Ø.9656

1 CAL STD #1 ICWS-9424

QUAD

Sample Name:	**CAL STD #1 ICWS-9424**	*Injection Volume:*	**50.0**
Vial Number:	**269**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 12:21**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



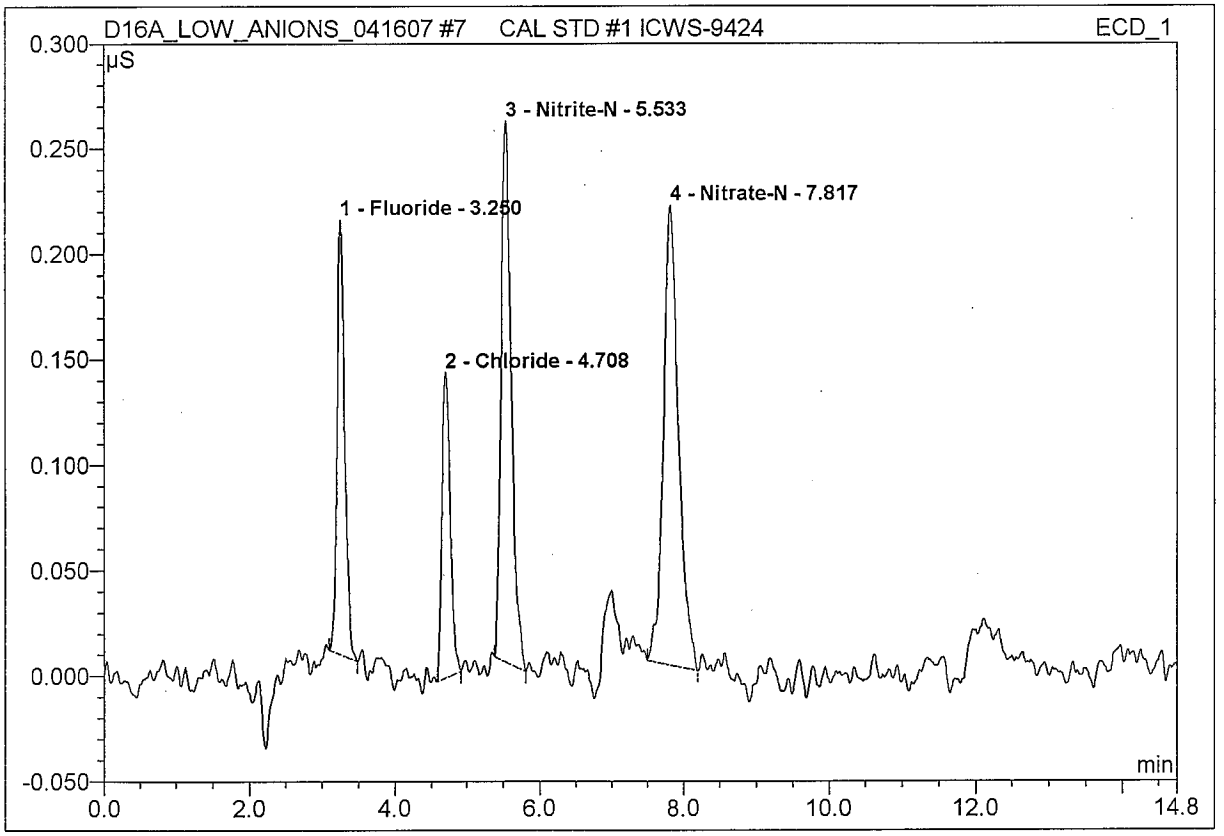
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.25	Fluoride	0.206	0.025	17.24	0.0747	BMB
2	4.71	Chloride	0.145	0.019	13.13	0.0764	BMB
3	5.53	Nitrite-N	0.256	0.041	28.40	0.0749	BMB
4	7.00	Bromide	0.037	0.007	4.96	0.0629	BMB*
5	7.82	Nitrate-N	0.218	0.053	36.28	0.0764	BMB
Total:			0.861	0.146	100.00	0.365	

(u) CWK 4/16/07

7 CAL STD #1 ICWS-9424

QUAD

Sample Name:	**CAL STD #1 ICWS-9424**	*Injection Volume:*	**50.0**
Vial Number:	**269**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 12:21**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



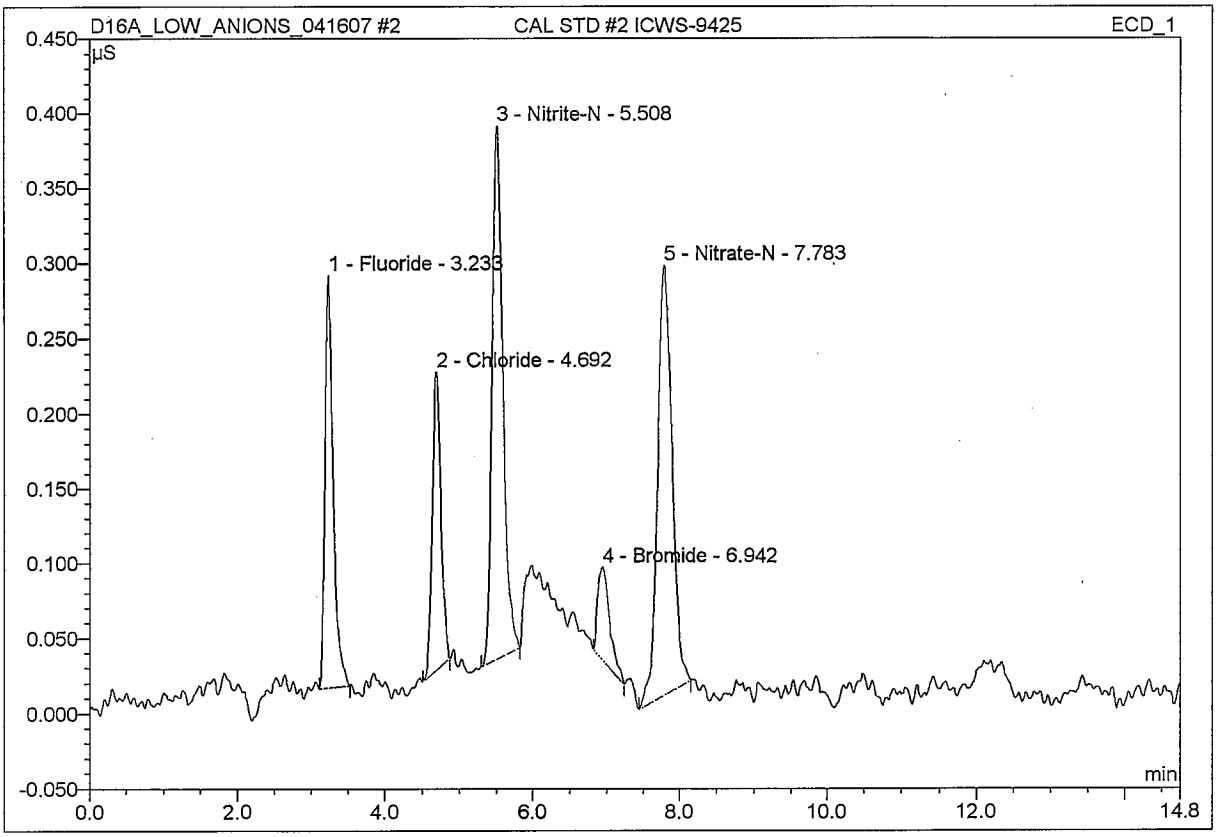
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.25	Fluoride	0.206	0.025	18.14	0.0860	BMB
2	4.71	Chloride	0.145	0.019	13.81	0.0819	BMB
3	5.53	Nitrite-N	0.256	0.041	29.88	0.0833	BMB
4	7.82	Nitrate-N	0.218	0.053	38.17	0.0846	BMB
Total:			0.825	0.139	100.00	0.336	

original

2 CAL STD #2 ICWS-9425

QUAD

Sample Name:	**CAL STD #2 ICWS-9425**	*Injection Volume:*	**50.0**
Vial Number:	**270**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 12:38**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

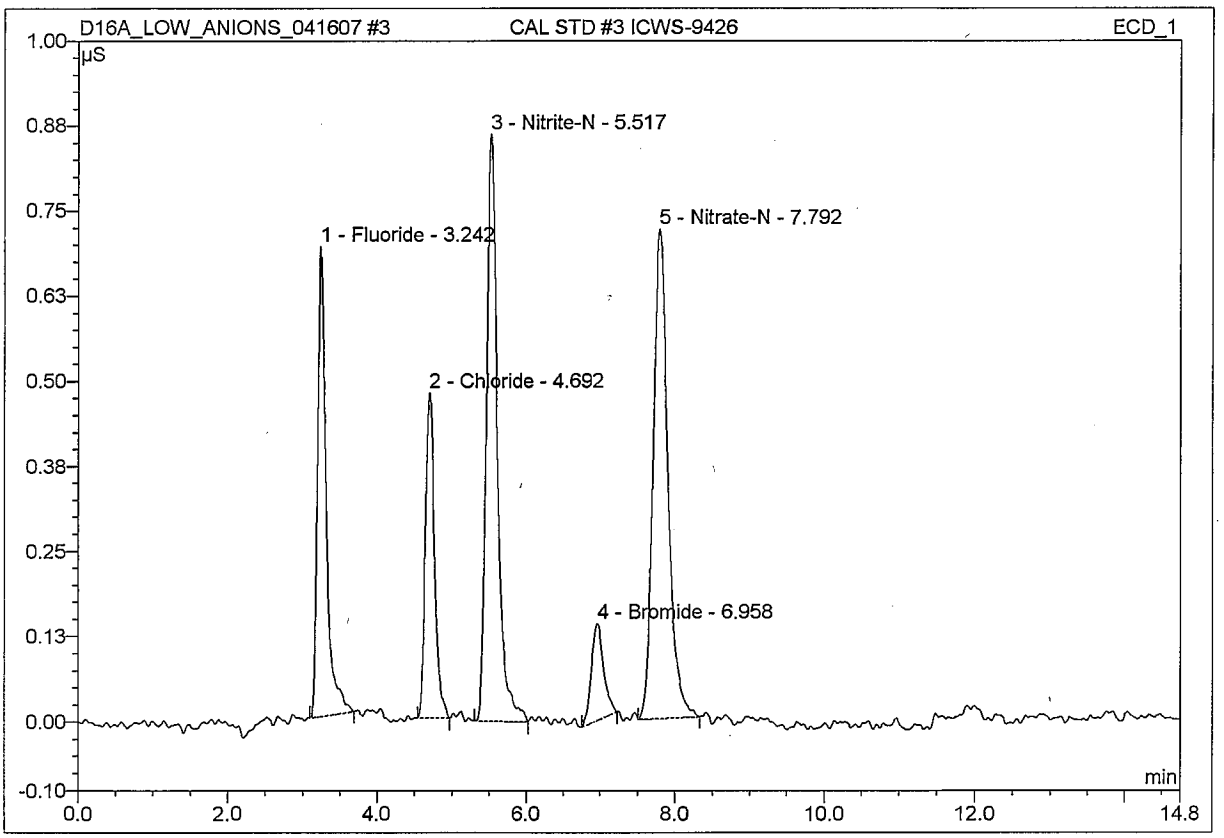


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	0.275	0.035	17.75	0.0997	BMB
2	4.69	Chloride	0.199	0.027	13.66	0.1049	BMB
3	5.51	Nitrite-N	0.356	0.059	29.75	0.1038	BMB
4	6.94	Bromide	0.062	0.012	5.83	0.1058	BMB
5	7.78	Nitrate-N	0.286	0.065	33.01	0.1003	BMB
Total:			1.177	0.198	100.00	0.514	

3 CAL STD #3 ICWS-9426

QUAD

Sample Name:	**CAL STD #3 ICWS-9426**	*Injection Volume:*	**50.0**
Vial Number:	**306**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 12:55**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

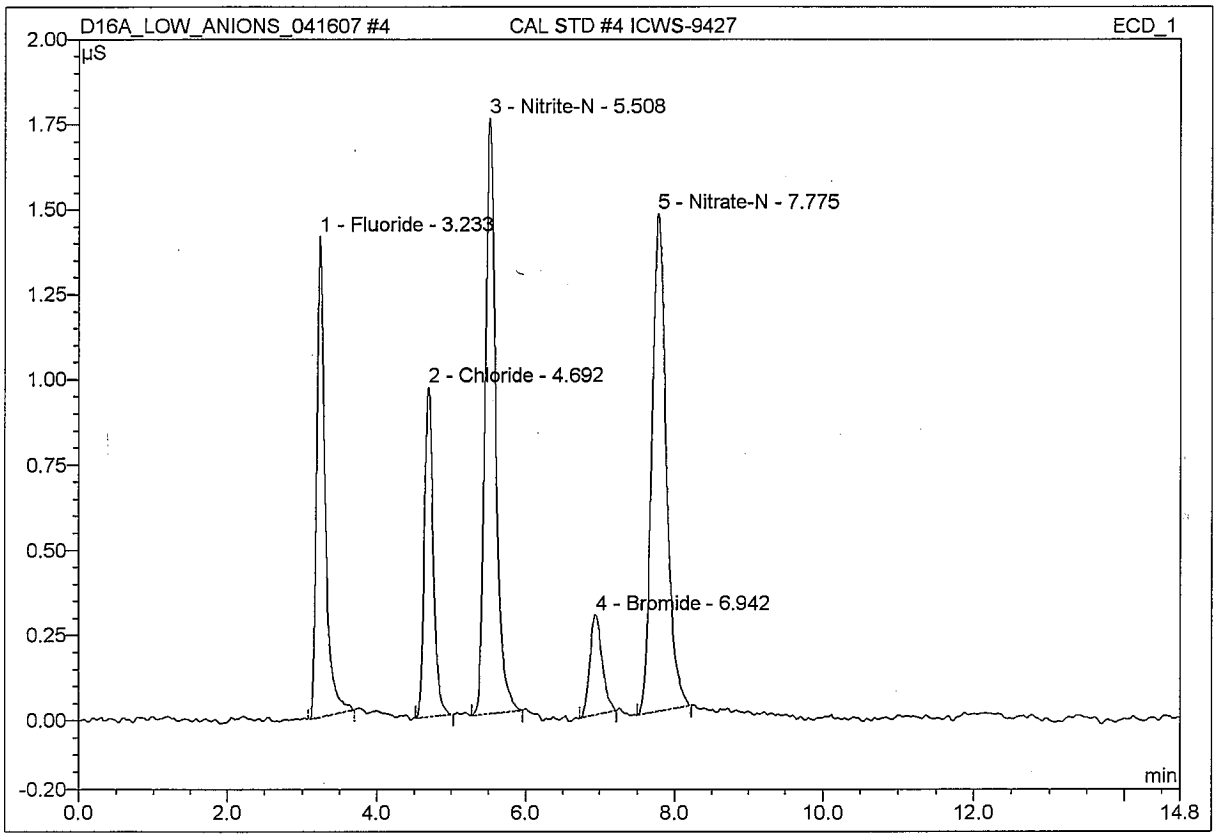


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.24	Fluoride	0.690	0.093	18.64	0.2478	BMB
2	4.69	Chloride	0.477	0.066	13.28	0.2505	BMB
3	5.52	Nitrite-N	0.860	0.149	29.80	0.2492	BMB
4	6.96	Bromide	0.141	0.027	5.37	0.2416	BMB
5	7.79	Nitrate-N	0.717	0.165	32.92	0.2490	BMB
Total:			2.886	0.500	100.00	1.238	

4 CAL STD #4 ICWS-9427

QUAD

Sample Name:	**CAL STD #4 ICWS-9427**	*Injection Volume:*	**50.0**
Vial Number:	**307**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 13:12**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

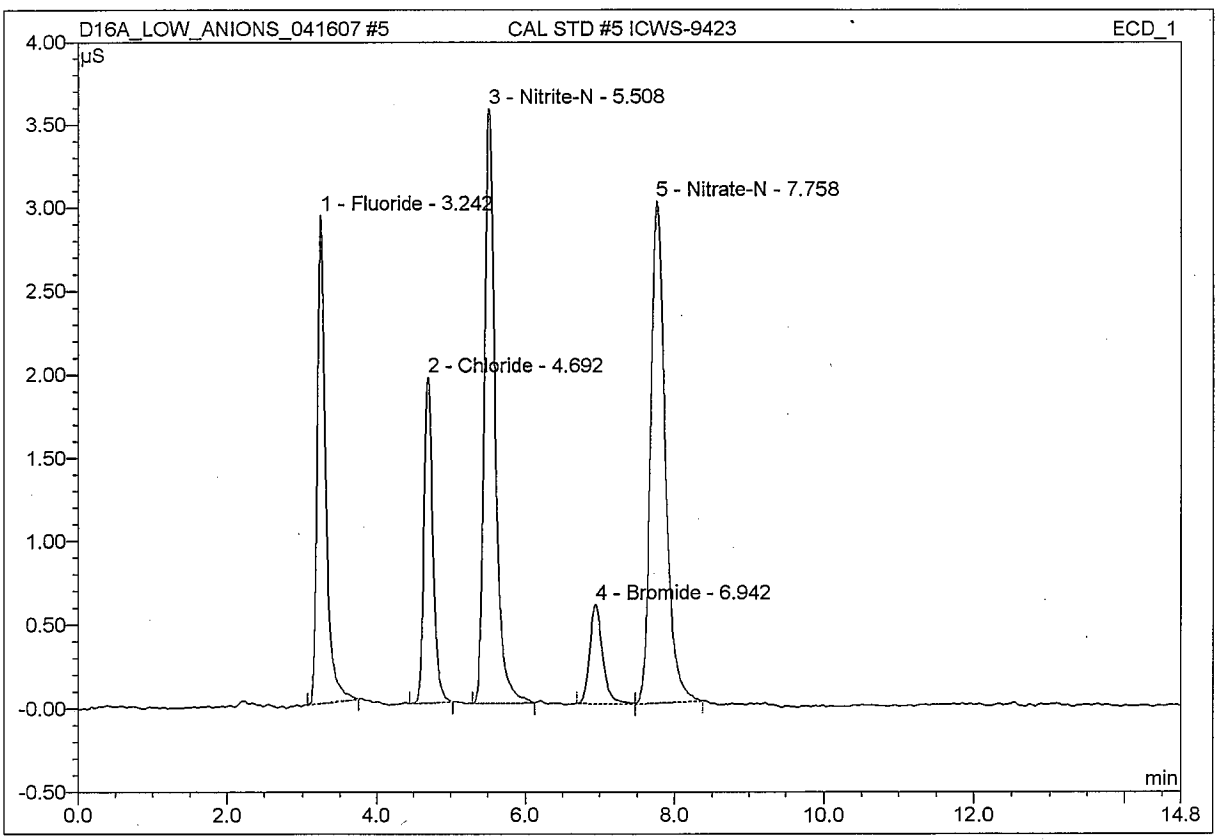


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	1.411	0.187	18.69	0.4989	BMB
2	4.69	Chloride	0.966	0.133	13.37	0.5021	BMB
3	5.51	Nitrite-N	1.748	0.292	29.29	0.5007	BMB
4	6.94	Bromide	0.294	0.056	5.62	0.5020	BMB
5	7.78	Nitrate-N	1.459	0.330	33.04	0.4994	BMB
Total:			5.878	0.998	100.00	2.503	

5 CAL STD #5 ICWS-9423

QUAD

Sample Name:	**CAL STD #5 ICWS-9423**	*Injection Volume:*	**50.0**
Vial Number:	**308**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 13:29**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

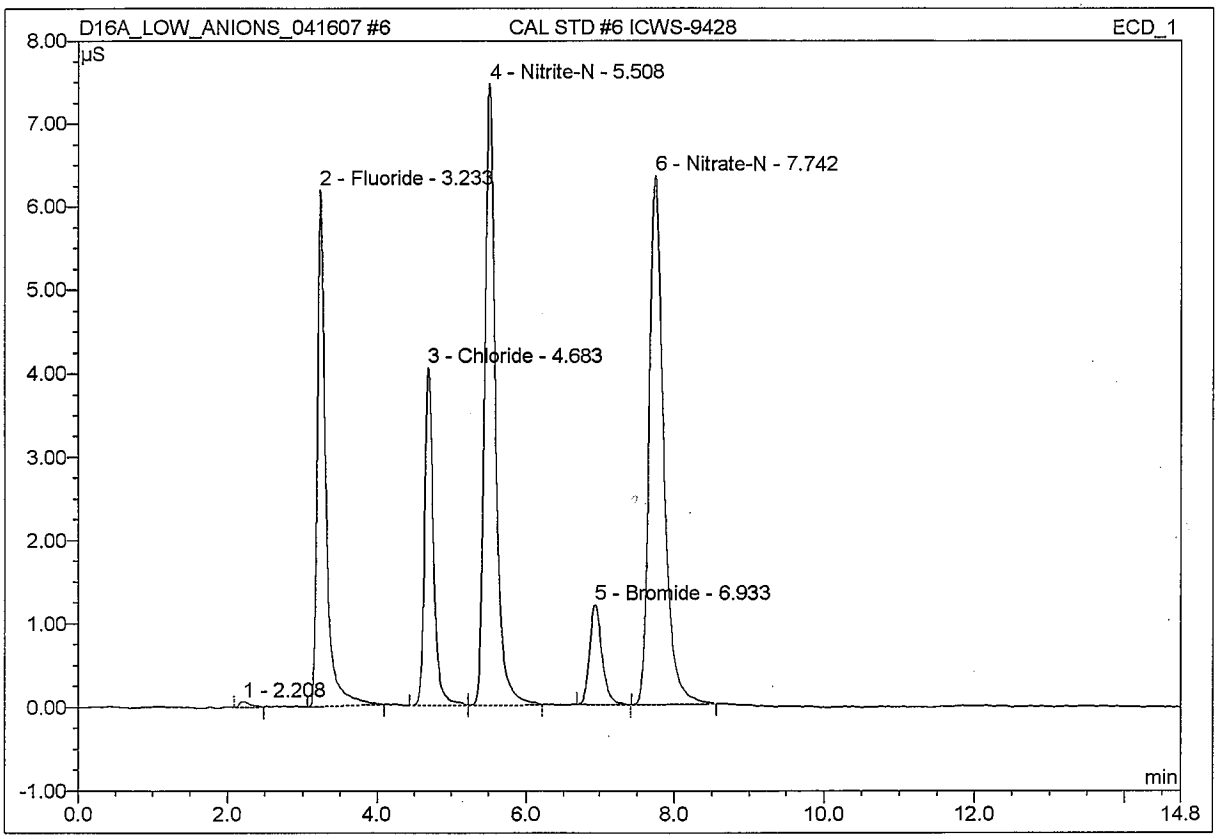


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.24	Fluoride	2.922	0.382	18.55	1.0018	BMB
2	4.69	Chloride	1.951	0.269	13.07	0.9972	BMB
3	5.51	Nitrite-N	3.567	0.606	29.40	0.9992	BMB
4	6.94	Bromide	0.593	0.119	5.76	1.0027	BMb
5	7.76	Nitrate-N	3.007	0.684	33.21	1.0006	bMB
Total:			12.039	2.060	100.00	5.001	

6 CAL STD #6 ICWS-9428

QUAD

Sample Name:	**CAL STD #6 ICWS-9428**	*Injection Volume:*	**50.0**
Vial Number:	**309**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 13:46**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

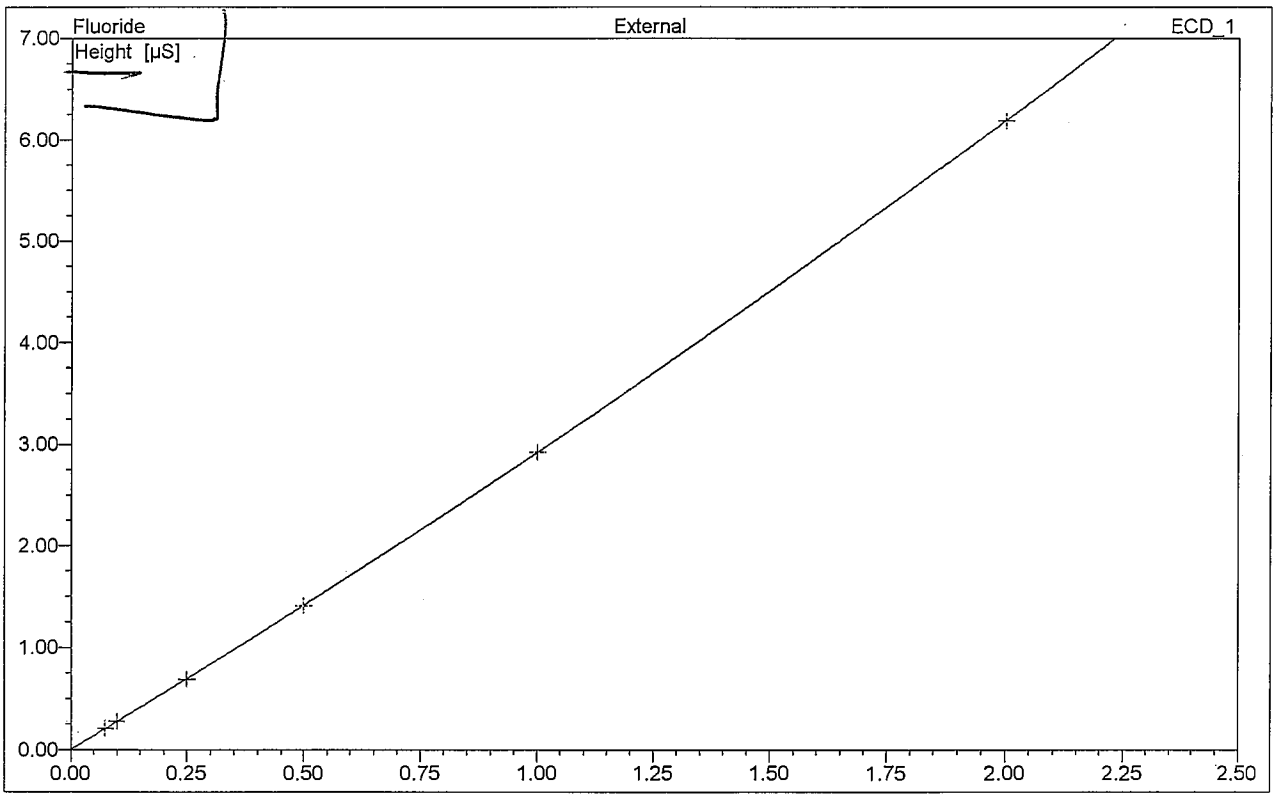


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.21	n.a.	0.068	0.011	0.26	n.a.	BMB
2	3.23	Fluoride	6.188	0.821	18.97	1.9997	BMB
3	4.68	Chloride	4.048	0.574	13.25	2.0005	BM
4	5.51	Nitrite-N	7.457	1.253	28.94	2.0002	MB
5	6.93	Bromide	1.200	0.236	5.44	1.9993	BMB
6	7.74	Nitrate-N	6.339	1.435	33.13	1.9999	BMB
Total:			25.301	4.330	100.00	10.000	

~~4 CAL STD #4 ICWS-9427~~ DFW 4/18/07

QUAD

Sample Name:	**CAL STD #4 ICWS-9427**	*Injection Volume:*	**50.0**
Vial Number:	**307**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 13:12**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

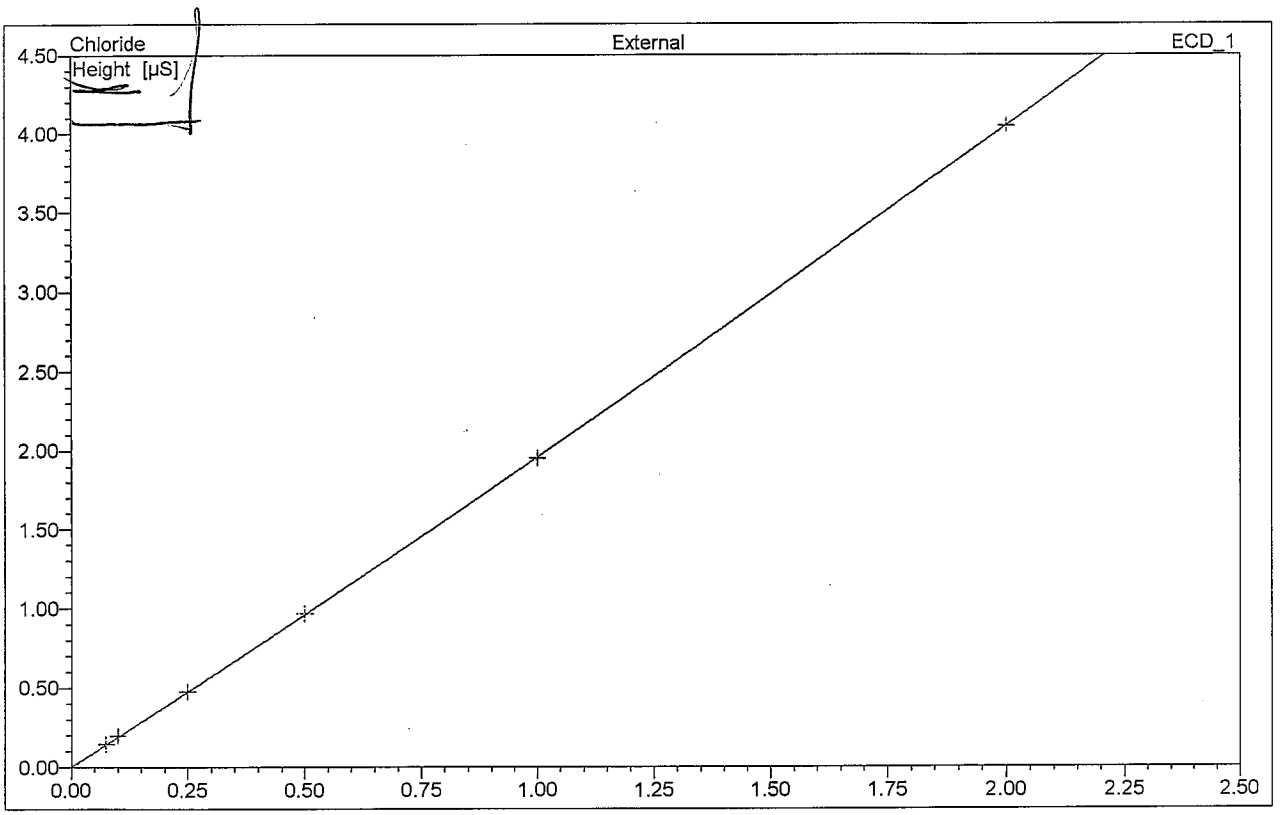


No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	✓ 0.9996	0.0000	2.739293	0.177604
2	4.69	Chloride	Quad	6	0.9998	0.0000	1.889466	0.067051
3	5.51	Nitrite-N	Quad	6	0.9997	0.0000	3.411458	0.158481
4	6.94	Bromide	Quad	6	1.0000	0.0000	0.581641	0.009270
5	7.78	Nitrate-N	Quad	6	0.9996	0.0000	2.839897	0.164894
Average:					0.9997	0.0000	2.2924	0.1155

~~4 CAL STD #4 ICWS-9427~~ DPW 4/18/07

QUAD

Sample Name:	**CAL STD #4 ICWS-9427**	*Injection Volume:*	**50.0**
Vial Number:	**307**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 13:12**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

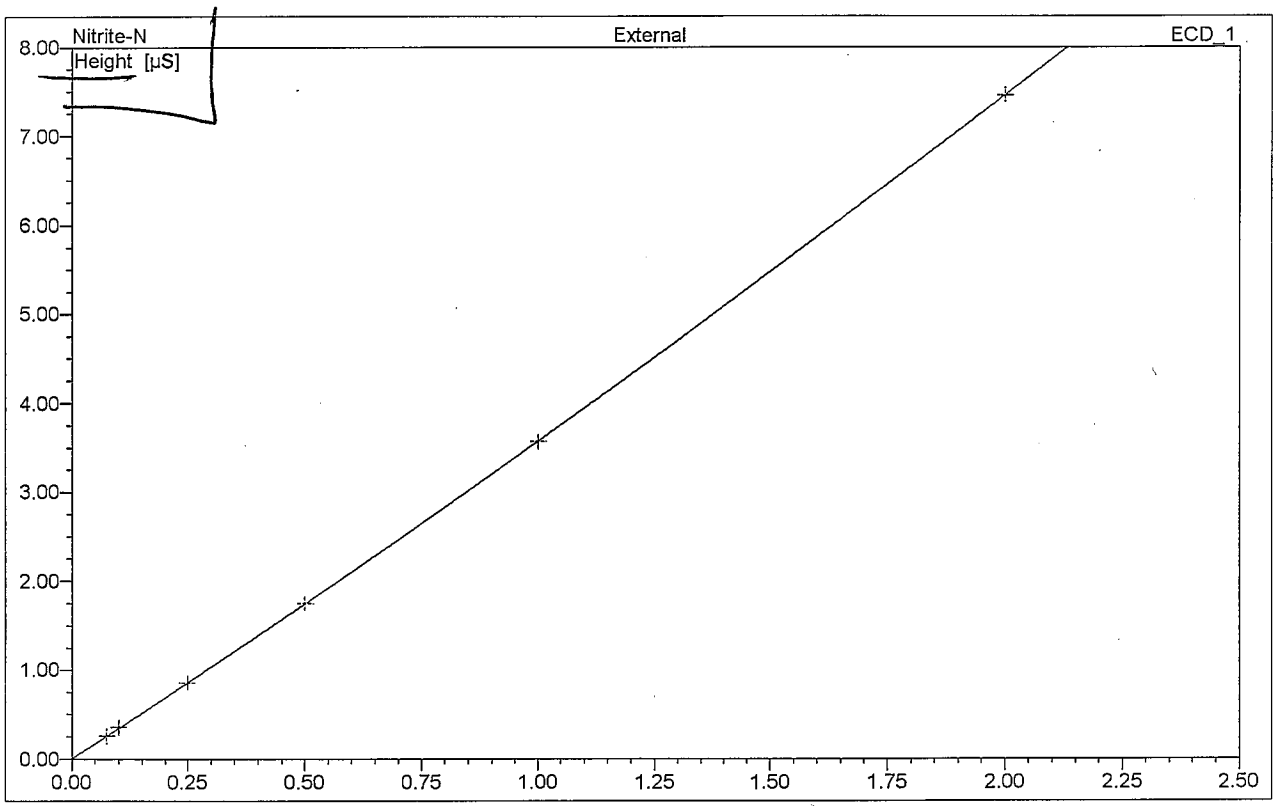


No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9996	0.0000	2.739293	0.177604
2	4.69	Chloride	Quad	6	0.9998	0.0000	1.889466	0.067051
3	5.51	Nitrite-N	Quad	6	0.9997	0.0000	3.411458	0.158481
4	6.94	Bromide	Quad	6	1.0000	0.0000	0.581641	0.009270
5	7.78	Nitrate-N	Quad	6	0.9996	0.0000	2.839897	0.164894
Average:					0.9997	0.0000	2.2924	0.1155

~~4 CAL STD #4 ICWS-9427~~ DW 4/18/07

QUAD

Sample Name:	**CAL STD #4 ICWS-9427**	*Injection Volume:*	**50.0**
Vial Number:	**307**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 13:12**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

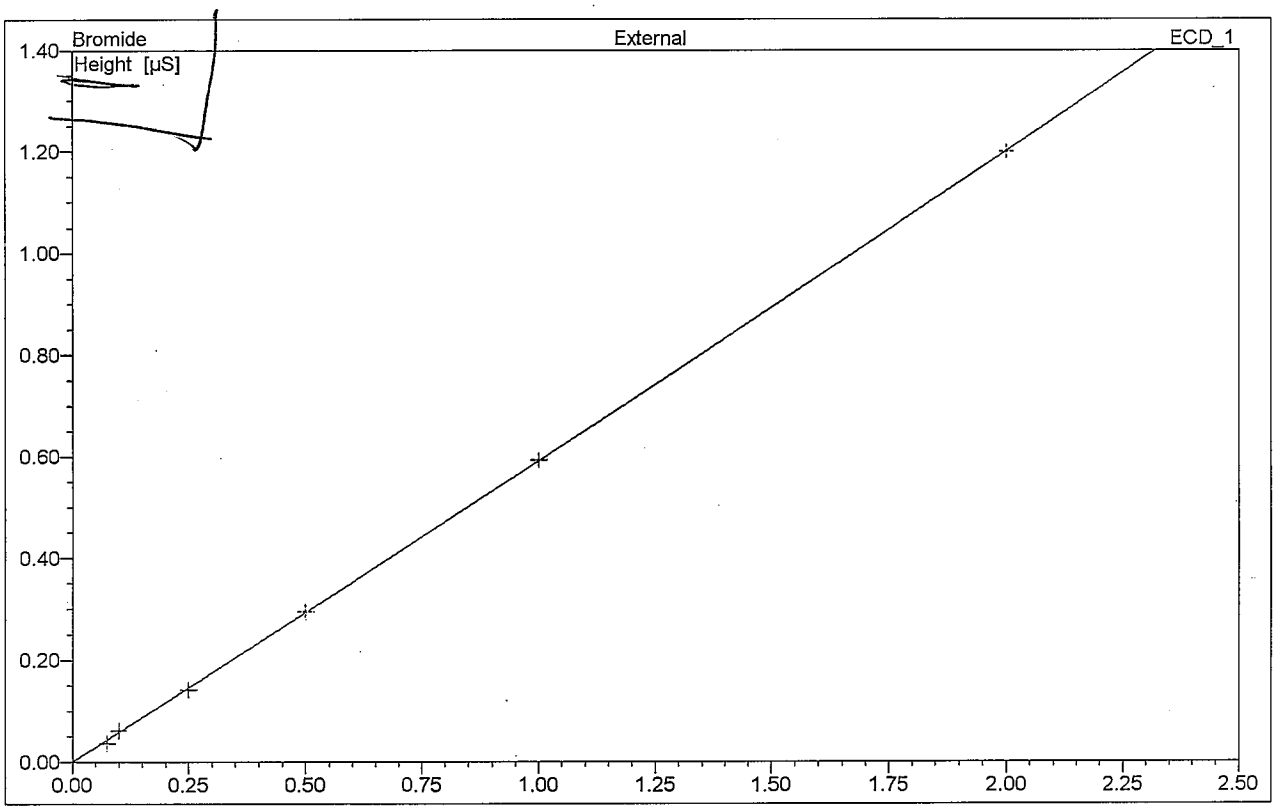


No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9996	0.0000	2.739293	0.177604
2	4.69	Chloride	Quad	6	0.9998	0.0000	1.889466	0.067051
3	5.51	Nitrite-N	Quad	6	✓ 0.9997	0.0000	3.411458	0.158481
4	6.94	Bromide	Quad	6	1.0000	0.0000	0.581641	0.009270
5	7.78	Nitrate-N	Quad	6	0.9996	0.0000	2.839897	0.164894
Average:					0.9997	0.0000	2.2924	0.1155

~~4 CAL STD #4 ICWS-9427~~ DEW 4/18/07

QUAD

Sample Name:	**CAL STD #4 ICWS-9427**	*Injection Volume:*	**50.0**
Vial Number:	**307**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 13:12**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

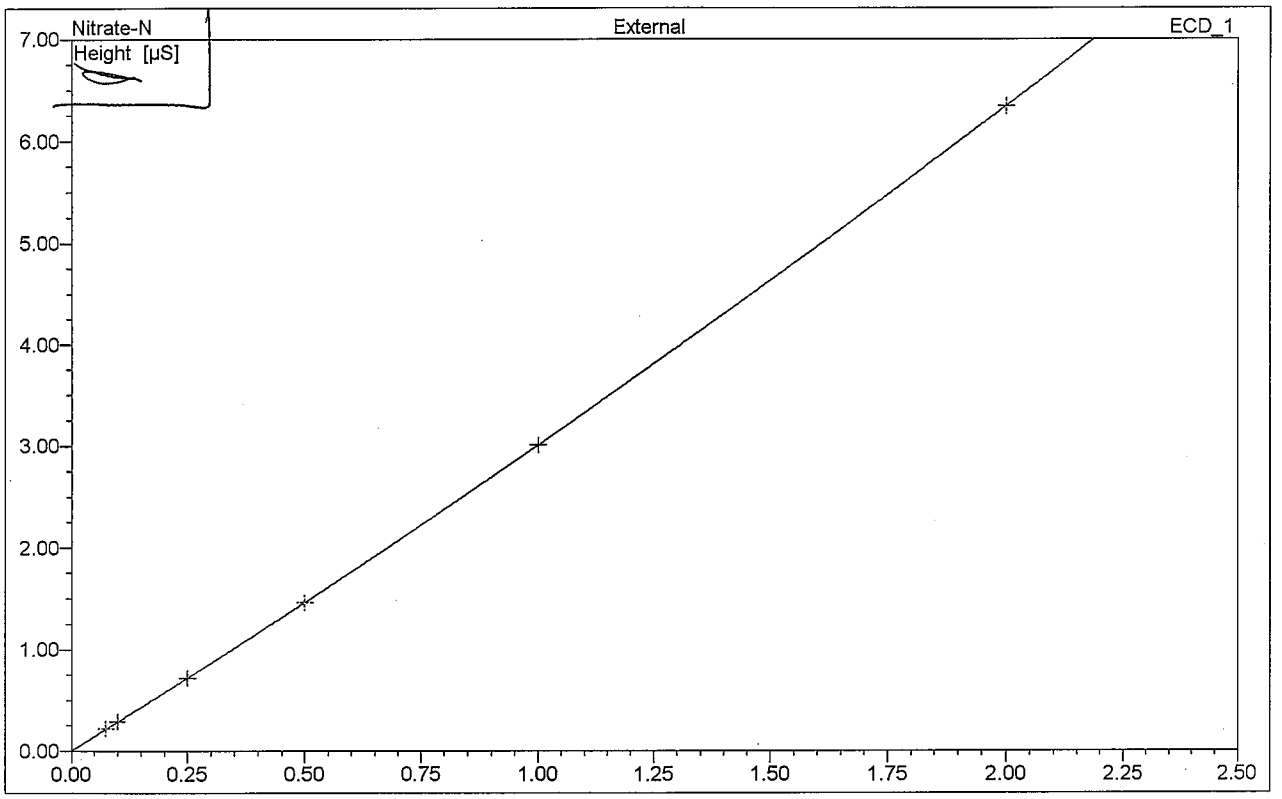


No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9996	0.0000	2.739293	0.177604
2	4.69	Chloride	Quad	6	0.9998	0.0000	1.889466	0.067051
3	5.51	Nitrite-N	Quad	6	0.9997	0.0000	3.411458	0.158481
4	6.94	Bromide	Quad	6	✓ 1.0000	0.0000	0.581641	0.009270
5	7.78	Nitrate-N	Quad	6	0.9996	0.0000	2.839897	0.164894
Average:					0.9997	0.0000	2.2924	0.1155

~~4 CAL STD #4 ICWS-9427~~ DKW 4/18/07

QUAD

Sample Name:	**CAL STD #4 ICWS-9427**	*Injection Volume:*	**50.0**
Vial Number:	**307**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**4/16/2007 13:12**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. (R)	Offset	Slope	Curve
1	3.23	Fluoride	Quad	6	0.9996	0.0000	2.739293	0.177604
2	4.69	Chloride	Quad	6	0.9998	0.0000	1.889466	0.067051
3	5.51	Nitrite-N	Quad	6	0.9997	0.0000	3.411458	0.158481
4	6.94	Bromide	Quad	6	1.0000	0.0000	0.581641	0.009270
5	7.78	Nitrate-N	Quad	6	✓ 0.9996	0.0000	2.839897	0.164894
Average:					0.9997	0.0000	2.2924	0.1155

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 2/26/07 Chemist: DKW Expiration Date: 4/30/07

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-9254	F-	17125	ERA	12/31/07	1000. ppm	5.	50.	100. PPM
2. (Intermediate Calib. Source)	Cl-	36065	↓	6/30/07	↓	↓	↓	↓
3.	NO2N-	17075	↓	7/31/07	↓	↓	↓	↓
4.	BR-	05017	↓	1/31/09	↓	↓	↓	↓
5.	NO3N-	17026	↓	2/28/08	↓	↓	↓	↓
6. ICWI-9255	F-	1-38F-2	SPEX	8/15/07	1000. ppm	5.	50.	100. PPM
7. (Intermediate 2nd Source)	Cl-	1-45CL-2	↓	1/30/08	↓	↓	↓	↓
8.	NO2N-	1-13NO2N-2	↓	9/15/07	↓	↓	↓	↓
9.	BR-	1-1BR-2	↓	4/30/07	↓	↓	↓	↓
10.	NO3N-	1-27NO2N-2	↓	5/15/07	↓	↓	↓	↓
11.								
12.								
13.		DKW		2/26/07				
14.								

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 2/26/07 Chemist: DKW Expiration Date: 4/30/07

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-9254	F-	17125	ERA	12/31/07	1000. ppm	5.	50.	100. PPM
2. (Intermediate Calib. Source)	Cl-	36065	↓	6/30/07	↓	↓	↓	↓
3.	NO2N-	17075	↓	7/31/07	↓	↓	↓	↓
4.	BR-	05017	↓	1/31/09	↓	↓	↓	↓
5.	NO3N-	17026	↓	2/28/08	↓	↓	↓	↓
6. ICWI-9255	F-	1-38F-2	SPEX	8/15/07	1000. ppm	5.	50.	100. PPM
7. (Intermediate 2nd Source)	Cl-	1-45CL-2	↓	1/30/08	↓	↓	↓	↓
8.	NO2N-	1-13NO2N-2	↓	9/15/07	↓	↓	↓	↓
9.	BR-	1-1BR-2	↓	4/30/07	↓	↓	↓	↓
10.	NO3N-	1-27NO2N-2	↓	5/15/07	↓	↓	↓	↓
11.								
12.				2/26/07				
13.		DKW						
14.								

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 4/16/07 Chemist: CWK Expiration Date: 4/17/07

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS 9421	F-	ICWI-	9255	4/30/07	100 ppm	0.750	100ml	0.750 ppm
2. (ICV/LCS)	Cl-							
3.	NO2-N							
4.	Br-							
5.	NO3-N							
6. ICWS-9422	F-							
7. (ICV/LCSD)	Cl-							
8.	NO2-N							
9.	Br-							
10.	NO3-N							
11. ICWS-9423	F-	ICWI.	9254			1.00 ✓		1.00 ppm ✓
12. (CV)	Cl-							
13.	NO2-N							
14.	Br-							
15.	NO3-N							

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 4/16/07 Chemist: CWK Expiration Date: 4/17/07

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9424	F-	ICWI-	9254	4/30/07	100 ppm	0.075	100ml	0.075ppm
2. (Cal std ①)	Cl-					✓		✓
3.	NO2-N							
4.	Br-							
5.	NO3-N							
6. ICWS-9425	F-					0.100		0.100 ppm
7. (cal std ②)	Cl-					✓		✓
8.	NO2-N							
9.	Br-							
10.	NO3-N							
11. ICWS-9426	F-					0.250		0.250ppm
12. (cal std ③)	Cl-					✓		✓
13.	NO2-N							
14.	Br-							
15.	NO3-N							

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 4/16/07 Chemist: CWK Expiration Date: 4/17/07

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9427	F-	ICWI-	9254	4/30/07	100 ppm	0.500	100 ml	0.500 ppm
2. (Cal Std 4)	Cl-							
3.	NO2-N							
4.	Br-							
5.	NO3-N							
6. ICWS-9428	F-					2.00		2.00 ppm
7. (Cal Std 6)	Cl-							
8.	NO2-N							
9.	Br-							
10.	NO3-N							
11.								
12.			CWK 4/16/07					
13.								
14.								

STL Knoxville Anions in Air Data Review / Narrative Checklist for Methods 9056/9057/26A, SOP KNOX-WC-0005, Rev. 8

Lot #:	H7E040102	Analysis Date:	5/8/07	File ID:	E08 - LOWANIONS - 050807 D16A - LOWANIONS - 041607-QVAD	ICAL File ID:	D16A-LOWANIONS-041607-QVAD

Review Items	NA	Yes	No	If No, why is data reportable?	2nd ✓
1. Were PM checklists (L40), Lot Summary and any applicable QAS reviewed?		✓			✓
2. ICV within 90-110%R?		✓			✓
3. ICB/CCB < 1/2 RL?		✓		☐ **[ccb1] No analyte > MDL in associated samples.**	✓
4. CCVs/CCBs run after every 10 samples, and at end of sequence?		✓			✓
5. Is %D ≤10% for each CCV?		✓			✓
6. If CCV failed, was it rerun only once?	✓				N/A
7. LCS/LCSD analytes within 90-110%R? *If no, list LCS ID:*		✓		☐ **[lcs3] LCS recovery >upper control limit & sample results <RL.**	✓
8. Method blank < 1/2 RL? *If no, list blank ID:*		✓		☐ **[mb3] No analyte > RL in associated samples.** ☐ [mb7] Sample results > 10x higher than blank.	✓
9. Matrix spikes run at required frequency?		✓			✓
10. Matrix spikes within 75-125% recovery? *If no, list MS ID:* _____		✓		☐ [air ms1] MS %R slightly outside limits for 1 sample. ☐ [air ms2] MS %R slightly outside limits for >1 sample. ☐ Air train reagent blank – spike result not reported.	✓
11. Were MS run #'s assigned to all matrix spikes except reagent blanks?		✓			✓
12. Sample analyses done within holding time (HT)? *If no, list samples:*		✓		☐ [ht1] HT expired upon receipt. ☐ *[ht2] Analysis requested after HT expired.*	✓
13. Were results processed using correct ICAL?		✓			✓
14. Are positive results within the calibration range?		✓			✓
15. Is integration acceptable for all samples, QC samples and standards?		✓			✓
16. For manual integrated standards and QC samples, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system.	✓
17. Calculations checked for error? (Document manual calculation checks.)		✓			✓
18. Were spreadsheets checked for transcription errors?		✓			✓
19. Final report/F6 correct? (Verify results, RLs, units, qualifiers, DFs, dates, spikes.)		✓			✓
20. Are all nonconformances documented and discussed in narrative?	✓			List NCM #:	N/A
21. Appropriate air train autotext selected for narrative?		✓		☐ [air1] Cl^- reported as HCl and Cl_2. ☐ [air2] Cl^- reported as HCl only. ☐ [air3] Cl^-, F^- reported as HCl, Cl_2, HF. ☒ [air4] Cl^-, F^-, Br^- reported as HCl, Cl_2, HF, HBr, Br_2. ☐ [air5] Cl^-, F^-, NO_2^-, NO_3^- reported as HCl, Cl_2, HF, HNO_2, HNO_3. ☐ [air6] Cl^-, F^-, Br^-, I^- reported as HCl, Cl_2, HF, HBr, Br_2, I^-. ☐ [air7] Cl^-, F^-, NO_2^-, NO_3^- reported as Cl^-, F^-, NO_2^-, NO_3^-.	✓
22. Sample pH adjustment included in narrative?	✓			☐ [air pH] Sample pH adjusted prior to analysis.	N/A
23. Audit sample results included in narrative?	✓			☐ [audit2] Audit results in mg/L.	N/A

1st Level Reviewer: CWK	Date: 5/15/07	2nd Level Reviewer: [signature]	Date: 5/18/07

JV87L MS 1/10 Cl^-

$y = 1.889466(0.40460) + 0.067051(0.40460)^2$

$y = 0.764477944 + 0.010976326$

$y = 0.775$ ✓ = (Cl^- peak height)

Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 7135146
Prep Date: 05/08/2007 0930
Comp Date: 05/08/2007 1800

Analyte: Hydrogen Fluoride
CAS #: 7664-39-3
QuantIMS #: 5646

Analyst Initials: CWK
Analyst LIMS Code: 035620
Instr. ID: 600

Reviewed by: DW
Date: 5/18/07
MW Factor: 1.053051836

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H7E040102	1		4M	0.1	0.050	JV87E1AD	490	10	0.0000	ND	515.9954	257.9977	5,159.95	050807	1303
H7E040102	2		4M	0.1	0.050	JV87F1AD	275	10	0.3420	ND	289.5893	144.7946	2,895.89	050807	1620
H7E040102	3		4M	0.1	0.050	JV87G1AH	420	10	0.0000	ND	442.2818	221.1409	4,422.82	050807	1029
H7E040102	3	S	4M	0.1	0.050	JV87G1AJ	420	10	2.0705	915.7444	442.2818	221.1409	4,422.82	050807	1046
H7E040102	3	D	4M	0.1	0.050	JV87G1AK	420	10	2.0403	902.3875	442.2818	221.1409	4,422.82	050807	1212
H7E040102	4		4M	0.1	0.050	JV87H1AH	250	10	0.4231	ND	263.2630	131.6315	2,632.63	050807	1338
H7E040102	4	S	4M	0.1	0.050	JV87H1AJ	250	10	2.2826	600.9240	263.2630	131.6315	2,632.63	050807	1410
H7E040102	4	D	4M	0.1	0.050	JV87H1AK	250	10	2.2858	601.7665	263.2630	131.6315	2,632.63	050807	1443
H7E040102	5		4M	0.1	0.050	JV87J1AD	475	10	0.0000	ND	500.20	250.10	5,002.00	050807	1320
H7E040102	6		4M	0.1	0.050	JV87K1AD	290	10	0.3696	ND	305.39	152.69	3,053.85	050807	1652
H7E040102	7		4M	0.1	0.050	JV87L1AD	100	10	0.0000	ND	105.31	52.65	1,053.05	050807	1103
H7E040102	7	S	4M	0.1	0.050	JV87L1AE	100	10	1.9831	208.8307	105.31	52.65	1,053.05	050807	1120
H7E040102	8		4M	0.1	0.050	JV87M1AD	100	10	0.5262	55.4116	105.31	52.65	1,053.05	050807	1515
H7E040102	8	S	4M	0.1	0.050	JV87M1AE	100	10	2.4771	260.8515	105.31	52.65	1,053.05	050807	1547
H7E040102	9		4M	0.1	0.050	JV87N1AD	100	10	0.0000	ND	105.31	52.65	1,053.05	050807	1137
H7E040102	9	S	4M	0.1	0.050	JV87N1AE	100	10	2.1432	225.6901	105.31	52.65	1,053.05	050807	1155
H7E150000	146	B	4M	0.1	0.050	JW0H11AA	100	1	0.0000	ND	10.53	5.27	105.31	050807	1012
H7E150000	146	C	4M	0.1	0.050	JW0H11AC	100	1	0.7739	81.4957	10.53	5.27	105.31	050807	0937
H7E150000	146	L	4M	0.1	0.050	JW0H11AD	100	1	0.7823	82.3802	10.53	5.27	105.31	050807	0954

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information: ✓ ✓ ✓ ✓ ✓

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI-9502	100.00	0.750	100.0	JW0H11AC	0.75	105.31	78.98
LCSD	ICWI-9502	100.00	0.750	100.0	JW0H11AD	0.75	105.31	78.98
MS (1)	ICWI-9502	100.00	0.020	10.0	JV87G1AJ	0.20	4,422.82	884.56
MSD (1)	ICWI-9502	100.00	0.020	10.0	JV87G1AK	0.20	4,422.82	884.56
MS (2)	ICWI-9502	100.00	0.020	10.0	JV87H1AJ	0.20	2,632.63	526.53
MSD (2)	ICWI-9502	100.00	0.020	10.0	JV87H1AK	0.20	2,632.63	526.53
MS (3)	ICWI-9502	100.00	0.020	10.000	JV87L1AE	0.20	1,053.05	210.61
MSD (3)								
MS (4)	ICWI-9502	100.00	0.020	10.000	JV87M1AE	0.20	1,053.05	210.61
MSD (4)								
MS (5)	ICWI-9502	100.00	0.020	10.000	JV87N1AE	0.20	1,053.05	210.61
MSD (5)								

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

Comments:

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 7135325
Prep Date: 05/08/2007 0930
Comp Date: 05/08/2007 1800

Analyte: Hydrogen Bromide
CAS #: 10035-10-6
QuantIMS #: 5645

Analyst Initials: CWK
Analyst LIMS Code: 035620
Instr. ID: 600

Reviewed by: DJW
Date: 5/18/07
MW Factor: 1.012613887

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H7E040102	1		4J	0.1	0.050	JV87E1AC	490	10	0.0000	ND	496.1808	248.0904	4,961.81	050807	1303
H7E040102	3		4J	0.1	0.050	JV87G1AE	420	10	0.0000	ND	425.2978	212.6489	4,252.98	050807	1029
H7E040102	3	S	4J	0.1	0.050	JV87G1AF	420	10	2.0426	868.7134	425.2978	212.6489	4,252.98	050807	1046
H7E040102	3	D	4J	0.1	0.050	JV87G1AG	420	10	2.1396	909.9672	425.2978	212.6489	4,252.98	050807	1212
H7E040102	5		4J	0.1	0.050	JV87J1AC	475	10	0.0000	ND	480.9916	240.4958	4,809.92	050807	1320
H7E040102	7		4J	0.1	0.050	JV87L1AC	100	10	0.0000	ND	101.2614	50.6307	1,012.61	050807	1103
H7E040102	7	S	4J	0.1	0.050	JV87L1AF	100	10	1.9364	196.0826	101.2614	50.6307	1,012.61	050807	1120
H7E040102	9		4J	0.1	0.050	JV87N1AC	100	10	0.0000	ND	101.2614	50.6307	1,012.61	050807	1137
H7E040102	9	S	4J	0.1	0.050	JV87N1AF	100	10	1.9492	197.3787	101.26	50.63	1,012.61	050807	1155
H7E150000	325	B	4J	0.1	0.050	JW0691AA	100	1	0.0000	ND	10.13	5.06	101.26	050807	1012
H7E150000	325	C	4J	0.1	0.050	JW0691AC	100	1	0.7569	76.6447	10.13	5.06	101.26	050807	0937
H7E150000	325	L	4J	0.1	0.050	JW0691AD	100	1	0.7527	76.2194	10.13	5.06	101.26	050807	0954

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information: ✓ ✓ ✓ ✓ ✓

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI9502	100.00	0.750	100.0	JW0691AC	0.75	101.26	75.95
LCSD	ICWI9502	100.00	0.750	100.0	JW0691AD	0.75	101.26	75.95
MS (1)	ICWI9502	100.00	0.020	10.0	JV87G1AF	0.20	4,252.98	850.60
MSD (1)	ICWI9502	100.00	0.020	10.0	JV87G1AG	0.20	4,252.98	850.60
MS (2)	ICWI9502	100.00	0.020	10.0	JV87L1AF	0.20	1,012.61	202.52
MSD (2)								
MS (3)	ICWI9502	100.00	0.020	10.000	JV87N1AF	0.20	1,012.61	202.52
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 7135346
Prep Date: 05/08/2007 0930
Comp Date: 05/08/2007 1800

Analyte: Bromine
CAS #: 7726-95-6
QuantIMS #: 3450

Analyst Initials: CWK
Analyst LIMS Code: 035620
Instr. ID: 600

Reviewed by: DJW
Date: 5/18/07
MW Factor: 1.0

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H7E040102	2		4I	0.1	0.024	JV87F1AC	275	10	0.0000	ND	275.0000	66.0000	2,750.00	050807	1620
H7E040102	4		4I	0.1	0.024	JV87H1AE	250	10	0.0000	ND	250.0000	60.0000	2,500.00	050807	1338
H7E040102	4	S	4I	0.1	0.024	JV87H1AF	250	10	2.0187	504.6750	250.0000	60.0000	2,500.00	050807	1410
H7E040102	4	D	4I	0.1	0.024	JV87H1AG	250	10	2.2420	560.5000	250.0000	60.0000	2,500.00	050807	1443
H7E040102	6		4I	0.1	0.024	JV87K1AC	290	10	0.0000	ND	290.0000	69.6000	2,900.00	050807	1652
H7E040102	8		4I	0.1	0.024	JV87M1AC	100	10	0.0000	ND	100.0000	24.0000	1,000.00	050807	1515
H7E040102	8	S	4I	0.1	0.024	JV87M1AF	100	10	1.6333	163.3300	100.0000	24.0000	1,000.00	050807	1547
H7E150000	346	B	4I	0.1	0.024	JW0761AA	100	1	0.0000	ND	10.0000	2.4000	100.00	050807	1012
H7E150000	346	C	4I	0.1	0.024	JW0761AC	100	1	0.7569	75.6900	10.00	2.40	100.00	050807	0937
H7E150000	346	L	4I	0.1	0.024	JW0761AD	100	1	0.7527	75.2700	10.00	2.40	100.00	050807	0954

Spike Information:

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)

Comments:

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

	✓	✓	✓	✓		✓		
LCS	ICWI9502	100.00	0.750	100.0	JW0761AC	0.75	100.00	75.00
LCSD	ICWI9502	100.00	0.750	100.0	JW0761AD	0.75	100.00	75.00
MS (1)	ICWI9502	100.00	0.020	10.0	JV87H1AF	0.20	2,500.00	500.00
MSD (1)	ICWI9502	100.00	0.020	10.0	JV87H1AG	0.20	2,500.00	500.00
MS (2)	ICWI9502	100.00	0.020	10.0	JV87M1AF	0.20	1,000.00	200.00
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 7135407
Prep Date: 05/08/2007 0930
Comp Date: 05/08/2007 1800

Analyte: Hydrogen Chloride
CAS #: 7647-01-0
QuantIMS #: 2702

Analyst Initials: CWK
Analyst LIMS Code: 035620
Instr. ID: 600

Reviewed by: DRW
Date: 5/18/07
MW Factor: 1.028429188

✓ Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H7E040102	9		4L	0.1	0.042	JV87N1AA	100	10	0.0000	ND	102.8429	43.1940	1,028.43	050807	1137
H7E040102	9	S	4L	0.1	0.042	JV87N1AG	100	10	2.1293	218.9834	102.8429	43.1940	1,028.43	050807	1155
H7E150000	407	B	4L	0.1	0.042	JW1DJ1AA	100	1	0.0000	ND	10.2843	4.3194	102.84	050807	1012
H7E150000	407	C	4L	0.1	0.042	JW1DJ1AC	100	1	0.7511	77.2453	10.2843	4.3194	102.84	050807	0937
H7E150000	407	L	4L	0.1	0.042	JW1DJ1AD	100	1	0.7628	78.4486	10.2843	4.3194	102.84	050807	0954

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information: ✓ ✓ ✓ ✓ ✓

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI9502	100.00	0.750	100.0	JW1DJ1AC	0.75	102.84	77.13
LCSD	ICWI9502	100.00	0.750	100.0	JW1DJ1AD	0.75	102.84	77.13
MS (1)	ICWI9502	100.00	0.020	10.0	JV87N1AG	0.20	1,028.43	205.69
MSD (1)								
MS (2)								
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments:

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
Dionex IC Runlog Cover Page

Analyst:	CWK	Date:	5/8/07	Sequence ID:	E08 - LOWANIONS - 050807

Instrument:	☑ DX-600	Method:	☐ KNOX-WC-0003, SW-846 0061/7199
"Aragorn"	☐ ICS-1500		☐ KNOX-WC-0005, ☐ SW-846 9056 ☐ EPA 300.0 ☐ SW-846 9057-Mod ☑ EPA 26A-Mod
	☐ DX-320		☐ KNOX-WC-0014, EPA 314.0

Preventive Maintenance	Instrument Conditions		
Daily:	Flow Rate =	1.00	mL/min
☑ Check pump and gas pressure	Pressure =	2239.	psi
☑ Check all lines for crimping, leaks and discoloration	Conductance =	23.2	µS
As Needed:	Suppressor Current =	43.	mA
☐ Change column and guard column	Eluent Generator =	—	mM KOH
☐ Change column and/or guard column bed support			
☐ Clean conductivity cell			
☐ De-gas pump head when flow is erratic			
☐ Check/replace eluant end line filter			

MS/MSD Spike Information

WO #	Compound	Spike ID	Parent Conc.	Spike Added (mL)	Final Volume (mL)	Final Conc.
JV87N	F-	JOWI-9502	100 ppm	0.020 ml	10 ml	0.20 ppm
|	Cl-	|	|	|	|	|
|	Br-	|	|	|	|	|
JV87L	F-	|	|	|	|	|
|	Cl-	|	|	|	|	|
|	Br-	|	|	|	|	|
JV87M	F-	|	|	|	|	|
|	Cl-	|	|	|	|	|
|	Br-	|	|	|	|	|
JV87G	F-	|	|	|	|	|
|	Cl-	|	|	|	|	|
|	Br-	|	|	|	|	|
JV87H	F-	|	|	|	|	|
|	Cl-	|	|	|	|	|
Comments:	Br-	|	|	|	|	|

Batch: 7135146 (F-) Batch: 7135407 (HCl for DI H2O Blank)
Batch: 7135325 (HBr-)
Batch: 7135396 (Br_2)

☑ Sodium Thiosulfate added to NaOH impinger samples.

Sequence: E08_LOW_ANIONS_050807
Operator: kaukerc

Printed: 5/9/2007 8:05:35 AM

Title:
Datasource: Aragorn_net
Location: IC_ARAGORN
Timebase: IC_Aragorn
#Samples: 30

Created: 5/8/2007 9:30:07 AM by kaukerc
Last Update: 5/8/2007 3:07:18 PM by kaukerc

No.	Name	Comment	Inj. Vol.	Inj. Date/Time	Dil. Factor	*Multiplier [Liters]
1	CAL STD #1 ICWS-9424	QUAD	50.0	4/16/2007 12:21:03 PM	1.0000	
2	CAL STD #2 ICWS-9425	QUAD	50.0	4/16/2007 12:38:14 PM	1.0000	
3	CAL STD #3 ICWS-9426	QUAD	50.0	4/16/2007 12:55:24 PM	1.0000	
4	CAL STD #4 ICWS-9427	QUAD	50.0	4/16/2007 1:12:34 PM	1.0000	
5	CAL STD #5 ICWS-9423	QUAD	50.0	4/16/2007 1:29:45 PM	1.0000	
6	CAL STD #6 ICWS-9428	QUAD	50.0	4/16/2007 1:46:55 PM	1.0000	
7	ICV/LCS ICWS-9527	QUAD	50.0	5/8/2007 9:37:43 AM	1.0000	
8	ICV/LCSD ICWS-9528	QUAD	50.0	5/8/2007 9:54:54 AM	1.0000	
9	ICB/METHOD BLK	QUAD	50.0	5/8/2007 10:12:04 AM	1.0000	
10	H7E040102 JV87G 1/10	QUAD	50.0	5/8/2007 10:29:14 AM	10.0000	
11	H7E040102 JV87G MS 1/10 0.2 PPM F, CL, BR	QUAD	50.0	5/8/2007 10:46:25 AM	10.0000	
12	H7E040102 JV87L 1/10	QUAD	50.0	5/8/2007 11:03:35 AM	10.0000	
13	H7E040102 JV87L MS 1/10 0.2 PPM F, BR, CL	QUAD	50.0	5/8/2007 11:20:46 AM	10.0000	
14	H7E040102 JV87N 1/10	QUAD	50.0	5/8/2007 11:37:56 AM	10.0000	
15	H7E040102 JV87N MS 1/10 0.2 PPM BR, F, CL	QUAD	50.0	5/8/2007 11:55:07 AM	10.0000	
16	H7E040102 JV87G MSD 1/10 0.2 PPM CL, BR, F	QUAD	50.0	5/8/2007 12:12:16 PM	10.0000	
17	CCV ICWS-9529	QUAD	50.0	5/8/2007 12:29:27 PM	1.0000	
18	CCB	QUAD	50.0	5/8/2007 12:46:37 PM	1.0000	
19	H7E040102 JV87E 1/10	QUAD	50.0	5/8/2007 1:03:48 PM	10.0000	
20	H7E040102 JV87J 1/10	QUAD	50.0	5/8/2007 1:20:58 PM	10.0000	
21	H7E040102 JV87H 1/10	QUAD	50.0	5/8/2007 1:38:09 PM	10.0000	
22	H7E040102 JV87H MS 1/10 0.2 PPM CL, BR, F	QUAD	50.0	5/8/2007 2:10:35 PM	10.0000	
23	H7E040102 JV87H MSD 1/10 0.2 PPM CL, BR, F	QUAD	50.0	5/8/2007 2:43:00 PM	10.0000	
24	H7E040102 JV87M 1/10	QUAD	50.0	5/8/2007 3:15:26 PM	10.0000	
25	H7E040102 JV87M MS 1/10 0.2 PPM CL, F, BR	QUAD	50.0	5/8/2007 3:47:52 PM	10.0000	
26	H7E040102 JV87F 1/10	QUAD	50.0	5/8/2007 4:20:17 PM	10.0000	
27	H7E040102 JV87K 1/10	QUAD	50.0	5/8/2007 4:52:42 PM	10.0000	
28	CCV ICWS-9529	QUAD	50.0	5/8/2007 5:25:07 PM	1.0000	
29	CCB	QUAD	50.0	5/8/2007 5:42:17 PM	1.0000	
30	SHUTDOWN	QUAD	50.0	5/8/2007 5:59:27 PM	1.0000	

Sequence: E08_LOW_ANIONS_050807
Operator: kaukerc

Title:
Datasource: Aragorn_net
Location: IC_ARAGORN
Timebase: IC_Aragorn
#Samples: 30

Created: 5/8/2007 9:30:07 AM by kaukerc
Last Update: 5/8/2007 3:07:18 PM by kaukerc

No.	Name	Weight	Type	Status	Program
1	CAL STD #1 ICWS-9424	1.0000	Standard	Finished	ANIONS_AS14A
2	CAL STD #2 ICWS-9425	1.0000	Standard	Finished	ANIONS_AS14A
3	CAL STD #3 ICWS-9426	1.0000	Standard	Finished	ANIONS_AS14A
4	CAL STD #4 ICWS-9427	1.0000	Standard	Finished	ANIONS_AS14A
5	CAL STD #5 ICWS-9423	1.0000	Standard	Finished	ANIONS_AS14A
6	CAL STD #6 ICWS-9428	1.0000	Standard	Finished	ANIONS_AS14A
7	ICV/LCS ICWS-9527	1.0000	Unknown	Finished	ANIONS_AS14A
8	ICV/LCSD ICWS-9528	1.0000	Unknown	Finished	ANIONS_AS14A
9	ICB/METHOD BLK	1.0000	Unknown	Finished	ANIONS_AS14A
10	H7E040102 JV87G 1/10	1.0000	Unknown	Finished	ANIONS_AS14A
11	H7E040102 JV87G MS 1/10 0.2 PPM F, CL, BR	1.0000	Unknown	Finished	ANIONS_AS14A
12	H7E040102 JV87L 1/10	1.0000	Unknown	Finished	ANIONS_AS14A
13	H7E040102 JV87L MS 1/10 0.2 PPM F, BR. CL	1.0000	Unknown	Finished	ANIONS_AS14A
14	H7E040102 JV87N 1/10	1.0000	Unknown	Finished	ANIONS_AS14A
15	H7E040102 JV87N MS 1/10 0.2 PPM BR, F, CL	1.0000	Unknown	Finished	ANIONS_AS14A
16	H7E040102 JV87G MSD 1/10 0.2 PPM CL, BR, F	1.0000	Unknown	Finished	ANIONS_AS14A
17	CCV ICWS-9529	1.0000	Unknown	Finished	ANIONS_AS14A
18	CCB	1.0000	Unknown	Finished	ANIONS_AS14A
19	H7E040102 JV87E 1/10	1.0000	Unknown	Finished	ANIONS_AS14A
20	H7E040102 JV87J 1/10	1.0000	Unknown	Finished	ANIONS_AS14A
21	H7E040102 JV87H 1/10	1.0000	Unknown	Finished	ANIONS_AS14A_Cl2
22	H7E040102 JV87H MS 1/10 0.2 PPM CL, BR, F	1.0000	Unknown	Finished	ANIONS_AS14A_Cl2
23	H7E040102 JV87H MSD 1/10 0.2 PPM CL, BR, F	1.0000	Unknown	Finished	ANIONS_AS14A_Cl2
24	H7E040102 JV87M 1/10	1.0000	Unknown	Finished	ANIONS_AS14A_Cl2
25	H7E040102 JV87M MS 1/10 0.2 PPM CL, F, BR	1.0000	Unknown	Finished	ANIONS_AS14A_Cl2
26	H7E040102 JV87F 1/10	1.0000	Unknown	Finished	ANIONS_AS14A_Cl2
27	H7E040102 JV87K 1/10	1.0000	Unknown	Finished	ANIONS_AS14A_Cl2
28	CCV ICWS-9529	1.0000	Unknown	Finished	ANIONS_AS14A
29	CCB	1.0000	Unknown	Finished	ANIONS_AS14A
30	SHUTDOWN	1.0000	Unknown	Finished	SHUTDOWN

Sequence: E08_LOW_ANIONS_050807
Operator: kaukerc

Printed: 5/9/2007 8:05:35 AM

Title:
Datasource: Aragorn_net
Location: IC_ARAGORN
Timebase: IC_Aragorn
#Samples: 30

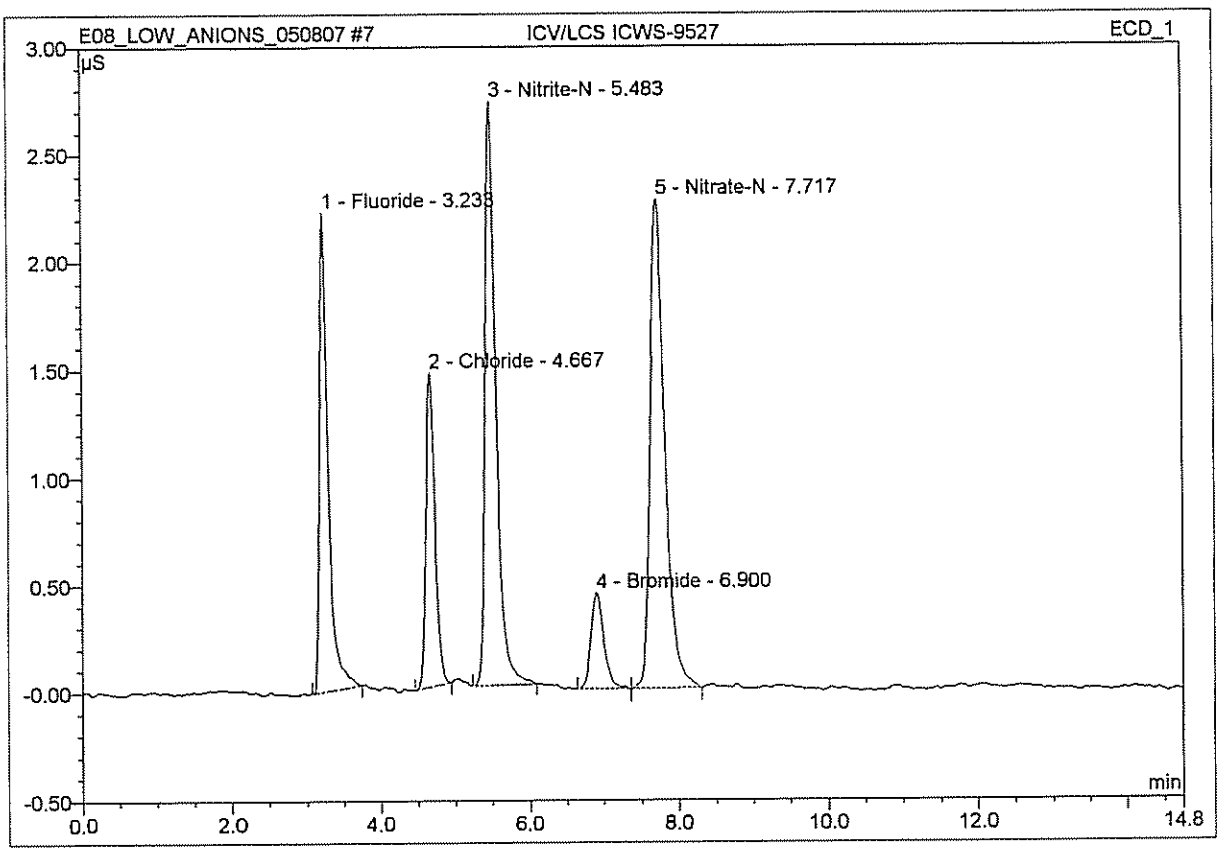
Created: 5/8/2007 9:30:07 AM by kaukerc
Last Update: 5/8/2007 3:07:18 PM by kaukerc

No.	Name	Method
1	CAL STD #1 ICWS-9424	ANIONS
2	CAL STD #2 ICWS-9425	ANIONS
3	CAL STD #3 ICWS-9426	ANIONS
4	CAL STD #4 ICWS-9427	ANIONS
5	CAL STD #5 ICWS-9423	ANIONS
6	CAL STD #6 ICWS-9428	ANIONS
7	ICV/LCS ICWS-9527	ANIONS
8	ICV/LCSD ICWS-9528	ANIONS
9	ICB/METHOD BLK	ANIONS
10	H7E040102 JV87G 1/10	ANIONS
11	H7E040102 JV87G MS 1/10 0.2 PPM F, CL, BR	ANIONS
12	H7E040102 JV87L 1/10	ANIONS
13	H7E040102 JV87L MS 1/10 0.2 PPM F, BR. CL	ANIONS
14	H7E040102 JV87N 1/10	ANIONS
15	H7E040102 JV87N MS 1/10 0.2 PPM BR, F, CL	ANIONS
16	H7E040102 JV87G MSD 1/10 0.2 PPM CL, BR, F	ANIONS
17	CCV ICWS-9529	ANIONS
18	CCB	ANIONS
19	H7E040102 JV87E 1/10	ANIONS
20	H7E040102 JV87J 1/10	ANIONS
21	H7E040102 JV87H 1/10	ANIONS
22	H7E040102 JV87H MS 1/10 0.2 PPM CL, BR, F	ANIONS
23	H7E040102 JV87H MSD 1/10 0.2 PPM CL, BR, F	ANIONS
24	H7E040102 JV87M 1/10	ANIONS
25	H7E040102 JV87M MS 1/10 0.2 PPM CL, F, BR	ANIONS
26	H7E040102 JV87F 1/10	ANIONS
27	H7E040102 JV87K 1/10	ANIONS
28	CCV ICWS-9529	ANIONS
29	CCB	ANIONS
30	SHUTDOWN	ANIONS

7 ICV/LCS ICWS-9527

QUAD

Sample Name:	**ICV/LCS ICWS-9527**	*Injection Volume:*	**50.0**
Vial Number:	**310**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/8/2007 9:37**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



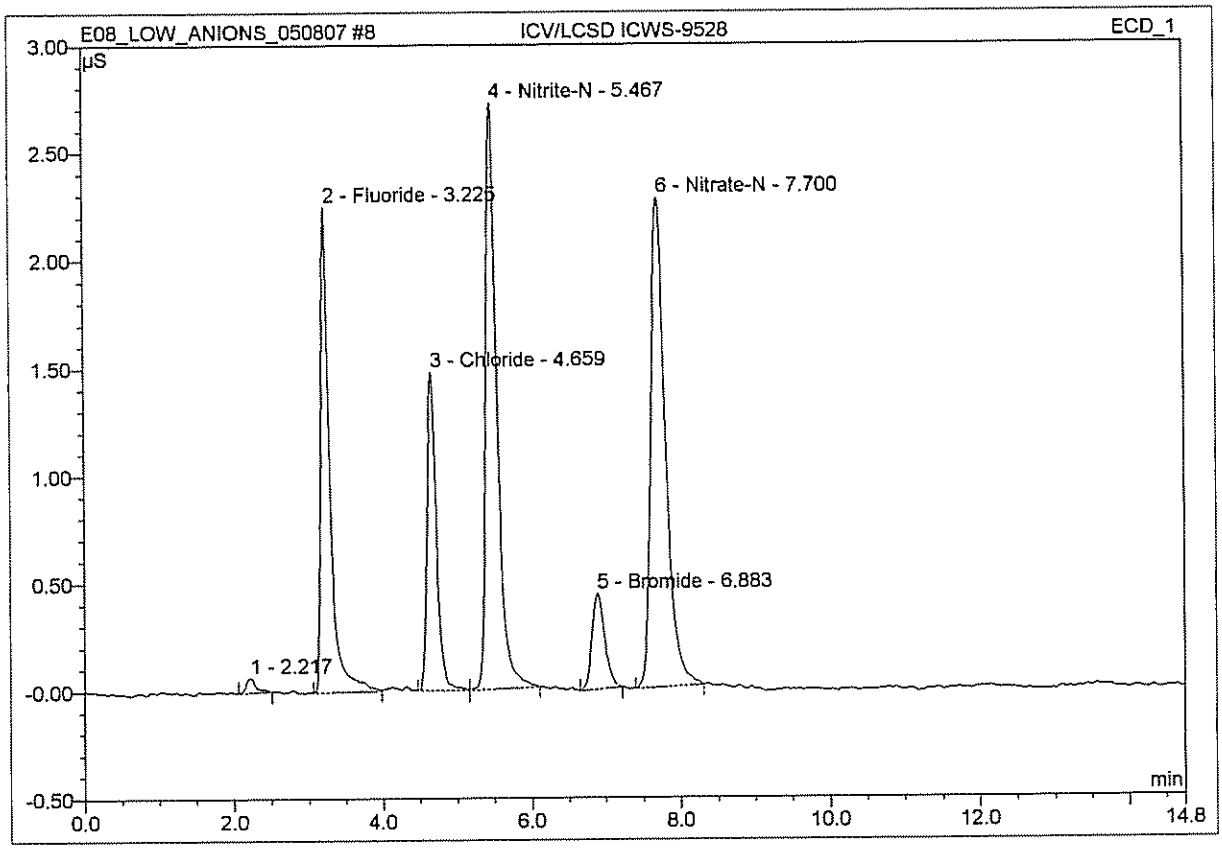
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type	
1	3.23	Fluoride	2.226	0.303	19.23	0.7739	BMB	103.2
2	4.67	Chloride	1.457	0.203	12.87	0.7511	BMB	100.1
3	5.48	Nitrite-N	2.713	0.461	29.20	0.7680	BMB	
4	6.90	Bromide	0.446	0.089	5.63	0.7569	BM	100.9
5	7.72	Nitrate-N	2.272	0.522	33.07	0.7659	MB	
Total:			9.114	1.577	100.00	3.816		

JW0H11AC HF-
JW069IAC HBr-
JW076IAC Br_2
JW1DJ1AC HCl

8 ICV/LCSD ICWS-9528

QUAD

Sample Name:	**ICV/LCSD ICWS-9528**	*Injection Volume:*	**50.0**
Vial Number:	**311**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/8/2007 9:54**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



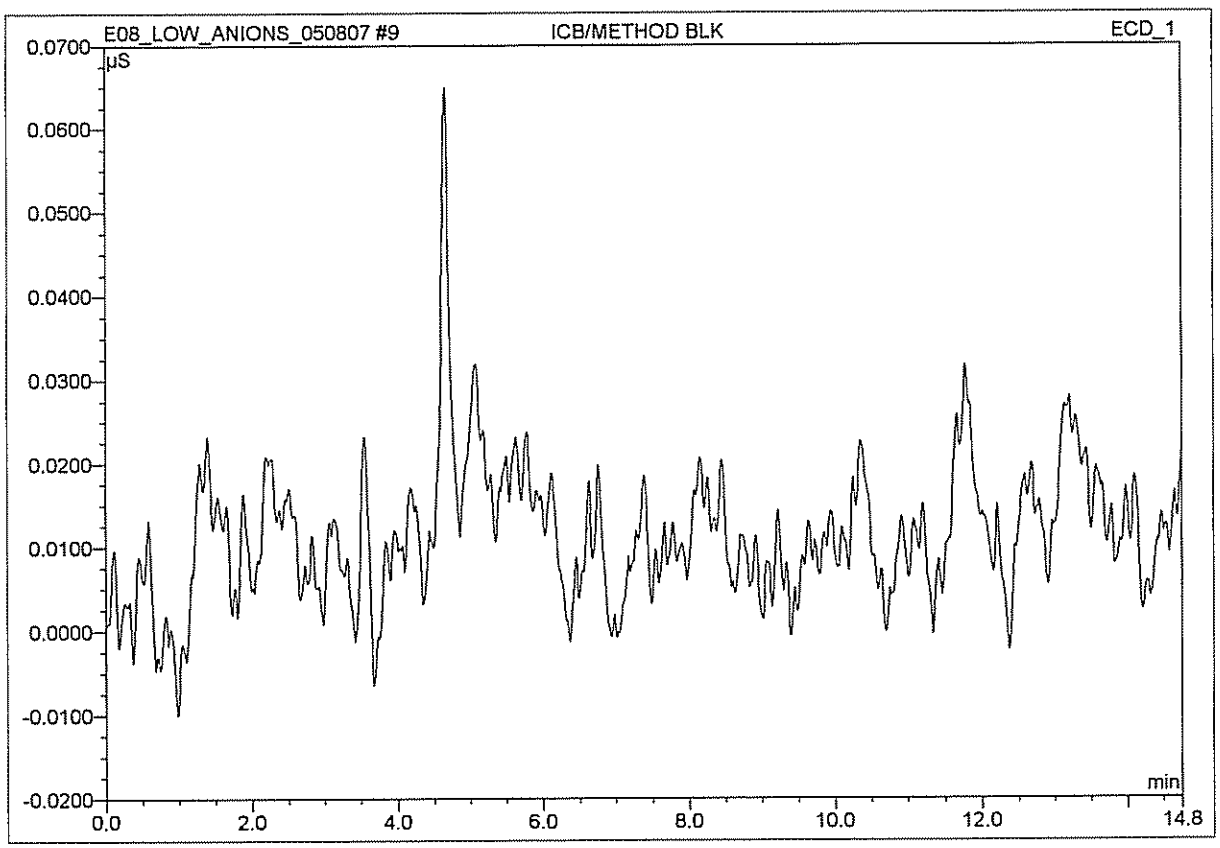
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type	
1	2.22	n.a.	0.068	0.011	0.65	n.a.	BMB	
2	3.23	Fluoride	2.252	0.322	19.77	0.7823	BMB	104.3 ✓
3	4.66	Chloride	1.480	0.213	13.08	0.7628	BMb	101.7 ✓
4	5.47	Nitrite-N	2.720	0.471	28.95	0.7697	bMB	
5	6.88	Bromide	0.443	0.088	5.39	0.7527	BMB	100.4 % lcs ✓
6	7.70	Nitrate-N	2.273	0.523	32.16	0.7664	BMB	
Total:			9.236	1.628	100.00	3.834		

JW0H11AD (AF) ✓
JW0691AD (HBr) ✓
JW0761AD (Br_2) ✓
JW1DJ1AD (ACl) ✓

9 ICB/METHOD BLK

QUAD

Sample Name:	**ICB/METHOD BLK**	*Injection Volume:*	**50.0**
Vial Number:	**312**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/8/2007 10:12**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
Total:			0.000	0.000	0.00	0.000	

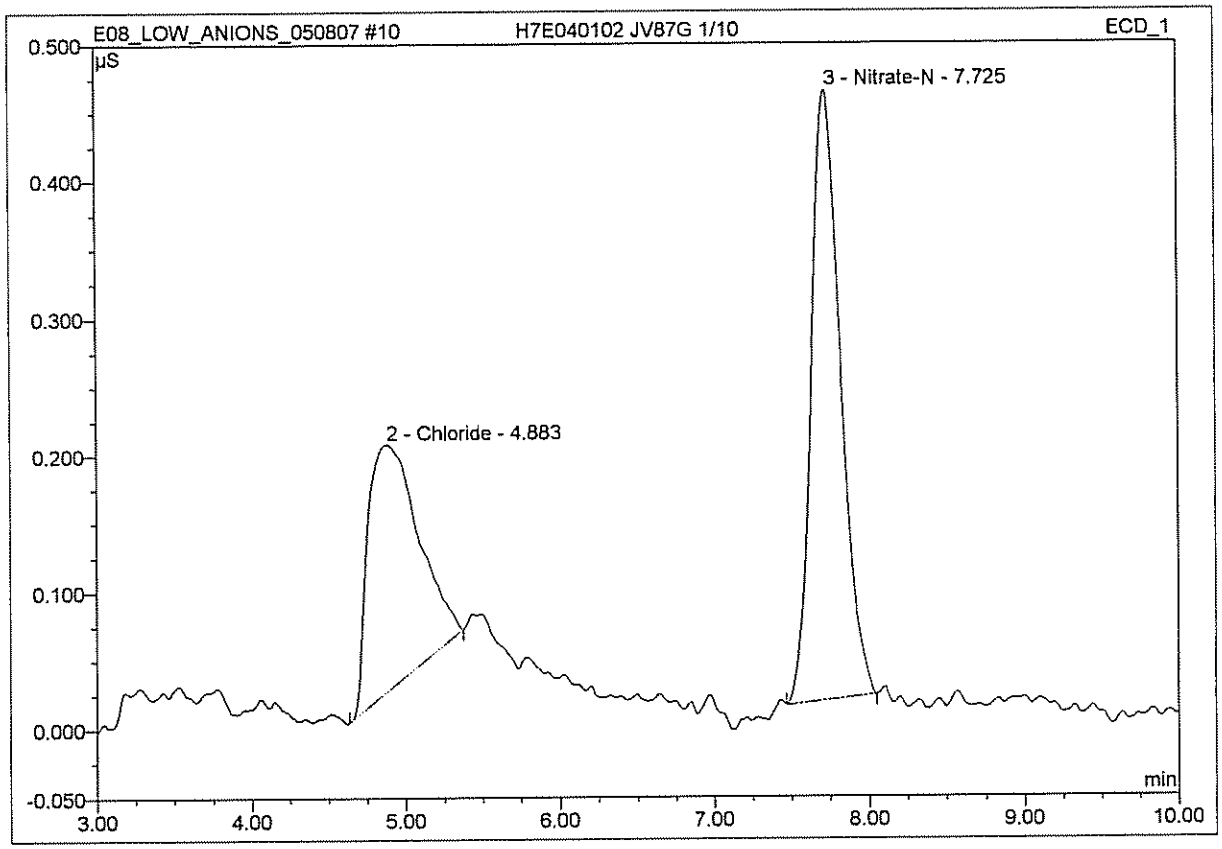
ND

JW0H11AA F- ✓
JW0691AA HBr ✓
JW0761AA Br_2 ✓
JW1DJ1AA HCl ✓

10 H7E040102 JV87G 1/10

QUAD

Sample Name:	**H7E040102 JV87G 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**313**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 10:29**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.05	n.a.	0.140	0.092	0.14	n.a.	BMB
2	4.88	Chloride	0.180	0.068	0.10	0.9509	BMB
3	7.73	Nitrate-N	0.445	0.098	0.15	1.5525	BMB
4	11.61	n.a.	196.046	67.179	99.62	n.a.	BMB
Total:			196.812	67.438	100.00	2.503	

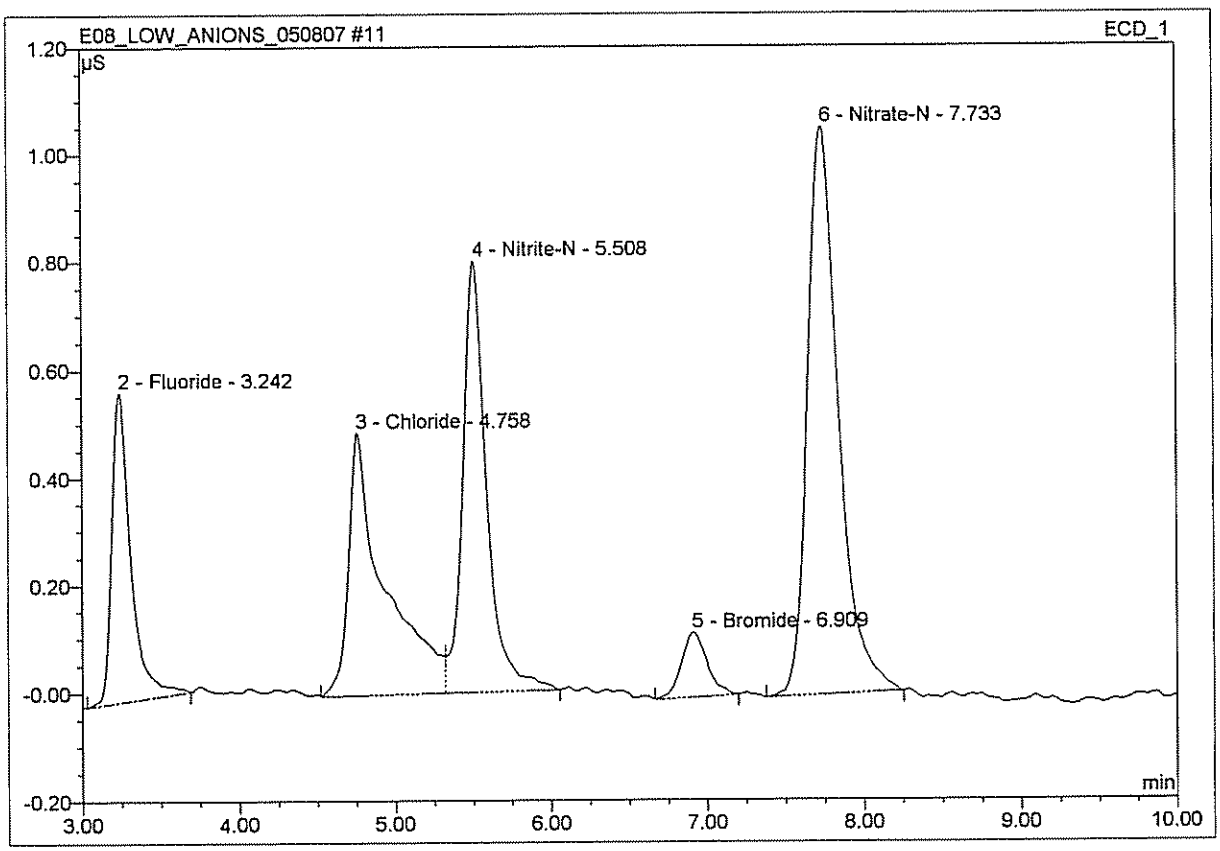
F- ND ✓

Br- ND ✓

11 H7E040102 JV87G MS 1/10 0.2 PPM F, CL, BR

QUAD

Sample Name:	**H7E040102 JV87G MS 1/10 0.2 PPM F, CL,**	*Injection Volume:*	**50.0**
Vial Number:	**314**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 10:46**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

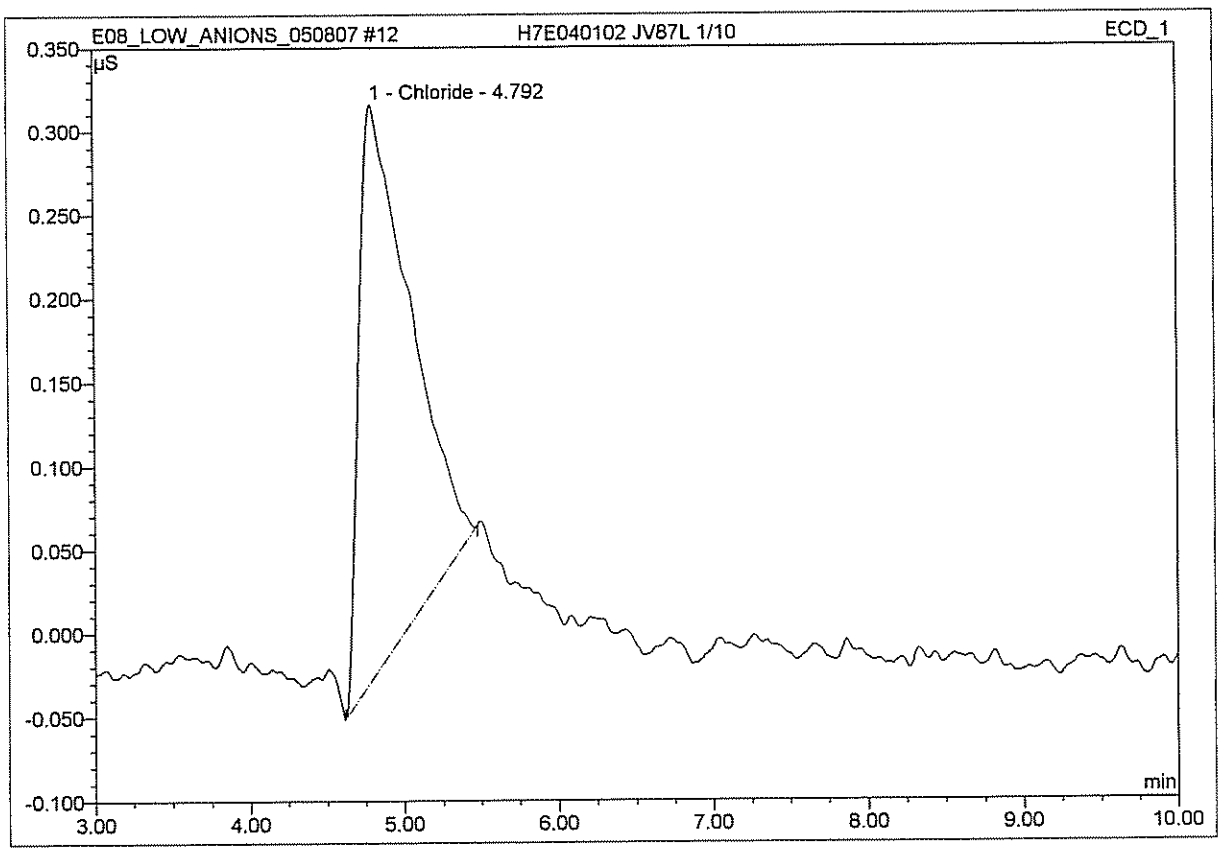


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.07	n.a.	0.134	0.057	0.08	n.a.	BMB
2	3.24	Fluoride	0.575	0.081	0.12	2.0705	BMB
3	4.76	Chloride	0.488	0.132	0.19	2.5608	BM
4	5.51	Nitrite-N	0.800	0.142	0.21	2.3205	MB
5	6.91	Bromide	0.119	0.023	0.03	2.0426	BMB
6	7.73	Nitrate-N	1.055	0.242	0.36	3.6371	BMB
7	11.63	n.a.	195.771	67.048	99.00	n.a.	BMB
Total:			198.942	67.725	100.00	12.631	

12 H7E040102 JV87L 1/10

QUAD

Sample Name:	**H7E040102 JV87L 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**315**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 11:03**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	4.79	Chloride	0.344	0.132	0.09	1.8095	BMB
2	11.47	n.a.	379.279	152.718	99.91	n.a.	BMB
Total:			379.623	152.851	100.00	1.810	

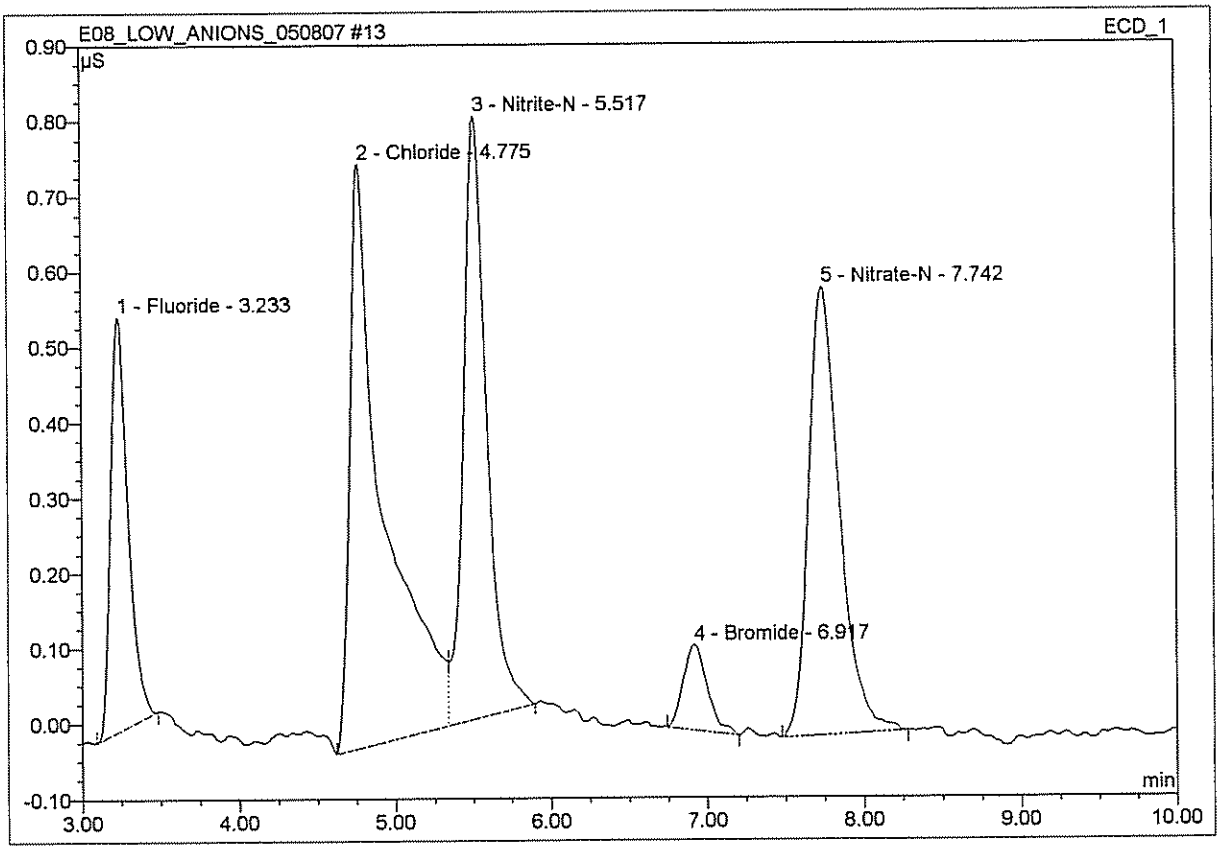
F- ND ✓

Br- ND ✓

13 H7E040102 JV87L MS 1/10 0.2 PPM F, BR. CL

QUAD

Sample Name:	**H7E040102 JV87L MS 1/10 0.2 PPM F, BR.**	*Injection Volume:*	**50.0**
Vial Number:	**316**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 11:20**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

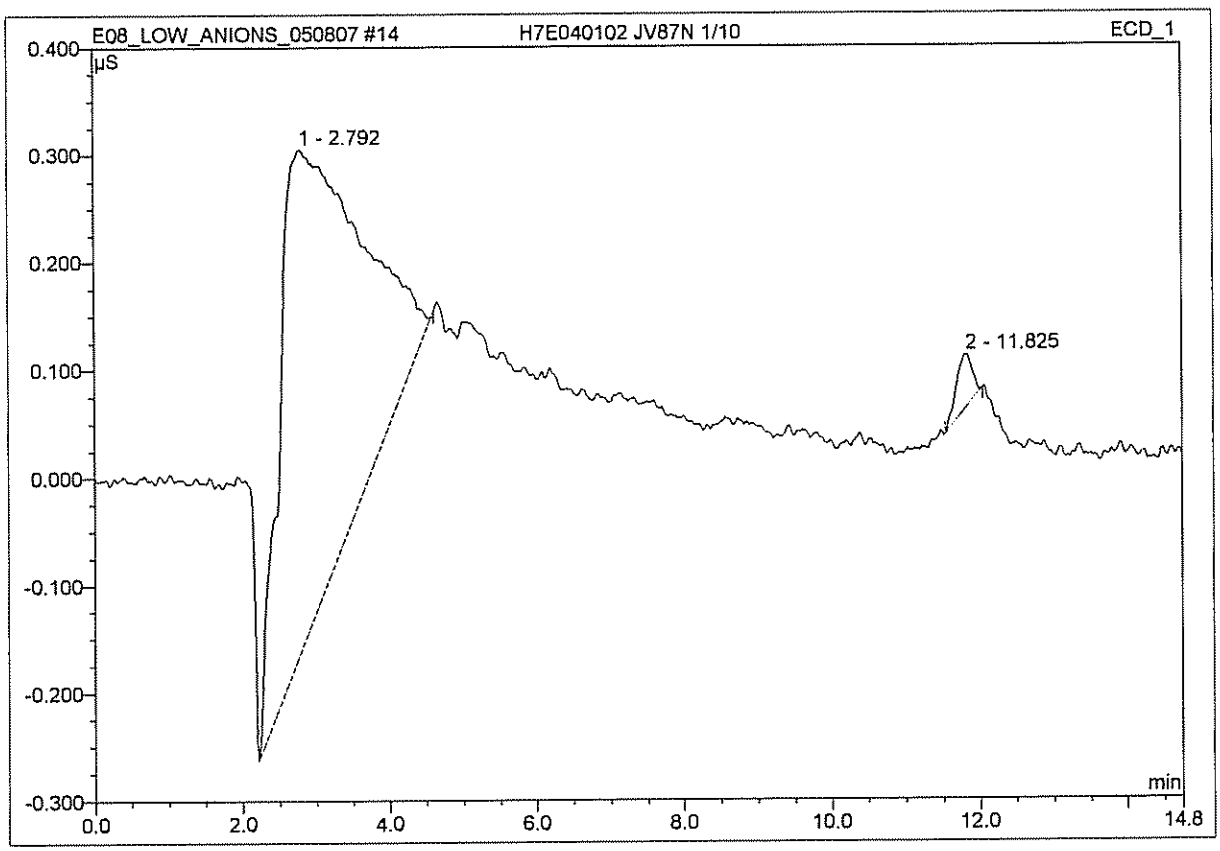


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	0.550	0.071	0.05	1.9831	BMB
2	4.78	Chloride	0.775	0.195	0.13	4.0460	BM
3	5.52	Nitrite-N	0.800	0.139	0.09	2.3189	MB
4	6.92	Bromide	0.113	0.020	0.01	1.9364	BMB
5	7.74	Nitrate-N	0.594	0.137	0.09	2.0668	BMB
6	11.47	n.a.	375.971	150.940	99.63	n.a.	BMB
Total:			378.803	151.501	100.00	12.351	

14 H7E040102 JV87N 1/10

QUAD

Sample Name:	**H7E040102 JV87N 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**317**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 11:37**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.79	n.a.	0.467	0.570	97.84	n.a.	BMB
2	11.83	n.a.	0.049	0.013	2.16	n.a.	BMB
Total:			0.516	0.582	100.00	0.000	

F- ND ✓

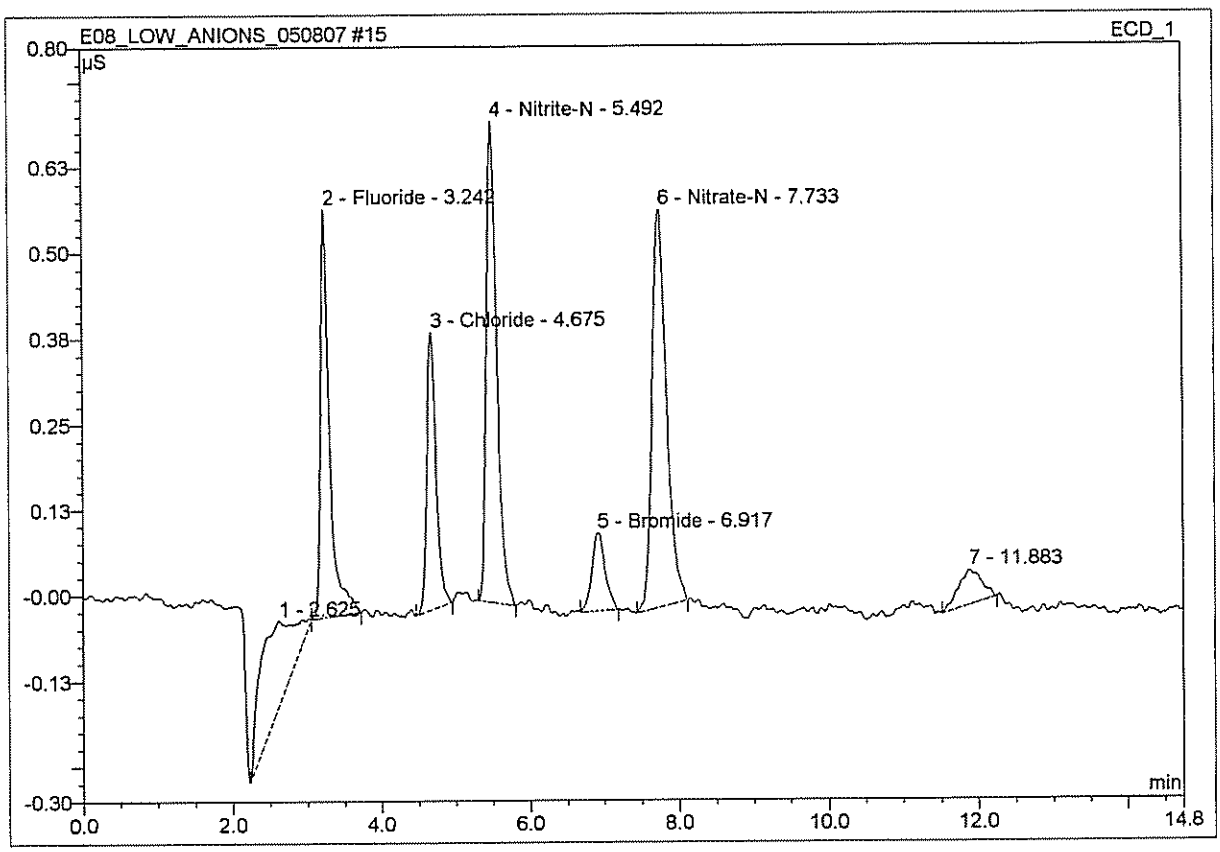
Cl- ND ✓

Br- ND ✓

15 H7E040102 JV87N MS 1/10 0.2 PPM BR, F, CL

QUAD

Sample Name:	**H7E040102 JV87N MS 1/10 0.2 PPM BR, F,**	*Injection Volume:*	**50.0**
Vial Number:	**318**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 11:55**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

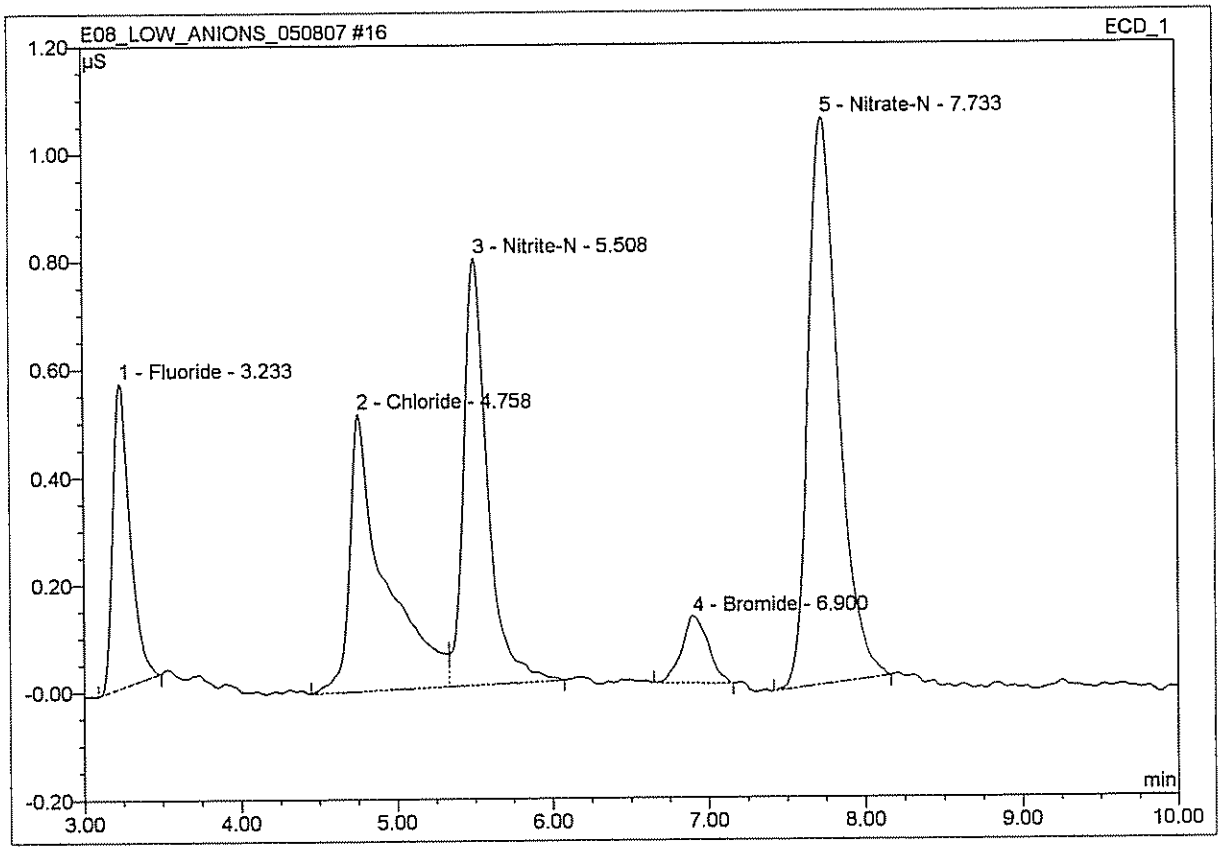


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.63	n.a.	0.122	0.070	14.07	n.a.	BMB
2	3.24	Fluoride	0.595	0.085	16.97	2.1432	bMB
3	4.68	Chloride	0.405	0.058	11.52	2.1293	BMB
4	5.49	Nitrite-N	0.702	0.115	22.95	2.0393	BMB
5	6.92	Bromide	0.114	0.023	4.68	1.9492	BMB
6	7.73	Nitrate-N	0.581	0.131	26.18	2.0216	BMB
7	11.88	n.a.	0.051	0.018	3.62	n.a.	BMB
Total:			2.570	0.501	100.00	10.283	

16 H7E040102 JV87G MSD 1/10 0.2 PPM CL, BR, F

QUAD

Sample Name:	**H7E040102 JV87G MSD 1/10 0.2 PPM CL, E**	*Injection Volume:*	**50.0**
Vial Number:	**318**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 12:12**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

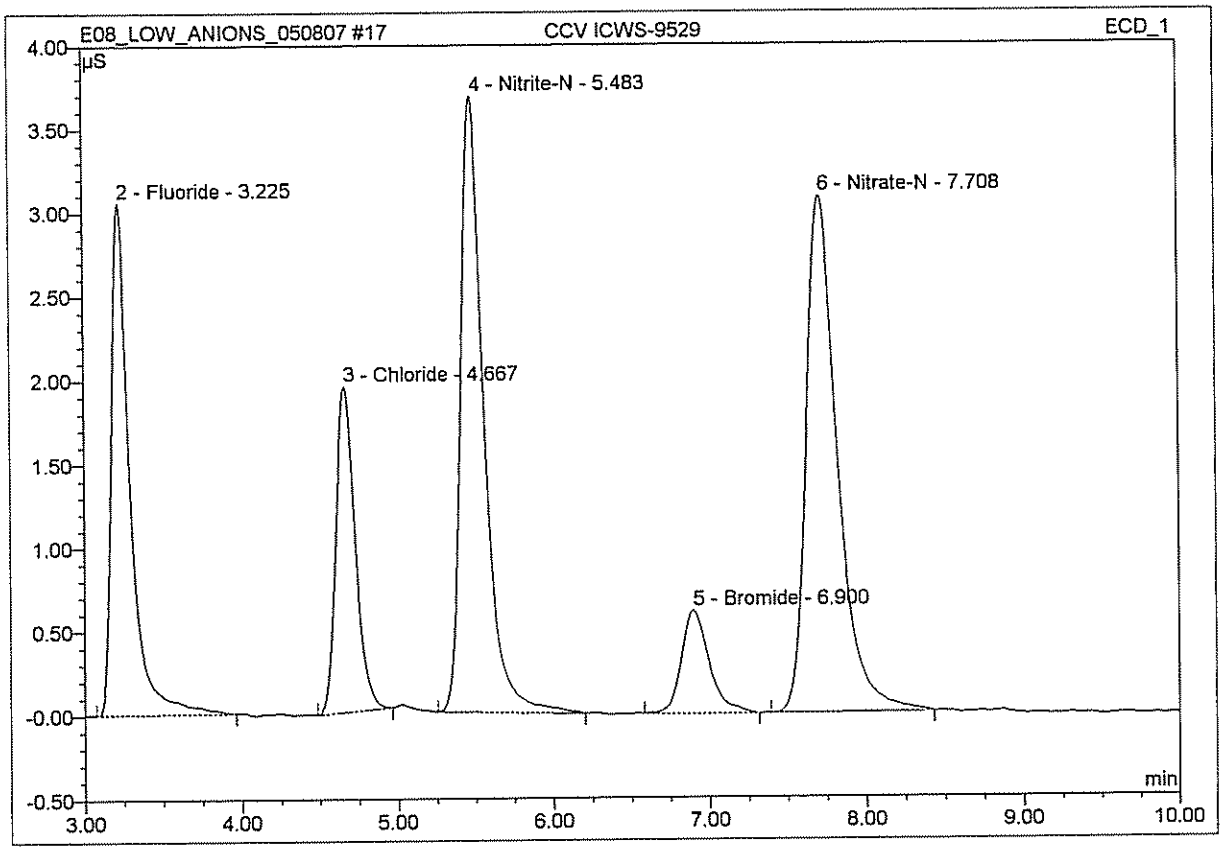


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	0.566	0.072	0.11	2.0403	BMB
2	4.76	Chloride	0.515	0.134	0.20	2.6993	BM
3	5.51	Nitrite-N	0.792	0.141	0.21	2.2976	MB
4	6.90	Bromide	0.125	0.025	0.04	2.1396	BMB
5	7.73	Nitrate-N	1.054	0.236	0.35	3.6333	BMB
6	11.62	n.a.	196.506	67.389	99.10	n.a.	BMB
Total:			199.558	67.998	100.00	12.810	

17 CCV ICWS-9529

QUAD

Sample Name:	**CCV ICWS-9529**	*Injection Volume:*	**50.0**
Vial Number:	**320**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/8/2007 12:29**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



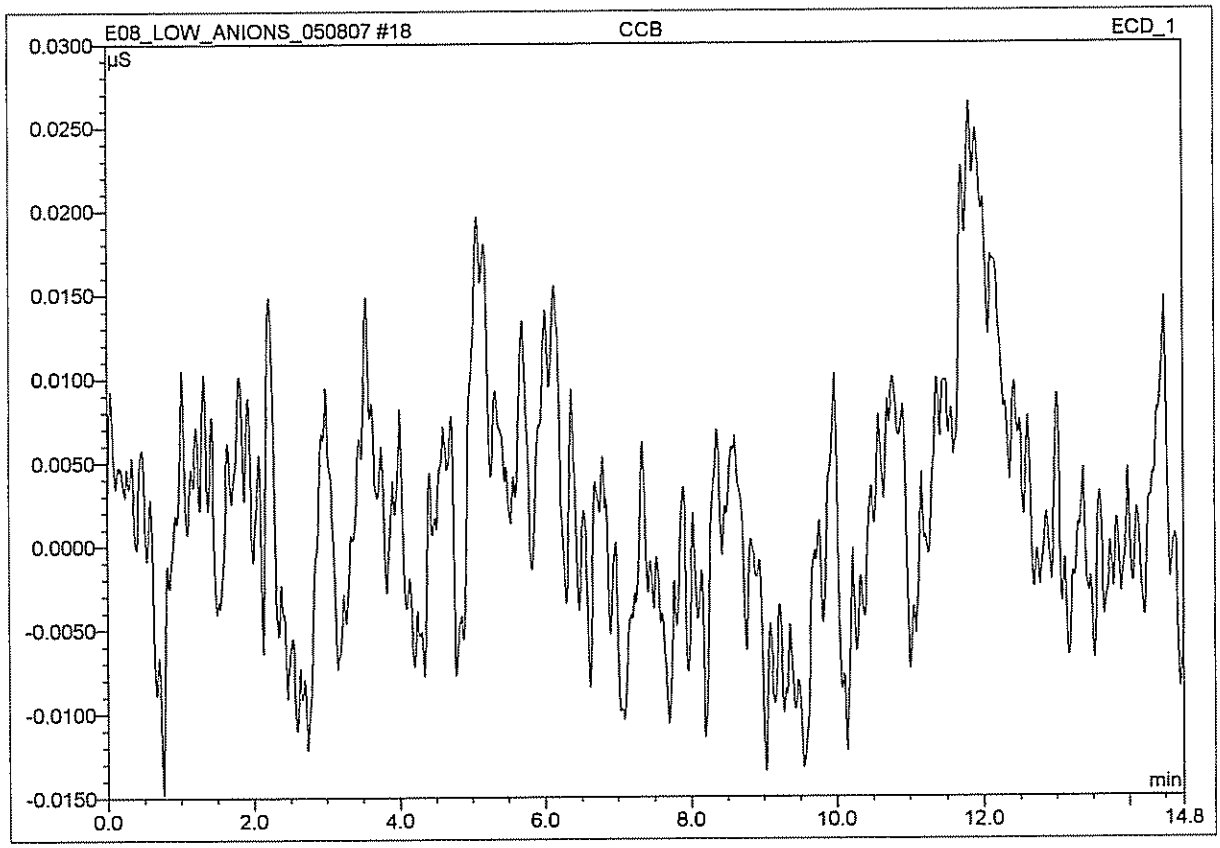
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.21	n.a.	0.076	0.011	0.49	n.a.	BMB
2	3.23	Fluoride	3.057	0.420	19.28	1.0452	BMB
3	4.67	Chloride	1.946	0.276	12.69	0.9948	BMB
4	5.48	Nitrite-N	3.680	0.631	28.98	1.0296	BMB
5	6.90	Bromide	0.612	0.126	5.79	1.0345	BMB
6	7.71	Nitrate-N	3.084	0.714	32.78	1.0250	BMB
Total:			12.456	2.178	100.00	5.129	

104.5%
98.5%
103.4%

18 CCB

QUAD

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**321**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/8/2007 12:46**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



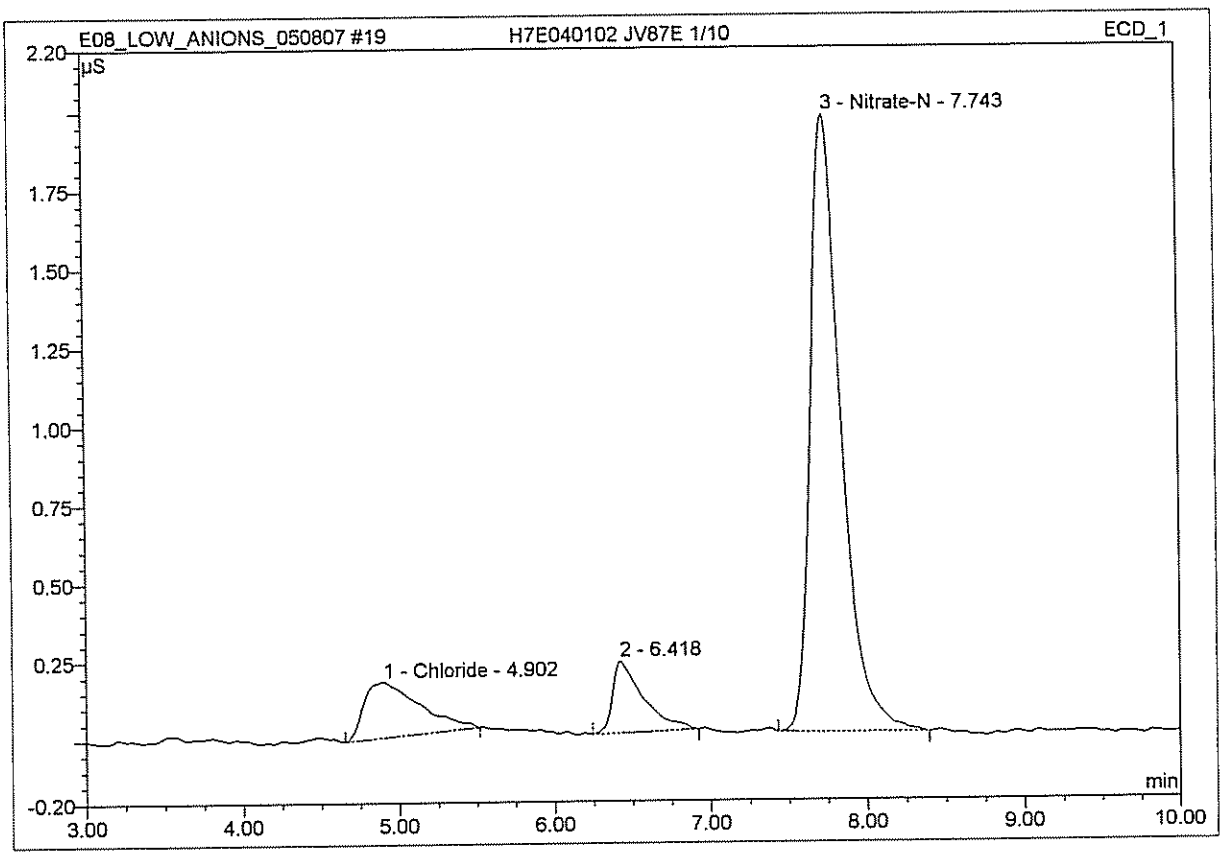
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
Total:			0.000	0.000	0.00	0.000	

ND

19 H7E040102 JV87E 1/10

QUAD

Sample Name:	**H7E040102 JV87E 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**358**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 13:03**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.74**	*Sample Amount:*	**1.0000**



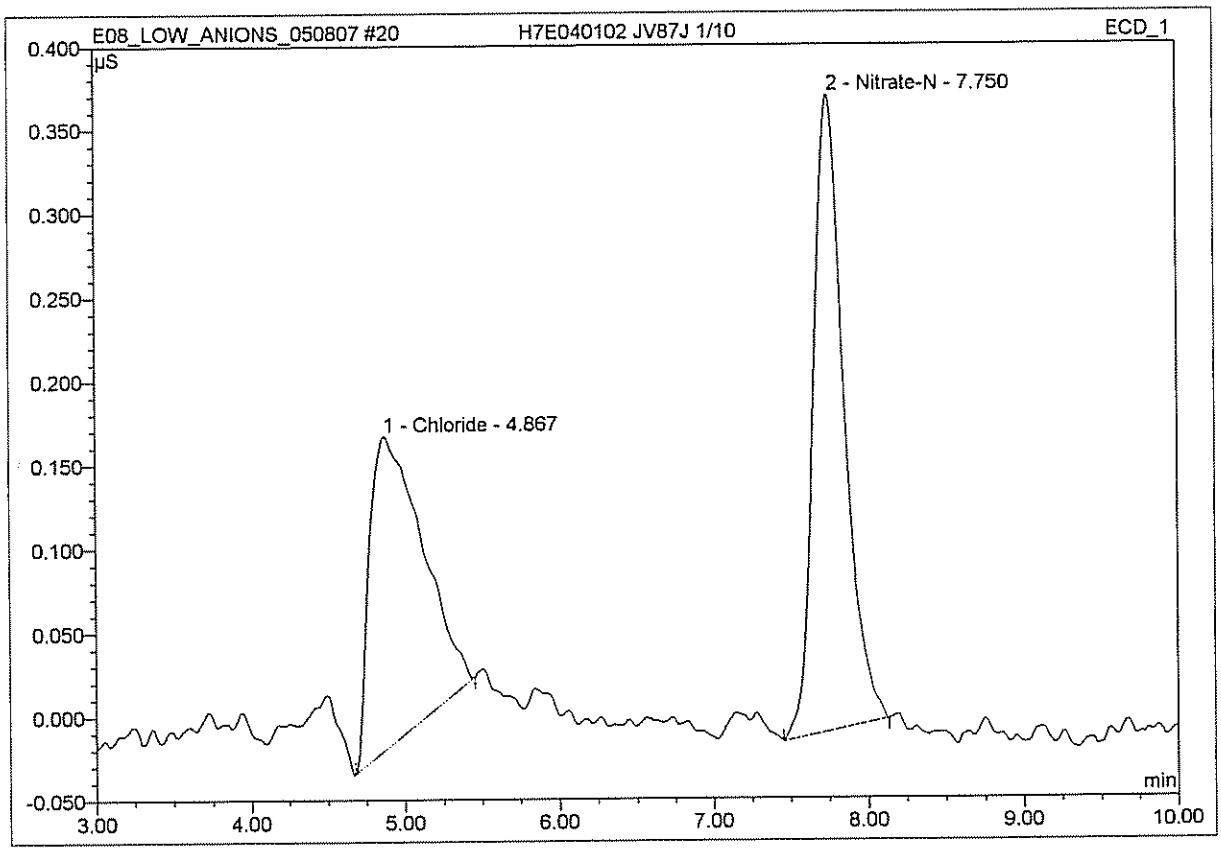
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	4.90	Chloride	0.177	0.073	0.12	0.9358	BMB
2	6.42	n.a.	0.228	0.052	0.09	n.a.	BMB
3	7.74	Nitrate-N	1.963	0.447	0.76	6.6551	BMB
4	11.65	n.a.	173.723	58.567	99.03	n.a.	BMB
Total:			176.091	59.140	100.00	7.591	

F- ND
Br- ND

20 H7E040102 JV87J 1/10

QUAD

Sample Name:	**H7E040102 JV87J 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**359**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 13:20**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	4.87	Chloride	0.187	0.074	0.12	0.9858	BMB
2	7.75	Nitrate-N	0.379	0.087	0.14	1.3249	BMB
3	11.63	n.a.	182.308	61.865	99.74	n.a.	BMB
Total:			182.874	62.026	100.00	2.311	

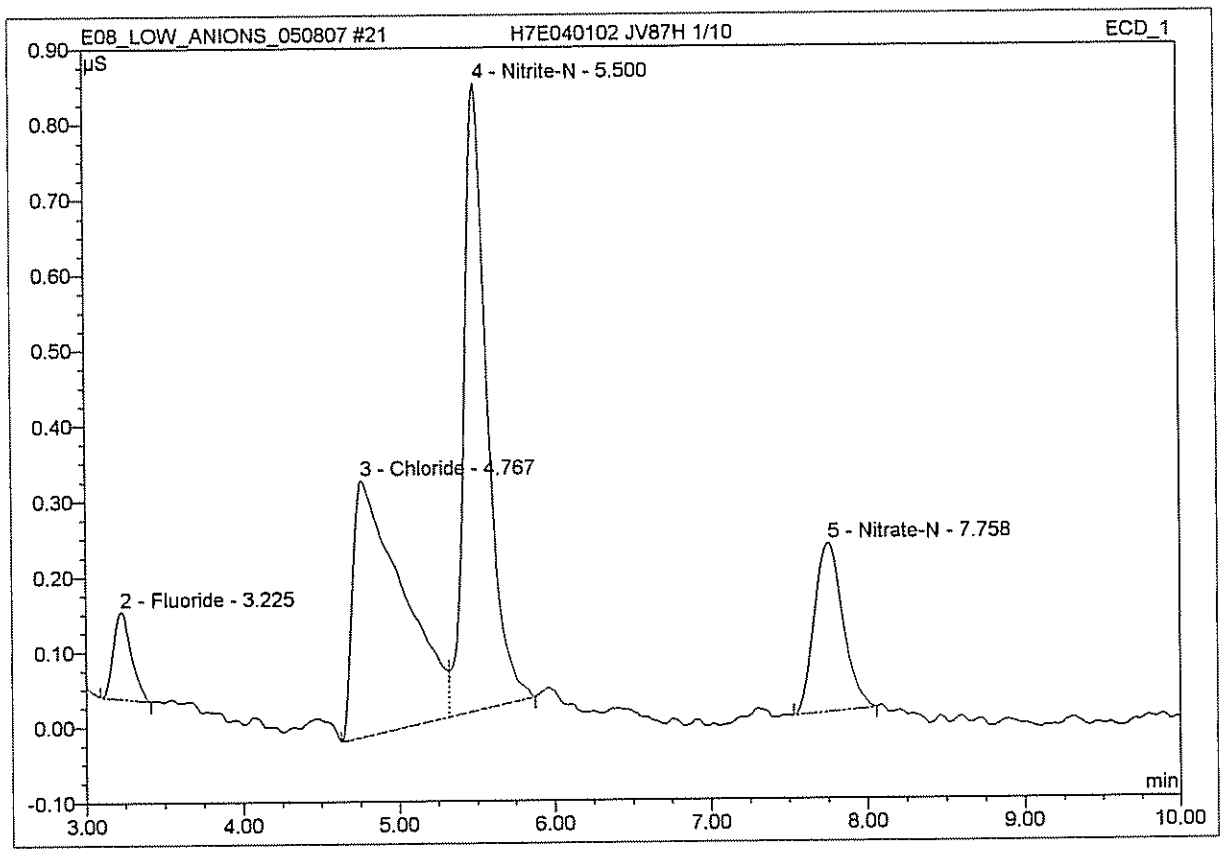
F - ND ✓

Br - ND ✓

21 H7E040102 JV87H 1/10

QUAD

Sample Name:	**H7E040102 JV87H 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**360**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 13:38**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



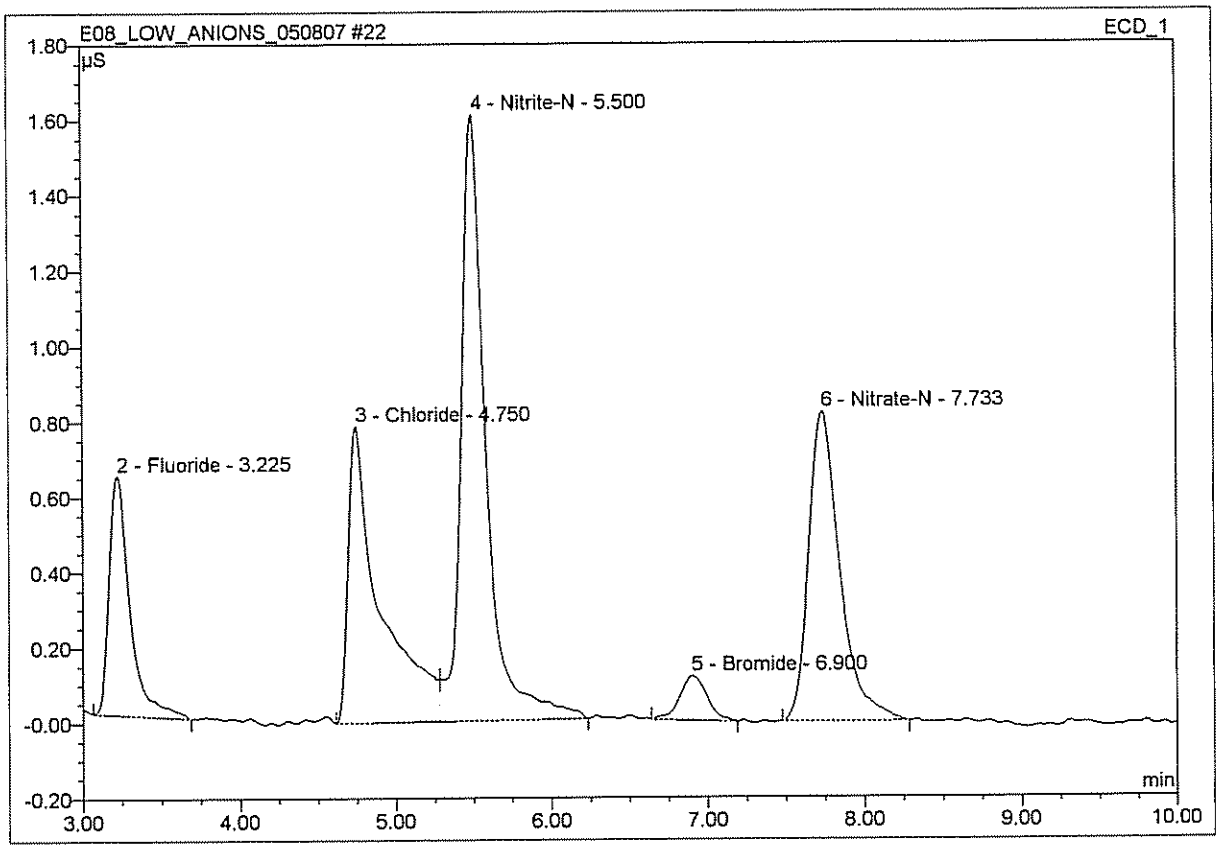
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.792	0.286	0.45	n.a.	BMB
2	3.23	Fluoride	0.116	0.015	0.02	0.4231	BMB
3	4.77	Chloride	0.341	0.126	0.20	1.7947	BM
4	5.50	Nitrite-N	0.832	0.143	0.23	2.4108	MB
5	7.76	Nitrate-N	0.225	0.048	0.08	0.7876	BMB
6	11.74	n.a.	33.057	10.445	16.50	n.a.	BMB
7	21.48	n.a.	59.159	52.237	82.52	n.a.	BMB
Total:			95.522	63.300	100.00	5.416	

Br- ND

22 H7E040102 JV87H MS 1/10 0.2 PPM CL, BR, F

QUAD

Sample Name:	**H7E040102 JV87H MS 1/10 0.2 PPM CL, BR**	*Injection Volume:*	**50.0**
Vial Number:	**361**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 14:10**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**

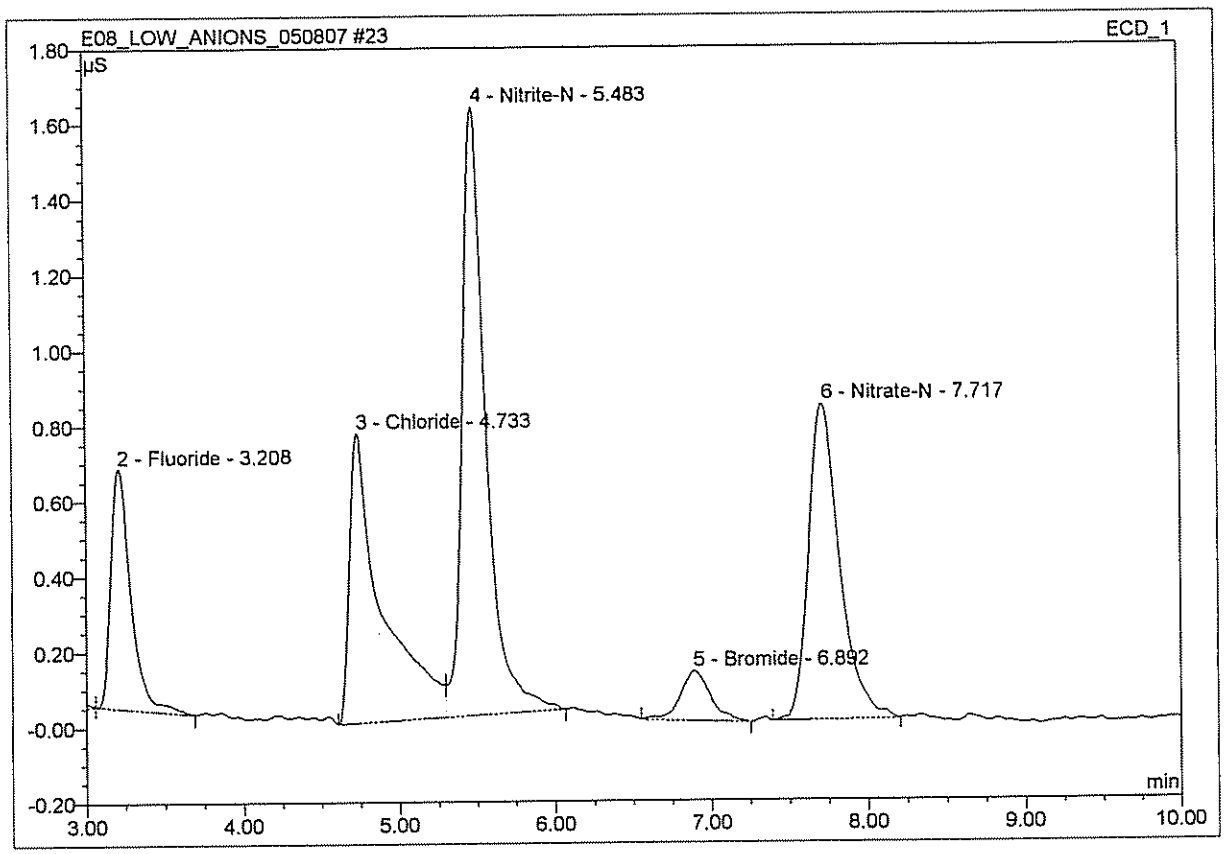


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.790	0.281	0.44	n.a.	BMB
2	3.23	Fluoride	0.635	0.097	0.15	2.2826	BMB
3	4.75	Chloride	0.787	0.187	0.29	4.1073	BM
4	5.50	Nitrite-N	1.607	0.298	0.47	4.6122	MB
5	6.90	Bromide	0.118	0.024	0.04	2.0187	BMB
6	7.73	Nitrate-N	0.821	0.190	0.30	2.8439	BMB
7	11.74	n.a.	32.943	10.389	16.29	n.a.	BMB
8	21.48	n.a.	59.244	52.317	82.02	n.a.	BMB
Total:			97.945	63.783	100.00	15.865	

23 H7E040102 JV87H MSD 1/10 0.2 PPM CL, BR, F

QUAD

Sample Name:	**H7E040102 JV87H MSD 1/10 0.2 PPM CL, E**	*Injection Volume:*	**50.0**
Vial Number:	**362**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 14:43**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**

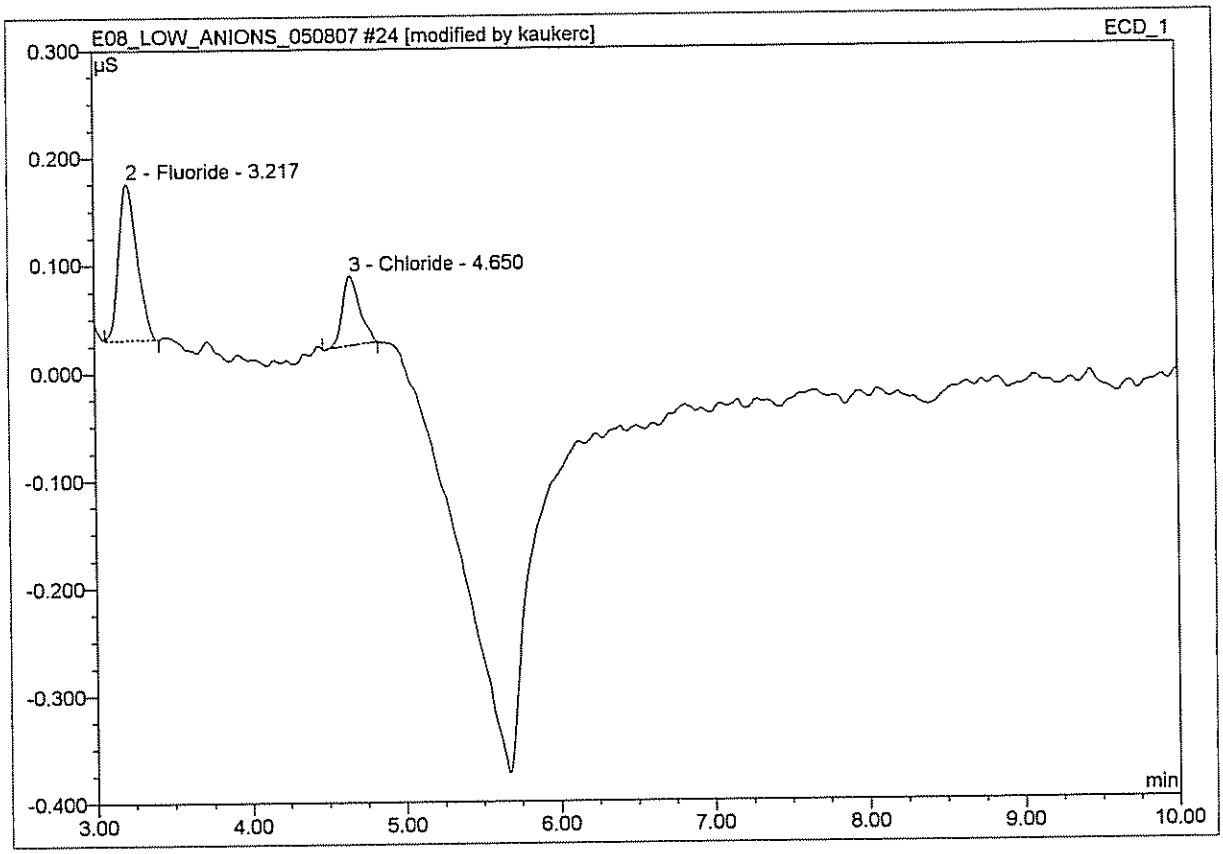


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.21	n.a.	1.797	0.298	0.47	n.a.	BMB
2	3.21	Fluoride	0.635	0.094	0.15	2.2858	bMB
3	4.73	Chloride	0.769	0.185	0.29	4.0119	BM
4	5.48	Nitrite-N	1.612	0.283	0.44	4.6263	MB
5	6.89	Bromide	0.131	0.029	0.05	2.2420	BMB
6	7.72	Nitrate-N	0.837	0.193	0.30	2.8969	BMB
7	11.72	n.a.	32.958	10.408	16.25	n.a.	BMB
8	21.43	n.a.	59.421	52.511	82.01	n.a.	BMB
9	29.03	n.a.	0.133	0.028	0.04	n.a.	BMB
Total:			98.293	64.029	100.00	16.063	

24 H7E040102 JV87M 1/10

QUAD

Sample Name:	**H7E040102 JV87M 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**363**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 15:15**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.845	0.309	0.59	n.a.	BMB
2	3.22	Fluoride	0.145	0.020	0.04	0.5262	BMB
3	4.65	Chloride	0.065	0.008	0.02	0.3411	BMB*
4	11.74	n.a.	0.373	0.124	0.24	n.a.	BMB
5	21.48	n.a.	58.847	52.039	99.12	n.a.	BMB
Total:			61.274	52.500	100.00	0.867	

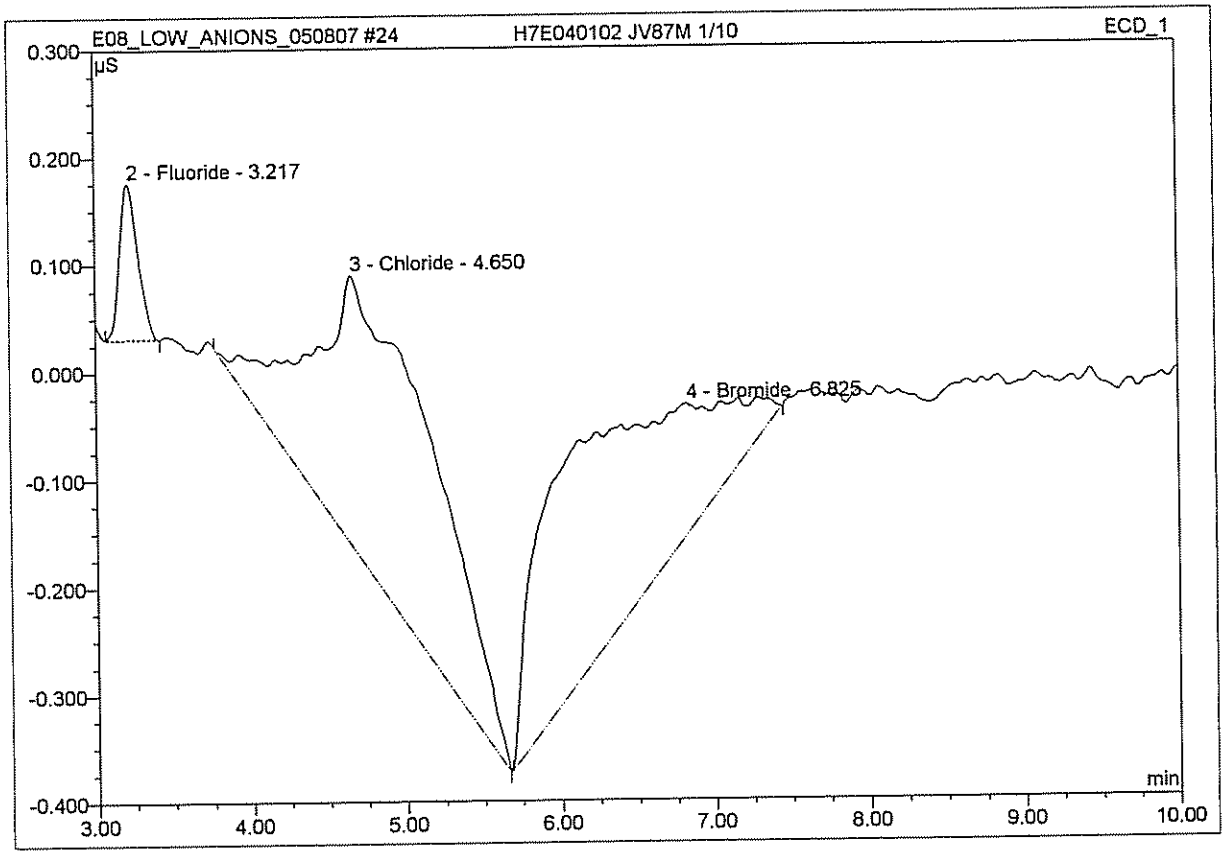
(B) CWK 5/9/07

Br- = ND

24 H7E040102 JV87M 1/10

QUAD

Sample Name:	**H7E040102 JV87M 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**363**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 15:15**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



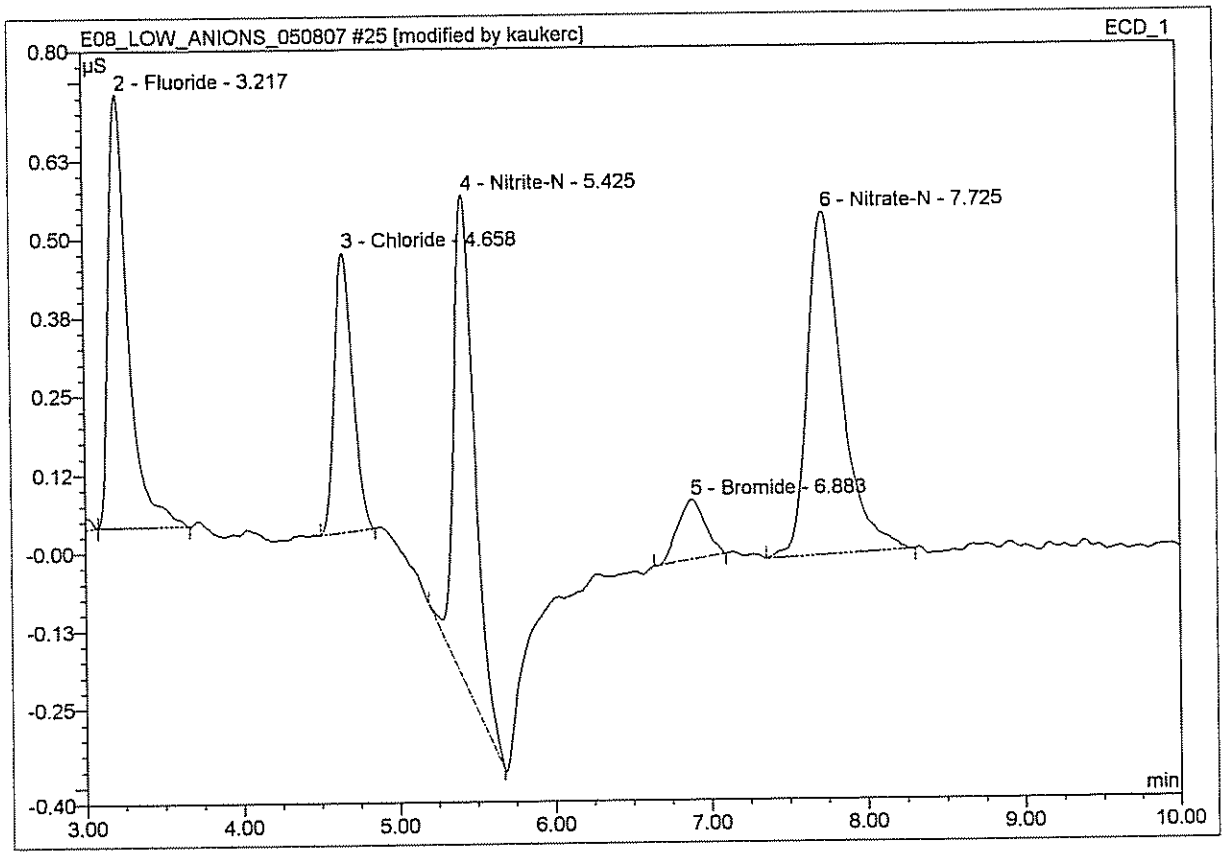
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.845	0.309	0.58	n.a.	BMB
2	3.22	Fluoride	0.145	0.020	0.04	0.5262	BMB
3	4.65	Chloride	0.251	0.252	0.48	1.3202	BMB
4	6.83	Bromide	0.121	0.234	0.44	2.0738	BMB
5	11.74	n.a.	0.373	0.124	0.23	n.a.	BMB
6	21.48	n.a.	58.847	52.039	98.23	n.a.	BMB
Total:			61.581	52.978	100.00	3.920	

original

25 H7E040102 JV87M MS 1/10 0.2 PPM CL, F, BR

QUAD

Sample Name:	**H7E040102 JV87M MS 1/10 0.2 PPM CL, F,**	*Injection Volume:*	**50.0**
Vial Number:	**364**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 15:47**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



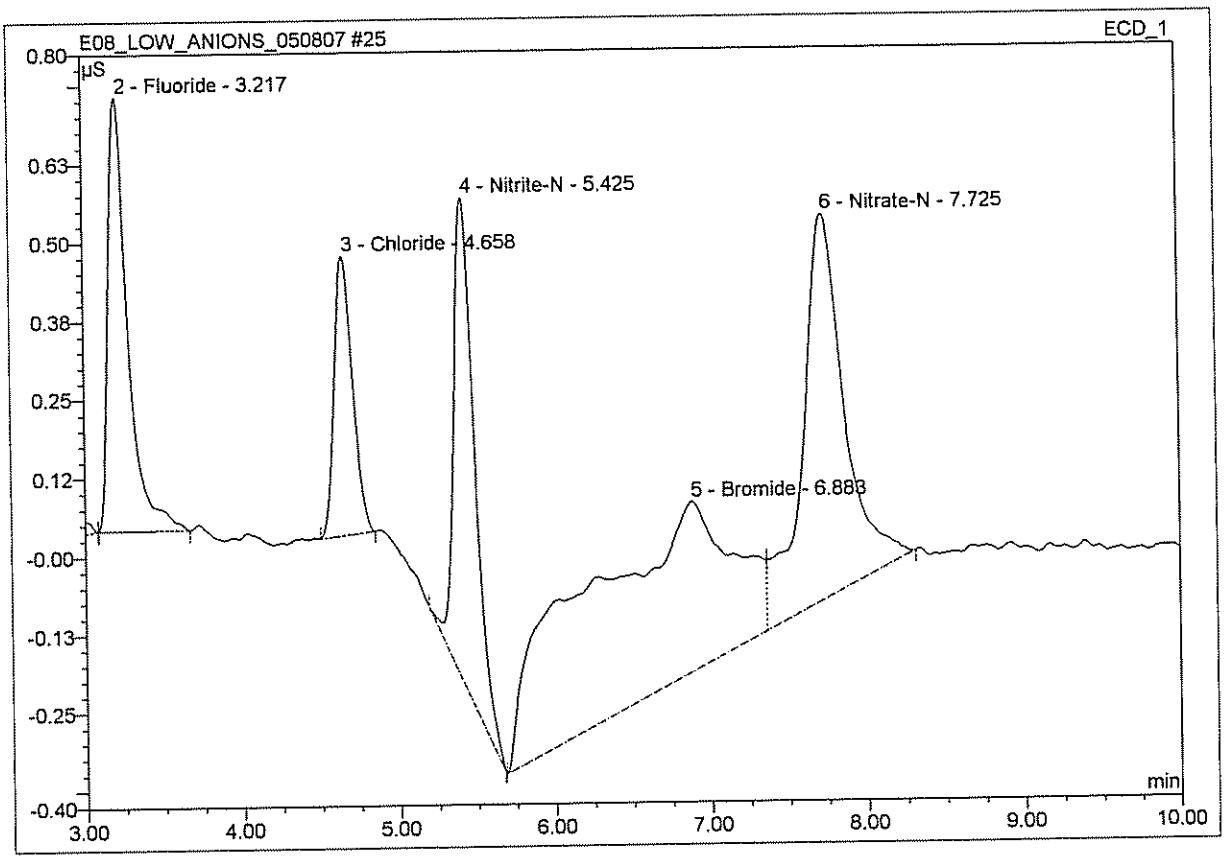
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.854	0.341	0.64	n.a.	BMb*
2	3.22	Fluoride	0.689	0.100	0.19	2.4771	bMB ✓
3	4.66	Chloride	0.444	0.060	0.11	2.3314	BMB
4	5.43	Nitrite-N	0.778	0.117	0.22	2.2570	BMB
5	6.88	Bromide	0.095	0.019	0.04	1.6333	BMB* ✓
6	7.73	Nitrate-N	0.545	0.139	0.26	1.8987	BMB*
7	11.74	n.a.	0.372	0.130	0.24	n.a.	BMB
8	21.48	n.a.	58.878	52.186	98.29	n.a.	BMB
Total:			63.656	53.093	100.00	10.598	

(B) CWK 5/9/07

25 H7E040102 JV87M MS 1/10 0.2 PPM CL, F, BR

QUAD

Sample Name:	**H7E040102 JV87M MS 1/10 0.2 PPM CL, F,**	*Injection Volume:*	**50.0**
Vial Number:	**364**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 15:47**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



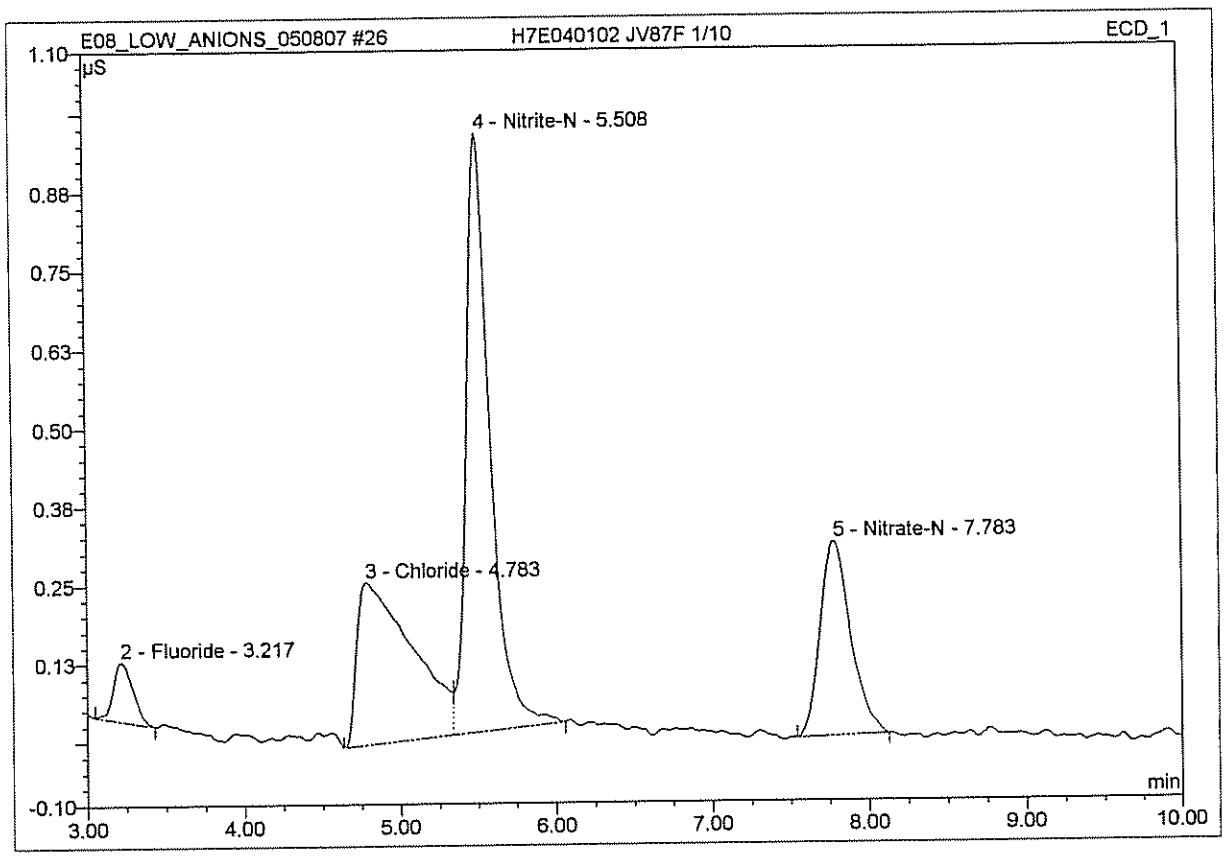
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.854	0.341	0.64	n.a.	BMB
2	3.22	Fluoride	0.689	0.100	0.19	2.4771	bMB
3	4.66	Chloride	0.444	0.060	0.11	2.3314	BMB
4	5.43	Nitrite-N	0.778	0.117	0.22	2.2570	BMB
5	6.88	Bromide	0.270	0.326	0.61	4.6164	BM
6	7.73	Nitrate-N	0.614	0.192	0.36	2.1361	MB
7	11.74	n.a.	0.372	0.130	0.24	n.a.	BMB
8	21.48	n.a.	58.878	52.186	97.63	n.a.	BMB
Total:			63.900	53.453	100.00	13.818	

original

26 H7E040102 JV87F 1/10

QUAD

Sample Name:	**H7E040102 JV87F 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**365**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 16:20**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



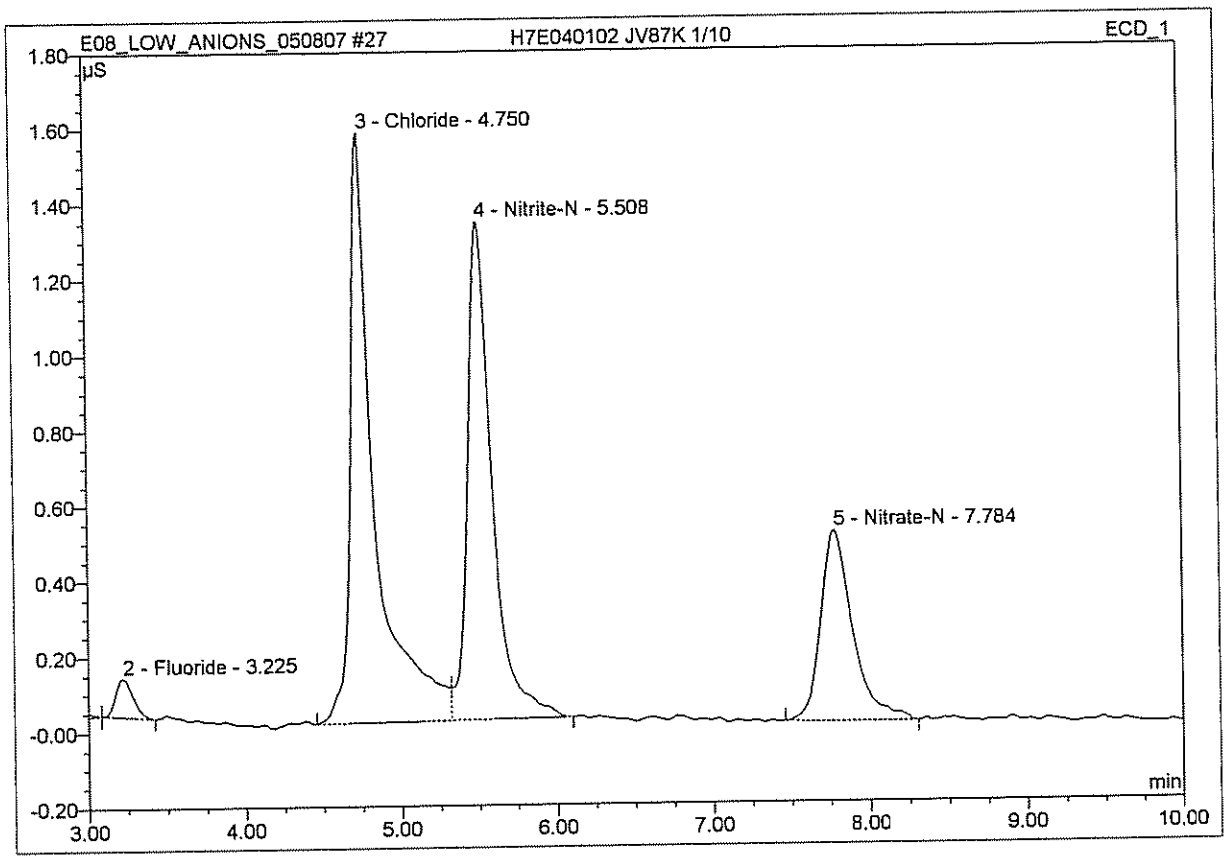
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.620	0.253	0.37	n.a.	BMB
2	3.22	Fluoride	0.094	0.014	0.02	0.3420	BMB
3	4.78	Chloride	0.258	0.106	0.16	1.3612	BM
4	5.51	Nitrite-N	0.952	0.169	0.25	2.7554	MB
5	7.78	Nitrate-N	0.309	0.070	0.10	1.0815	BMB
6	11.72	n.a.	46.693	14.705	21.66	n.a.	BMB
7	14.23	n.a.	0.153	0.029	0.04	n.a.	BMB
8	21.49	n.a.	59.176	52.535	77.39	n.a.	BMB
Total:			109.256	67.881	100.00	5.540	

Br - ND

27 H7E040102 JV87K 1/10

QUAD

Sample Name:	**H7E040102 JV87K 1/10**	*Injection Volume:*	**50.0**
Vial Number:	**366**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**10.0000**
Recording Time:	**5/8/2007 16:52**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



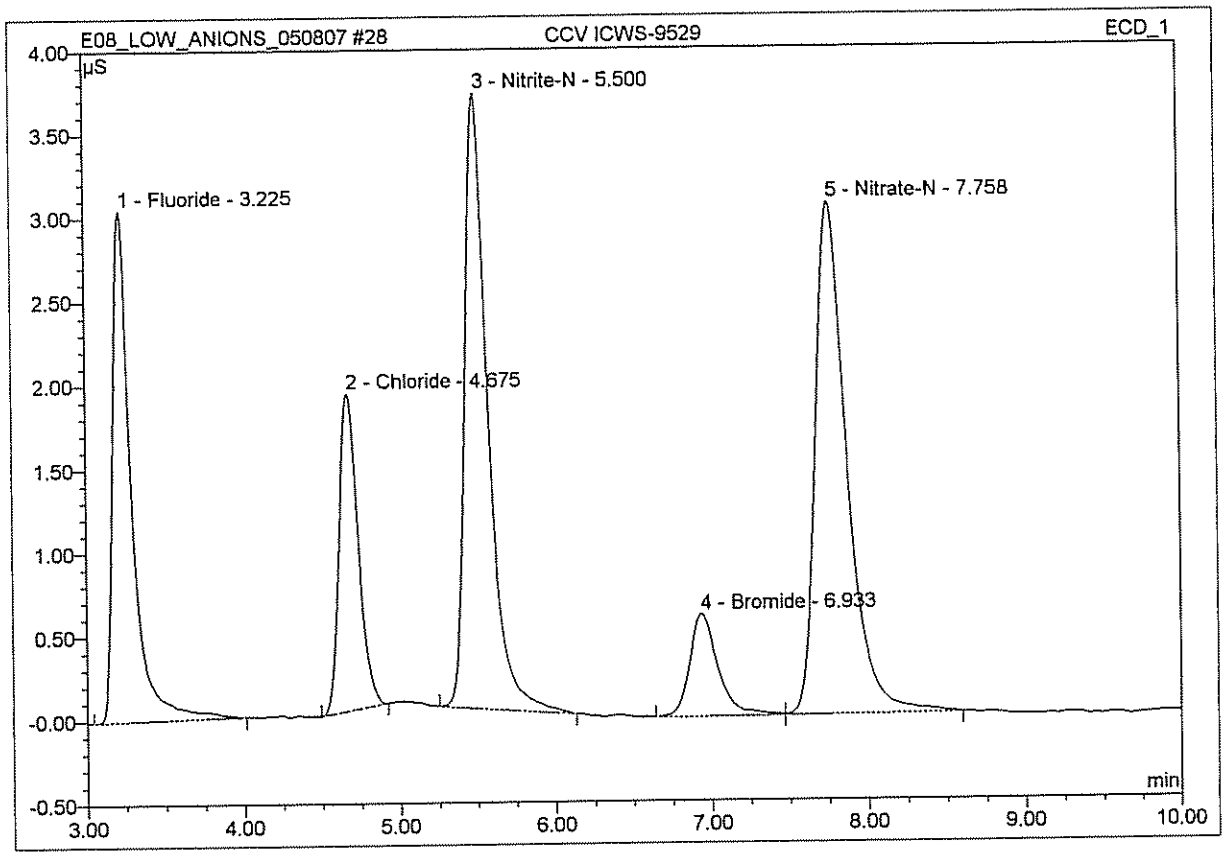
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.568	0.262	0.37	n.a.	BMB
2	3.23	Fluoride	0.101	0.013	0.02	0.3696	bMB
3	4.75	Chloride	1.565	0.285	0.41	8.0532	BM
4	5.51	Nitrite-N	1.320	0.240	0.34	3.8034	MB
5	7.78	Nitrate-N	0.503	0.119	0.17	1.7531	BMB
6	11.71	n.a.	51.792	16.380	23.42	n.a.	BMB
7	21.49	n.a.	59.311	52.645	75.27	n.a.	BMB
Total:			116.161	69.944	100.00	13.979	

Br- ND

28 CCV ICWS-9529

QUAD

Sample Name:	**CCV ICWS-9529**	*Injection Volume:*	**50.0**
Vial Number:	**368**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/8/2007 17:25**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



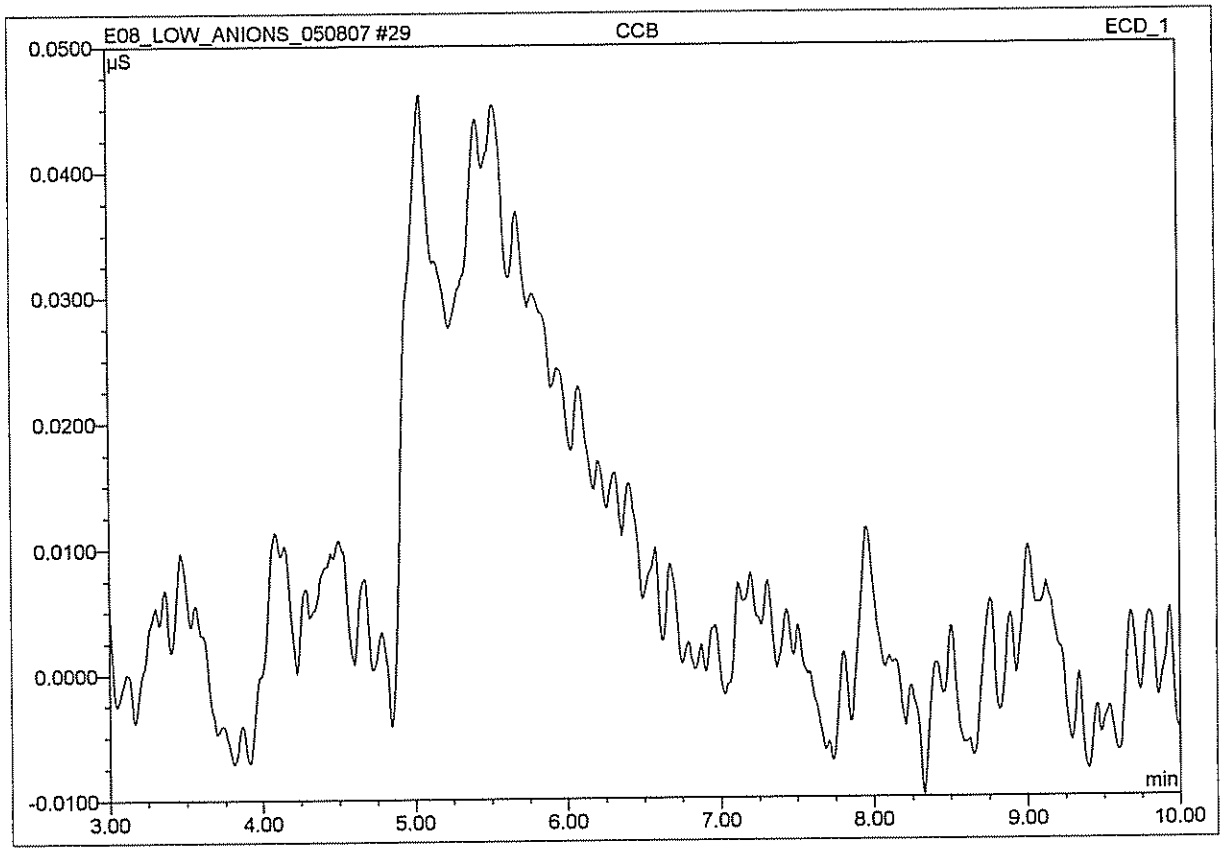
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	3.054	0.423	19.61	1.0441	BMB
2	4.68	Chloride	1.893	0.265	12.31	0.9684	BMB
3	5.50	Nitrite-N	3.676	0.629	29.14	1.0283	BMB
4	6.93	Bromide	0.609	0.128	5.91	1.0298	BM
5	7.76	Nitrate-N	3.058	0.713	33.03	1.0169	MB
Total:			12.289	2.157	100.00	5.087	

✓ 104.4%
✓ 96.8%
✓ 103%

29 CCB

QUAD

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**369**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/8/2007 17:42**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
Total:			0.000	0.000	0.00	0.000	

ND

STL Knoxville Anions in Air Data Review / Narrative Checklist for Methods 9056/9057/26A, SOP KNOX-WC-0005, Rev. 8

Lot #:	H7E040102	Analysis Date:	5/11/07	File ID:	E11-LOWANIONS-051107	ICAL File ID:	D16A-LOWANIONS-041607-QUAD

Review Items	NA	Yes	No	If No, why is data reportable?	2nd ✓
1. Were PM checklists (L40), Lot Summary and any applicable QAS reviewed?		✓			✓
2. ICV within 90-110%R?		✓			✓
3. ICB/CCB < 1/2 RL?		✓		☐ **[ccb1] No analyte > MDL in associated samples.**	✓
4. CCVs/CCBs run after every 10 samples, and at end of sequence?		✓			✓
5. Is %D ≤10% for each CCV?		✓			✓
6. If CCV failed, was it rerun only once?	✓				N/A
7. LCS/LCSD analytes within 90-110%R? *If no, list LCS ID:*		✓		☐ **[lcs3] LCS recovery >upper control limit & sample results <RL.**	✓
8. Method blank < 1/2 RL? *If no, list blank ID:*		✓		☐ **[mb3] No analyte > RL in associated samples.** ☐ [mb7] Sample results > 10x higher than blank.	✓
9. Matrix spikes run at required frequency?		✓			✓
10. Matrix spikes within 75-125% recovery? *If no, list MS ID:* _____		✓		☐ [air ms1] MS %R slightly outside limits for 1 sample. ☐ [air ms2] MS %R slightly outside limits for >1 sample. ☐ Air train reagent blank – spike result not reported.	✓
11. Were MS run #'s assigned to all matrix spikes except reagent blanks?		✓			✓
12. Sample analyses done within holding time (HT)? *If no, list samples:*		✓		☐ [ht1] HT expired upon receipt. ☐ *[ht2] Analysis requested after HT expired.*	✓
13. Were results processed using correct ICAL?		✓			✓
14. Are positive results within the calibration range?		✓			✓
15. Is integration acceptable for all samples, QC samples and standards?		✓			✓
16. For manual integrated standards and QC samples, are before/after chromatograms provided with initials/date/reason?		✓		Reasons: S=Split peak, U=Undetected peak, I=Incorrect peak integration, B=Baseline correction, W=Wrong peak chosen by data system.	✓
17. Calculations checked for error? (Document manual calculation checks.)		✓			✓
18. Were spreadsheets checked for transcription errors?		✓			✓
19. Final report/F6 correct? (Verify results, RLs, units, qualifiers, DFs, dates, spikes.)		✓			✓
20. Are all nonconformances documented and discussed in narrative?	✓			List NCM #:	N/A
21. Appropriate air train autotext selected for narrative?		✓		☐ [air1] Cl^- reported as HCl and Cl_2. ☐ [air2] Cl^- reported as HCl only. ☐ [air3] Cl^-, F^- reported as HCl, Cl_2, HF. ☒ [air4] Cl^-, F^-, Br^- reported as HCl, Cl_2, HF, HBr, Br_2. ☐ [air5] Cl^-, F^-, NO_2^-, NO_3^- reported as HCl, Cl_2, HF, HNO_2, HNO_3. ☐ [air6] Cl^-, F^-, Br^-, I^- reported as HCl, Cl_2, HF, HBr, Br_2, I^-. ☐ [air7] Cl^-, F^-, NO_2^-, NO_3^- reported as Cl^-, F^-, NO_2^-, NO_3^-.	✓
22. Sample pH adjustment included in narrative?	✓			☐ [air pH] Sample pH adjusted prior to analysis.	N/A
23. Audit sample results included in narrative?	✓			☐ [audit2] Audit results in mg/L.	N/A

1st Level Reviewer: CWK	Date: 5/16/07	2nd Level Reviewer: [illegible]	Date: 5/18/07

JV87G-MS-1/20-(Cl-)

$y = 1.889466(0.17768) + 0.067051(0.17768)^2$

$y = 0.335720319 + 0.002116812$

$y = 0.3378$ ✓ = (peak height Cl-)

Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomoly.

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 7135437
Prep Date: 05/11/2007 0900
Comp Date: 05/11/2007 1730

Analyte: Hydrogen Chloride
CAS #: 7647-01-0
QuantIMS #: 2702

Analyst Initials: CWK
Analyst LIMS Code: 035620
Instr. ID: 600

Reviewed by: DAW
Date: 5/18/07
MW Factor: 1.028429188

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H7E040102	1		4L	0.1	0.042	JV87E1AA	490	20	0.0000	ND	1,007.8606	423.3015	10,078.61	051107	1102
H7E040102	3		4L	0.1	0.042	JV87G1AA	420	20	0.0000	ND	863.8805	362.8298	8,638.81	051107	1011
H7E040102	3	S	4L	0.1	0.042	JV87G1AC	420	20	3.5536	1534.9429	863.8805	362.8298	8,638.81	051107	1028
H7E040102	3	D	4L	0.1	0.042	JV87G1AD	420	20	3.4047	1470.6270	863.8805	362.8298	8,638.81	051107	1045
H7E040102	5		4L	0.1	0.042	JV87J1AA	475	20	0.0000	ND	977.0077	410.3432	9,770.08	051107	1119
H7E040102	7		4L	0.1	0.042	JV87L1AA	100	40	1.2927	ND	411.3717	172.7761	4,113.72	051107	1245
H7E040102	7	S	4L	0.1	0.042	JV87L1AG	100	40	6.9852	718.3784	411.3717	172.7761	4,113.72	051107	1302
H7E150000	437	B	4L	0.1	0.042	JW1MV1AA	100	1	0.0000	ND	10.2843	4.3194	102.84	051107	0953
H7E150000	437	C	4L	0.1	0.042	JW1MV1AC	100	1	0.7933	81.5853	10.28	4.32	102.84	051107	0919
H7E150000	437	L	4L	0.1	0.042	JW1MV1AD	100	1	0.7904	81.2870	10.28	4.32	102.84	051107	0936

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information: ✓ ✓ ✓ ✓ ✓

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI9502	100.00	0.750	100.0	JW1MV1AC	0.75	102.84	77.13
LCSD	ICWI9502	100.00	0.750	100.0	JW1MV1AD	0.75	102.84	77.13
MS (1)	ICWI9502	100.00	0.020	10.0	JV87G1AC	0.20	8,638.81	1,727.76
MSD (1)	ICWI9502	100.00	0.020	10.0	JV87G1AD	0.20	8,638.81	1,727.76
MS (2)	ICWI9502	100.00	0.020	10.0	JV87L1AG	0.20	4,113.72	822.74
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

Comments: _____

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Batch # : 7135458
Prep Date: 05/11/2007 0900
Comp Date: 05/11/2007 1730

Analyte: Chlorine
CAS #: 7782-50-5
QuantIMS #: 515

Analyst Initials: CWK
Analyst LIMS Code: 035620
Instr. ID: 600

Reviewed by: DRW
Date: 5/18/07
MW Factor: 1.0

Lot Number	Lot Sample Number	Suffix	Method Code	QuantIMS LDL (µg/mL)	QuantIMS MDL (µg/mL)	WO #	Sample Volume (mL)	Bench DF	Final Halide Result (µg/mL) (Corrected for Bench DF)	Final Result (µg)	RL (µg)	MDL (µg)	LIMS DF	Analysis Date (mmddyy)	Analysis Time (hhmm)
H7E040102	2		4K	0.1	0.042	JV87F1AA	275	20	0.3872	ND	550.0000	231.0000	5,500.00	051107	1502
H7E040102	4		4K	0.1	0.042	JV87H1AA	250	20	0.4646	ND	500.0000	210.0000	5,000.00	051107	1324
H7E040102	4	S	4K	0.1	0.042	JV87H1AC	250	20	3.8160	954.0000	500.0000	210.0000	5,000.00	051107	1357
H7E040102	4	D	4K	0.1	0.042	JV87H1AD	250	20	3.8354	958.8500	500.0000	210.0000	5,000.00	051107	1429
H7E040102	6		4K	0.1	0.042	JV87K1AA	290	20	5.9875	1736.3750	580.0000	243.6000	5,800.00	051107	1534
H7E040102	8		4K	0.1	0.042	JV87M1AA	100	20	0.5726	ND	200.0000	84.0000	2,000.00	051107	1607
H7E040102	8	S	4K	0.1	0.042	JV87M1AG	100	20	5.0084	500.8400	200.0000	84.0000	2,000.00	051107	1639
H7E150000	458	B	4K	0.1	0.042	JW1TN1AA	100	1	0.0000	ND	10.0000	4.2000	100.00	051107	0953
H7E150000	458	C	4K	0.1	0.042	JW1TN1AC	100	1	0.7933	79.3300	10.00	4.20	100.00	051107	0919
H7E150000	458	L	4K	0.1	0.042	JW1TN1AD	100	1	0.7904	79.0400	10.00	4.20	100.00	051107	0936

STL Knoxville
SOP KNOX-WC-0005
Anions in Air Data Worksheet

Spike Information: ✓ ✓ ✓ ✓ ✓

Spike	Std. ID	Std. Conc. (µg/mL)	Spike Added (mL)	Final Volume (mL)	Work Order	True Spike Conc. (µg/mL)	LIMS DF	True Spike Amount (µg)
LCS	ICWI9502	100.00	0.750	100.0	JW1TN1AC	0.75	100.00	75.00
LCSD	ICWI9502	100.00	0.750	100.0	JW1TN1AD	0.75	100.00	75.00
MS (1)	ICWI9502	100.00	0.020	10.0	JV87H1AC	0.20	5,000.00	1,000.00
MSD (1)	ICWI9502	100.00	0.020	10.0	JV87H1AD	0.20	5,000.00	1,000.00
MS (2)	ICWI9502	100.00	0.020	10.0	JV87M1AG	0.20	2,000.00	400.00
MSD (2)								
MS (3)								
MSD (3)								
MS (4)								
MSD (4)								
MS (5)								
MSD (5)								

Comments: _____

True Spike Amount (µg) = Standard Concentration (ug/mL) x Spike Added (mL) / Final Volume (mL) x LIMS DF

STL Knoxville
Dionex IC Runlog Cover Page

Analyst:	CWK	Date:	5/11/07	Sequence ID:	E11-LOWANIONS-051107

Instrument:		Method:	
"Aragorn"	☑ DX-600		☐ KNOX-WC-0003, SW-846 0061/7199
	☐ ICS-1500		☐ KNOX-WC-0005, ☐ SW-846 9056 ☐ EPA 300.0 ☐ SW-846 9057-Mod ☑ EPA 26A-Mod
	☐ DX-320		☐ KNOX-WC-0014, EPA 314.0

Preventive Maintenance	Instrument Conditions		
Daily:	Flow Rate =	1.00	mL/min
☑ Check pump and gas pressure	Pressure =	2226.	psi
☑ Check all lines for crimping, leaks and discoloration	Conductance =	23.2	µS
As Needed:	Suppressor Current =	43.	mA
☐ Change column and guard column	Eluent Generator =	—	mM KOH
☐ Change column and/or guard column bed support			
☐ Clean conductivity cell			
☐ De-gas pump head when flow is erratic			
☐ Check/replace eluant end line filter			

MS/MSD Spike Information

WO #	Compound	Spike ID	Parent Conc.	Spike Added (mL)	Final Volume (mL)	Final Conc.
JV87G	Cl-	ICWI 9502	100ppm	0.020ml	10ml	0.20 ppm
JV87L	Cl-	ICWI9502	100 ppm	0.020 ml	10ml	0.20 ppm
JV87H	Cl-	ICWI-9502	100 ppm	0.020 ml	10ml	0.20ppm
JV87M	Cl-	ICWI-9502	100ppm	0.020 ml	10ml	0.20 ppm
				CWK		
				5/14/07		

Comments:

Batch: 7135437 (HCl)
Batch: 7135458 (Cl2)

☑ Sodium Thiosulfate added to NaOH impinger samples.

Sequence: E11_LOW_ANIONS_051107
Operator: kaukerc

Printed: 5/14/2007 8:05:09 AM

Title:
Datasource: Aragorn_net
Location: IC_ARAGORN
Timebase: IC_Aragorn
#Samples: 30

Created: 5/11/2007 9:18:07 AM by kaukerc
Last Update: 5/11/2007 2:10:16 PM by kaukerc

No.	Name	Comment	Inj. Vol.	Inj. Date/Time	Dil. Factor	*Multiplier [Liters]	Weight
1	CAL STD #1 ICWS-9424	QUAD	50.0	4/16/2007 12:21:03 PM	1.0000		1.0000
2	CAL STD #2 ICWS-9425	QUAD	50.0	4/16/2007 12:38:14 PM	1.0000		1.0000
3	CAL STD #3 ICWS-9426	QUAD	50.0	4/16/2007 12:55:24 PM	1.0000		1.0000
4	CAL STD #4 ICWS-9427	QUAD	50.0	4/16/2007 1:12:34 PM	1.0000		1.0000
5	CAL STD #5 ICWS-9423	QUAD	50.0	4/16/2007 1:29:45 PM	1.0000		1.0000
6	CAL STD #6 ICWS-9428	QUAD	50.0	4/16/2007 1:46:55 PM	1.0000		1.0000
7	ICV/LCS ICWS-9562	QUAD	50.0	5/11/2007 9:19:37 AM	1.0000		1.0000
8	ICV/LCSD ICWS-9563	QUAD	50.0	5/11/2007 9:36:47 AM	1.0000		1.0000
9	ICB/METHOD BLK	QUAD	50.0	5/11/2007 9:53:57 AM	1.0000		1.0000
10	H7E040102 JV87G 1/20	QUAD	50.0	5/11/2007 10:11:07 AM	20.0000		1.0000
11	H7E040102 JV87G MS 1/20 0.2 PPM CL	QUAD	50.0	5/11/2007 10:28:18 AM	20.0000		1.0000
12	H7E040102 JV87G MSD 1/20 0.2 PPM CL	QUAD	50.0	5/11/2007 10:45:28 AM	20.0000		1.0000
13	H7E040102 JV87E 1/20	QUAD	50.0	5/11/2007 11:02:39 AM	20.0000		1.0000
14	H7E040102 JV87J 1/20	QUAD	50.0	5/11/2007 11:19:49 AM	20.0000		1.0000
15	H7E040102 JV87L 1/20	QUAD	50.0	5/11/2007 11:36:59 AM	20.0000		1.0000
16	H7E040102 JV87L MS 1/20 0.2 PPM CL	QUAD	50.0	5/11/2007 11:54:10 AM	20.0000		1.0000
17	CCV ICWS-9564	QUAD	50.0	5/11/2007 12:11:20 PM	1.0000		1.0000
18	CCB	QUAD	50.0	5/11/2007 12:28:32 PM	1.0000		1.0000
19	H7E040102 JV87L 1/40	QUAD	50.0	5/11/2007 12:45:42 PM	40.0000		1.0000
20	H7E040102 JV87L MS 1/40 0.2 PPM CL	QUAD	50.0	5/11/2007 1:02:53 PM	40.0000		1.0000
21	H7E040102 JV87H 1/20	QUAD	50.0	5/11/2007 1:24:54 PM	20.0000		1.0000
22	H7E040102 JV87H MS 1/20 0.2 PPM CL	QUAD	50.0	5/11/2007 1:57:19 PM	20.0000		1.0000
23	H7E040102 JV87H MSD 1/20 0.2 PPM CL	QUAD	50.0	5/11/2007 2:29:45 PM	20.0000		1.0000
24	H7E040102 JV87F 1/20	QUAD	50.0	5/11/2007 3:02:10 PM	20.0000		1.0000
25	H7E040102 JV87K 1/20	QUAD	50.0	5/11/2007 3:34:36 PM	20.0000		1.0000
26	H7E040102 JV87M 1/20	QUAD	50.0	5/11/2007 4:07:01 PM	20.0000		1.0000
27	H7E040102 JV87M MS 1/20 0.2 PPM CL	QUAD	50.0	5/11/2007 4:39:27 PM	20.0000		1.0000
28	CCV ICWS-9564	QUAD	50.0	5/11/2007 5:11:52 PM	1.0000		1.0000
29	CCB	QUAD	50.0	5/11/2007 5:29:03 PM	1.0000		1.0000
30	SHUTDOWN	QUAD	50.0	5/11/2007 5:46:13 PM	1.0000		1.0000

Sequence: E11_LOW_ANIONS_051107
Operator: kaukerc

Printed: 5/14/2007 8:05:09 AM

Title:
Datasource: Aragorn_net
Location: IC_ARAGORN
Timebase: IC_Aragorn
#Samples: 30

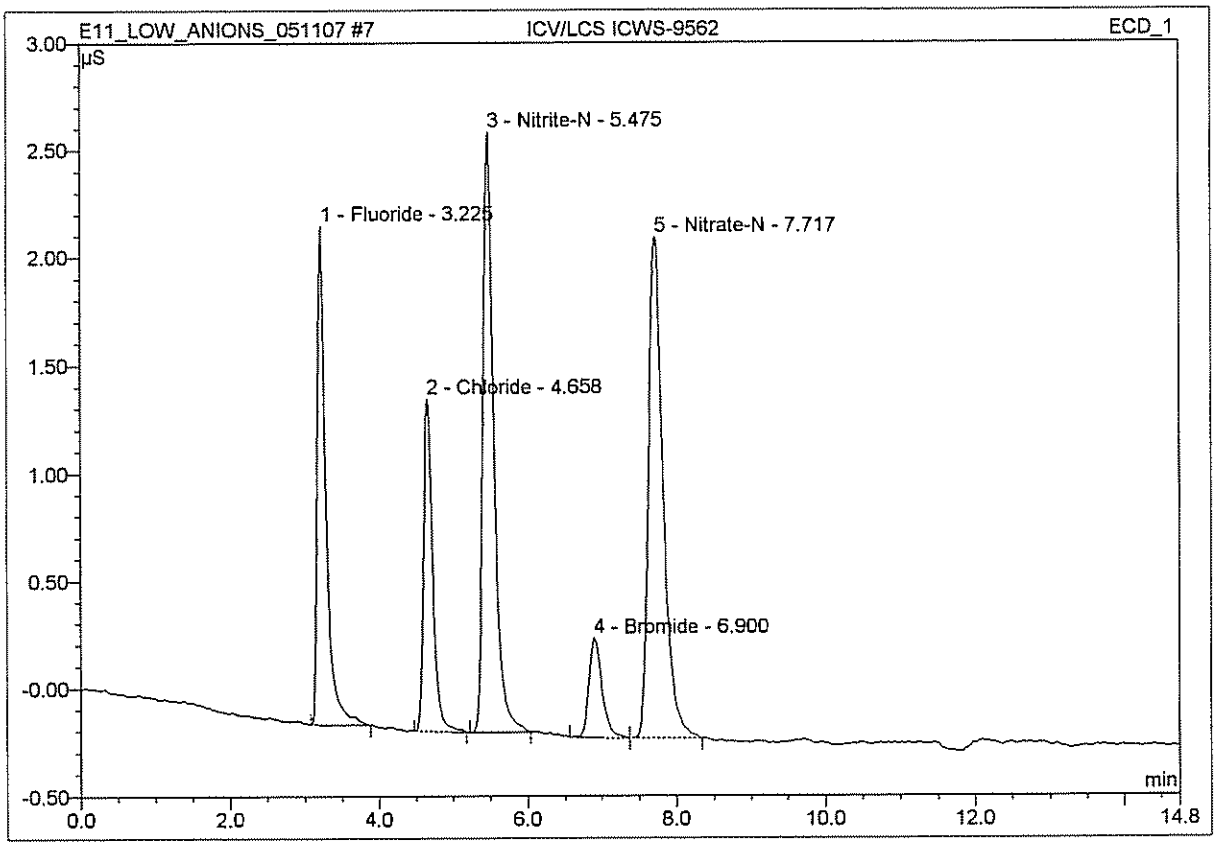
Created: 5/11/2007 9:18:07 AM by kaukerc
Last Update: 5/11/2007 2:10:16 PM by kaukerc

No.	Name	Type	Status	Program	Method
1	CAL STD #1 ICWS-9424	Standard	Finished	ANIONS_AS14A	ANIONS
2	CAL STD #2 ICWS-9425	Standard	Finished	ANIONS_AS14A	ANIONS
3	CAL STD #3 ICWS-9426	Standard	Finished	ANIONS_AS14A	ANIONS
4	CAL STD #4 ICWS-9427	Standard	Finished	ANIONS_AS14A	ANIONS
5	CAL STD #5 ICWS-9423	Standard	Finished	ANIONS_AS14A	ANIONS
6	CAL STD #6 ICWS-9428	Standard	Finished	ANIONS_AS14A	ANIONS
7	ICV/LCS ICWS-9562	Unknown	Finished	ANIONS_AS14A	ANIONS
8	ICV/LCSD ICWS-9563	Unknown	Finished	ANIONS_AS14A	ANIONS
9	ICB/METHOD BLK	Unknown	Finished	ANIONS_AS14A	ANIONS
10	H7E040102 JV87G 1/20	Unknown	Finished	ANIONS_AS14A	ANIONS
11	H7E040102 JV87G MS 1/20 0.2 PPM CL	Unknown	Finished	ANIONS_AS14A	ANIONS
12	H7E040102 JV87G MSD 1/20 0.2 PPM CL	Unknown	Finished	ANIONS_AS14A	ANIONS
13	H7E040102 JV87E 1/20	Unknown	Finished	ANIONS_AS14A	ANIONS
14	H7E040102 JV87J 1/20	Unknown	Finished	ANIONS_AS14A	ANIONS
15	H7E040102 JV87L 1/20	Unknown	Finished	ANIONS_AS14A	ANIONS
16	H7E040102 JV87L MS 1/20 0.2 PPM CL	Unknown	Finished	ANIONS_AS14A	ANIONS
17	CCV ICWS-9564	Unknown	Finished	ANIONS_AS14A	ANIONS
18	CCB	Unknown	Finished	ANIONS_AS14A	ANIONS
19	H7E040102 JV87L 1/40	Unknown	Finished	ANIONS_AS14A	ANIONS
20	H7E040102 JV87L MS 1/40 0.2 PPM CL	Unknown	Finished	ANIONS_AS14A	ANIONS
21	H7E040102 JV87H 1/20	Unknown	Finished	ANIONS_AS14A_Cl2	ANIONS
22	H7E040102 JV87H MS 1/20 0.2 PPM CL	Unknown	Finished	ANIONS_AS14A_Cl2	ANIONS
23	H7E040102 JV87H MSD 1/20 0.2 PPM CL	Unknown	Finished	ANIONS_AS14A_Cl2	ANIONS
24	H7E040102 JV87F 1/20	Unknown	Finished	ANIONS_AS14A_Cl2	ANIONS
25	H7E040102 JV87K 1/20	Unknown	Finished	ANIONS_AS14A_Cl2	ANIONS
26	H7E040102 JV87M 1/20	Unknown	Finished	ANIONS_AS14A_Cl2	ANIONS
27	H7E040102 JV87M MS 1/20 0.2 PPM CL	Unknown	Finished	ANIONS_AS14A_Cl2	ANIONS
28	CCV ICWS-9564	Unknown	Finished	ANIONS_AS14A	ANIONS
29	CCB	Unknown	Finished	ANIONS_AS14A	ANIONS
30	SHUTDOWN	Unknown	Finished	SHUTDOWN	ANIONS

7 ICV/LCS ICWS-9562

QUAD

Sample Name:	**ICV/LCS ICWS-9562**	*Injection Volume:*	**50.0**
Vial Number:	**310**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/11/2007 9:19**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	2.315	0.316	19.33	0.8034	BMB
2	4.66	Chloride	1.541	0.220	13.43	0.7933	BMB
3	5.48	Nitrite-N	2.786	0.473	28.95	0.7879	BMB
4	6.90	Bromide	0.460	0.094	5.78	0.7811	BMb
5	7.72	Nitrate-N	2.327	0.532	32.51	0.7837	bMB
Total:			9.430	1.635	100.00	3.949	

✓ 105.8%R

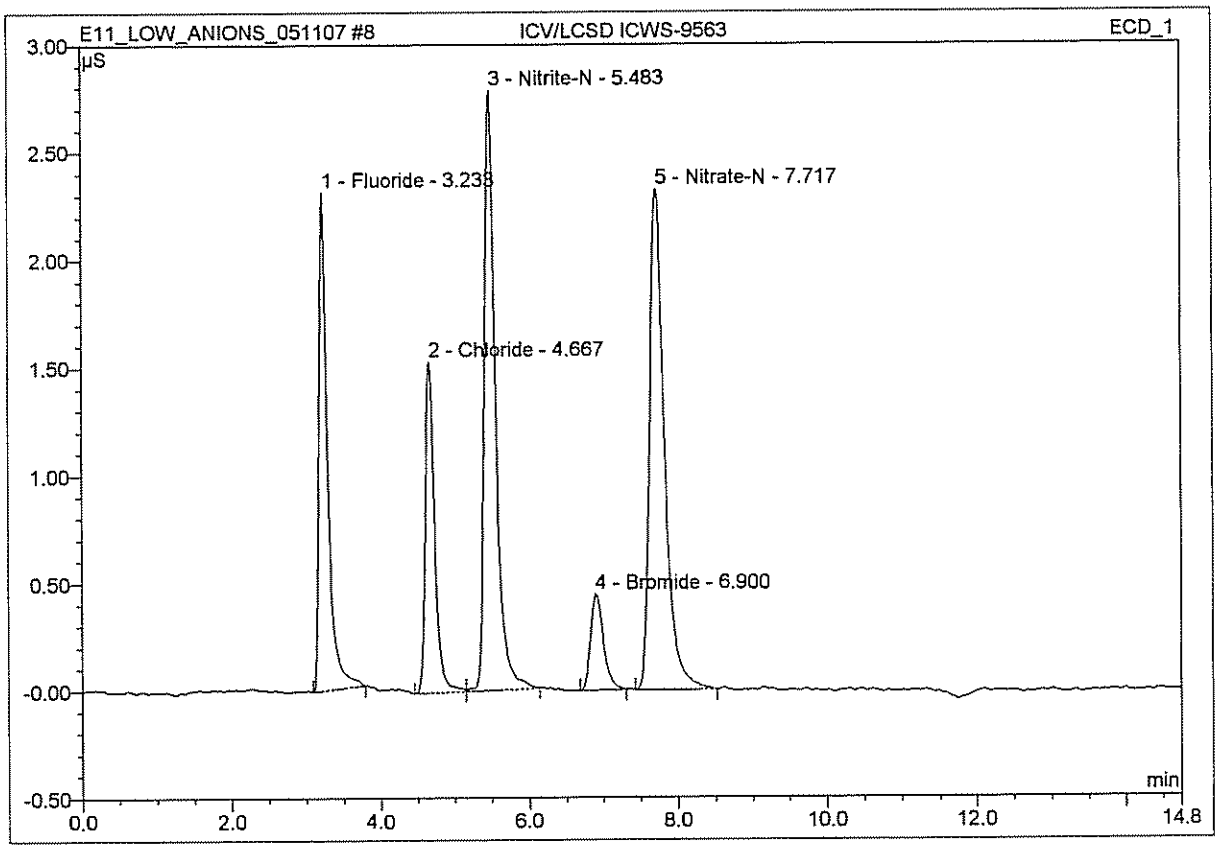
JW|TN|AC (Cl2) ✓

JW|MV|AC (N4) ✓

8 ICV/LCSD ICWS-9563

QUAD

Sample Name:	**ICV/LCSD ICWS-9563**	*Injection Volume:*	**50.0**
Vial Number:	**311**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/11/2007 9:36**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	2.314	0.313	19.03	0.8029	BMB
2	4.67	Chloride	1.535	0.221	13.44	0.7904	BM
3	5.48	Nitrite-N	2.784	0.483	29.34	0.7873	MB
4	6.90	Bromide	0.448	0.090	5.45	0.7606	BMB
5	7.72	Nitrate-N	2.325	0.538	32.74	0.7830	BMB
Total:			9.406	1.645	100.00	3.924	

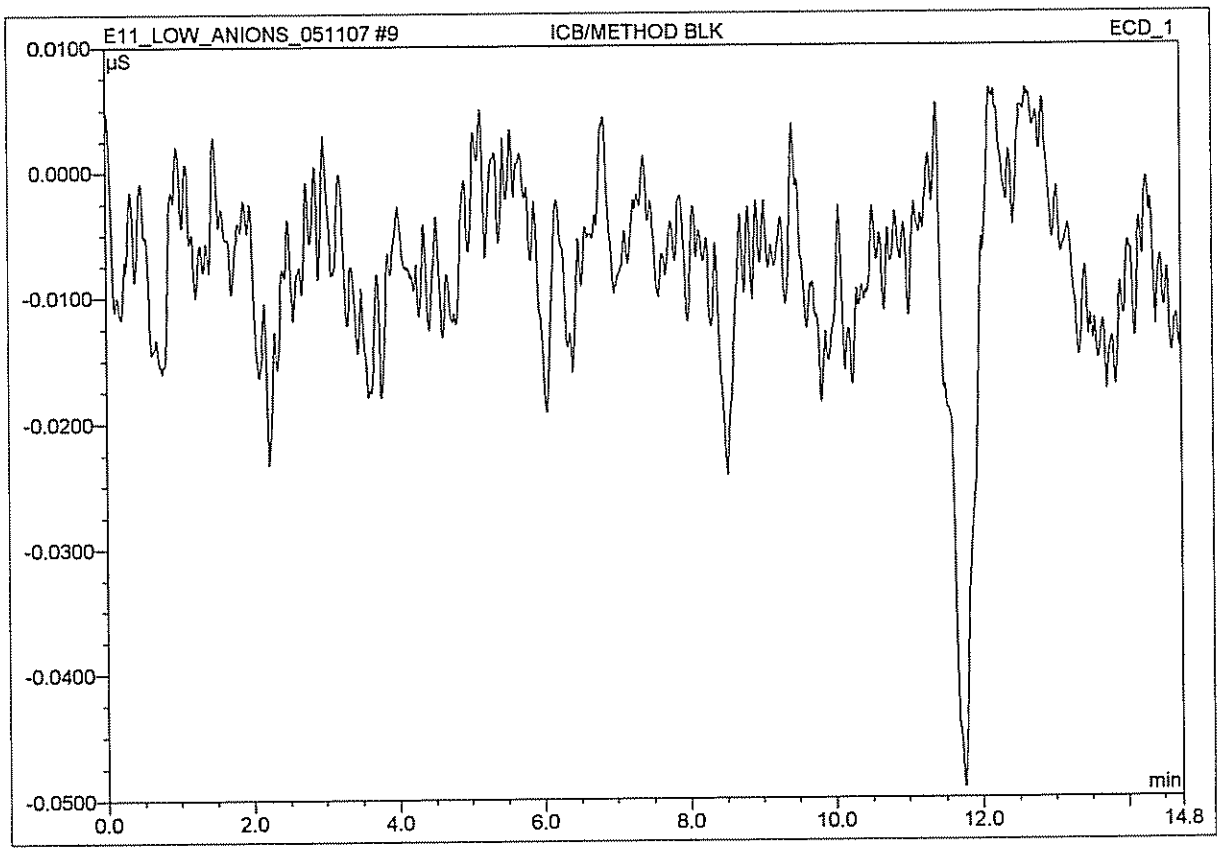
105.4%R

JWITN1AD Cl2
JWIMV1AD HCl

9 ICB/METHOD BLK

QUAD

Sample Name:	**ICB/METHOD BLK**	*Injection Volume:*	**50.0**
Vial Number:	**312**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/11/2007 9:53**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



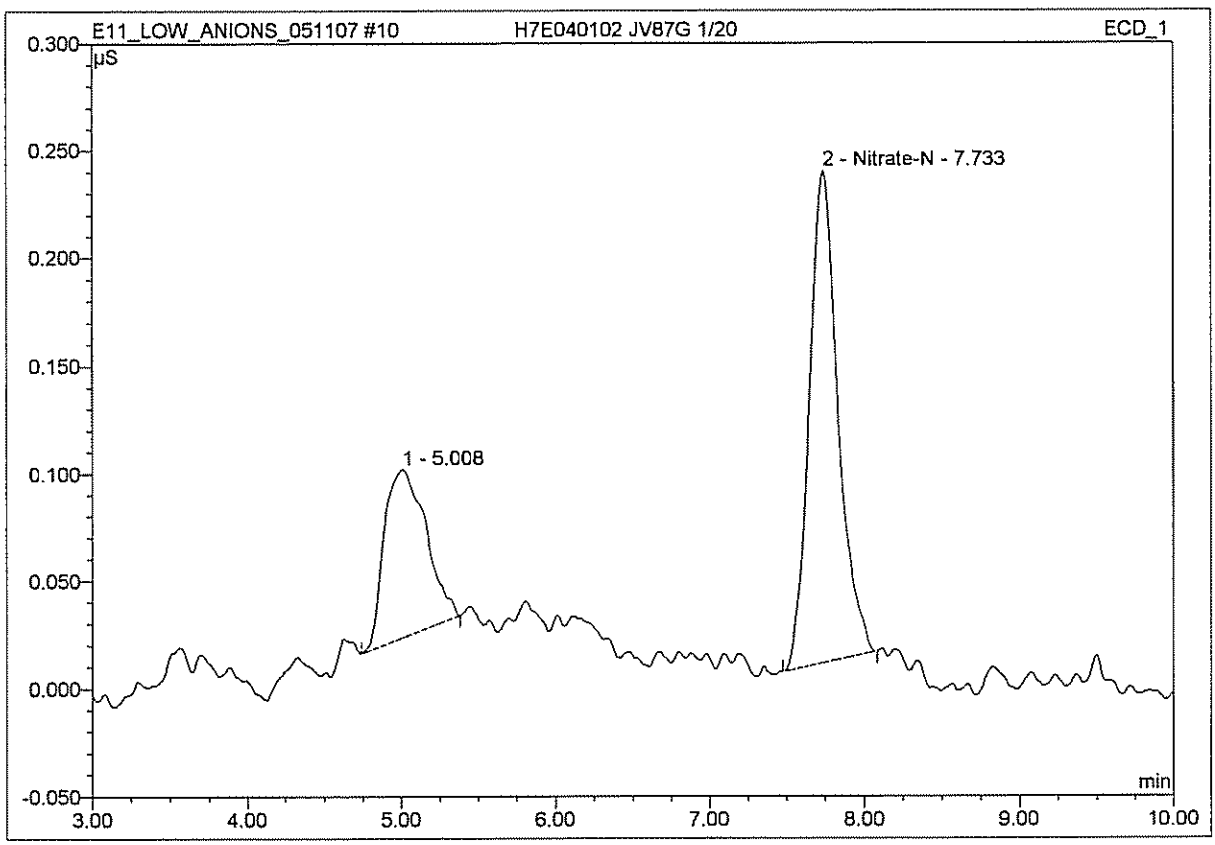
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
Total:			0.000	0.000	0.00	0.000	

JWITNIAA (Cl2) ✓
JWIMVIAA (NCl) ✓
(ND)

10 H7E040102 JV87G 1/20

QUAD

Sample Name:	**H7E040102 JV87G 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**313**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 10:11**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	5.01	n.a.	0.078	0.025	0.08	n.a.	BMB
2	7.73	Nitrate-N	0.229	0.049	0.15	1.6023	BMB
3	11.68	n.a.	100.826	32.375	99.77	n.a.	BMB
Total:			101.133	32.449	100.00	1.602	

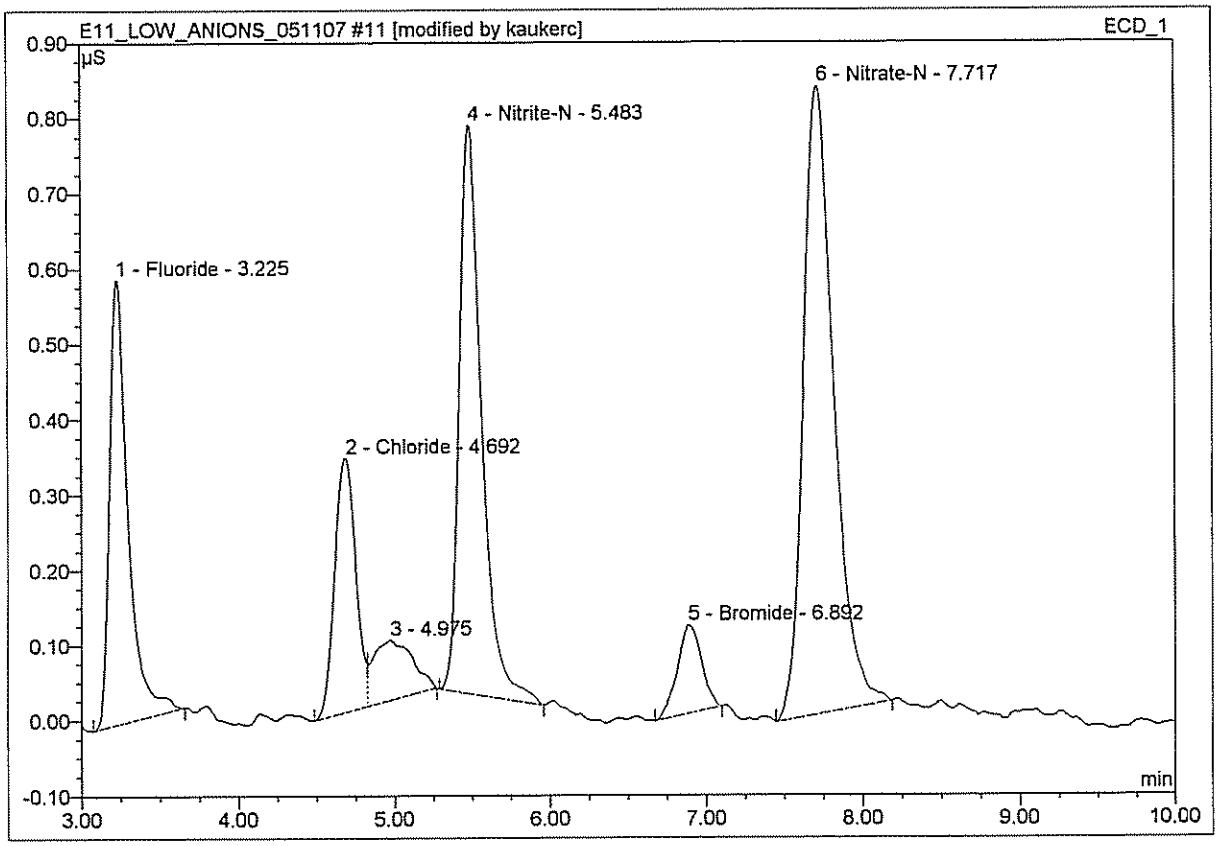
Cl- ND

(Sample screening run @ 1/10 w/ MS unacceptable results) DKW

11 H7E040102 JV87G MS 1/20 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87G MS 1/20 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**314**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 10:28**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



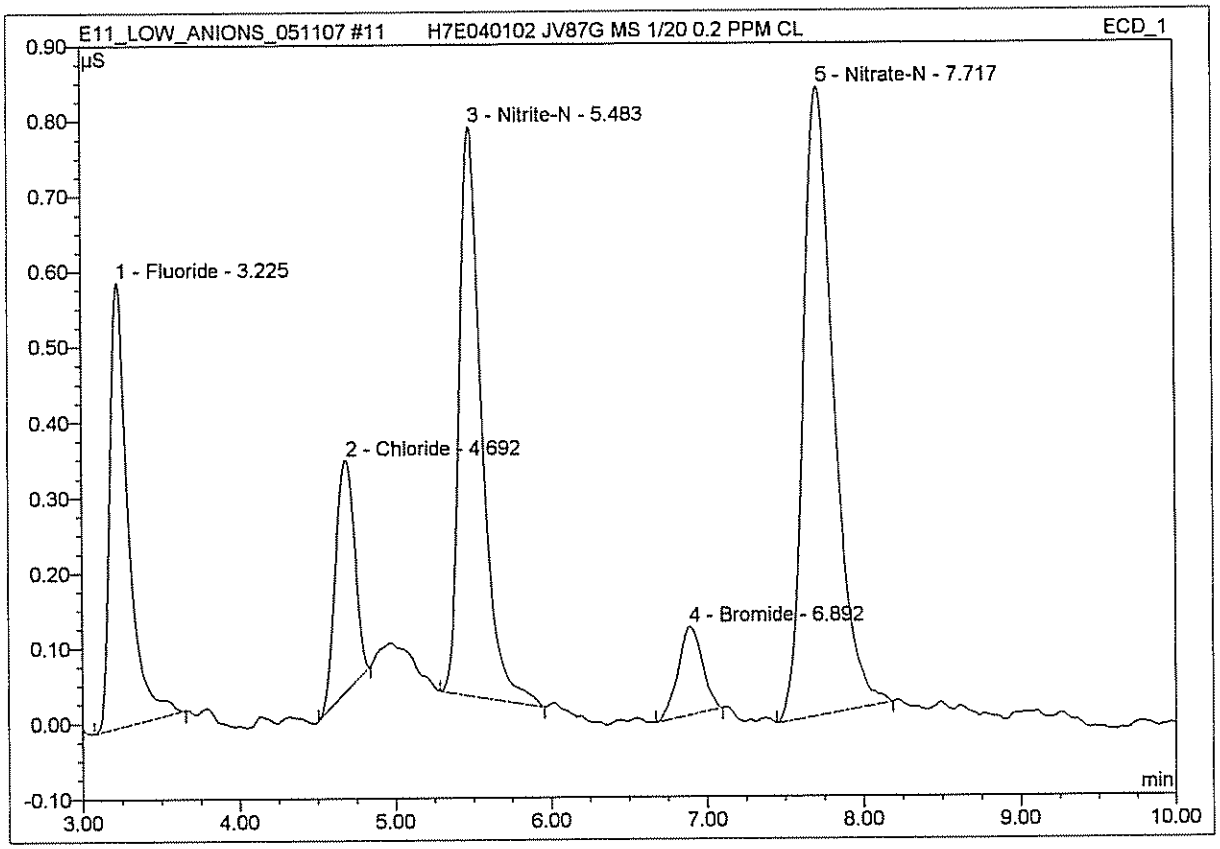
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	0.591	0.081	0.25	4.2554	BMB
2	4.69	Chloride	0.338	0.053	0.16	3.5536	BM *
3	4.98	n.a.	0.080	0.024	0.07	n.a.	MB*
4	5.48	Nitrite-N	0.755	0.125	0.38	4.3834	BMB
5	6.89	Bromide	0.117	0.021	0.06	4.0243	BMB
6	7.72	Nitrate-N	0.834	0.188	0.57	5.7775	BMB
7	11.67	n.a.	100.794	32.400	98.51	n.a.	BMB
Total:			103.509	32.892	100.00	21.994	

(B) CWK 5/11/07

11 H7E040102 JV87G MS 1/20 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87G MS 1/20 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**314**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 10:28**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



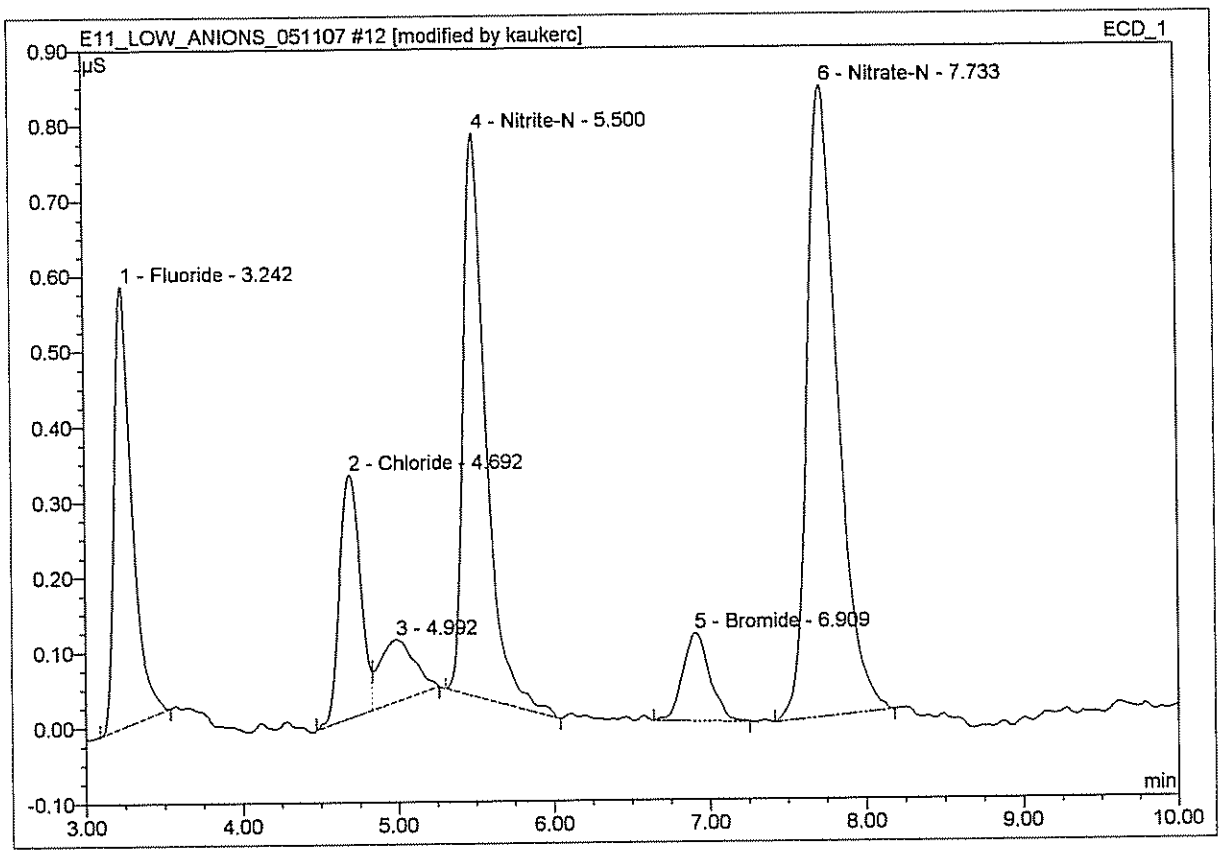
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	0.591	0.081	0.25	4.2554	BMB
2	4.69	Chloride	0.306	0.044	0.13	3.2202	BMB
3	5.48	Nitrite-N	0.755	0.125	0.38	4.3834	BMB
4	6.89	Bromide	0.117	0.021	0.06	4.0243	BMB
5	7.72	Nitrate-N	0.834	0.188	0.57	5.7775	BMB
6	11.67	n.a.	100.794	32.400	98.60	n.a.	BMB
Total:			103.398	32.859	100.00	21.661	

original

12 H7E040102 JV87G MSD 1/20 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87G MSD 1/20 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**315**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 10:45**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



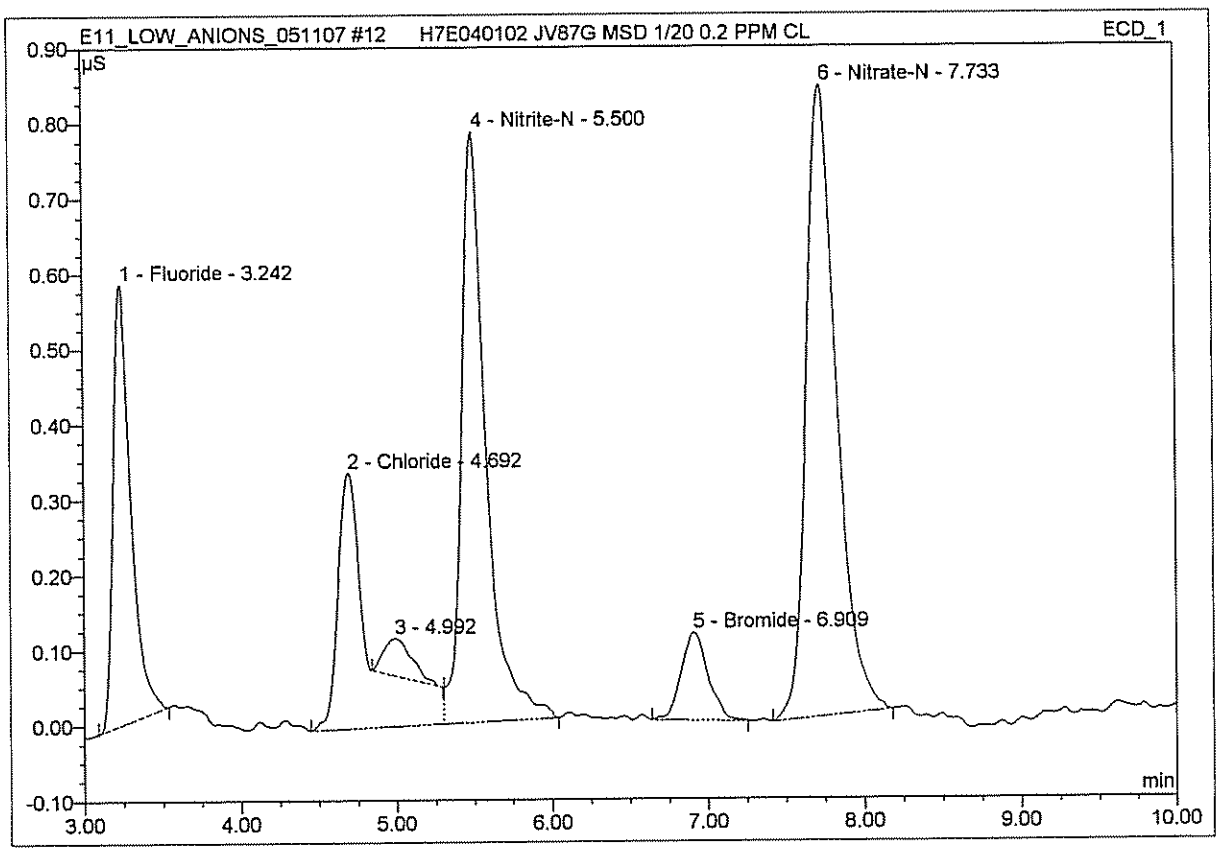
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.24	Fluoride	0.585	0.077	0.23	4.2106	BMB
2	4.69	Chloride	0.324	0.050	0.15	3.4047	BM *
3	4.99	n.a.	0.082	0.022	0.07	n.a.	MB*
4	5.50	Nitrite-N	0.748	0.125	0.38	4.3422	BMB*
5	6.91	Bromide	0.117	0.023	0.07	3.9942	BMB
6	7.73	Nitrate-N	0.838	0.189	0.57	5.8035	BMB
7	11.68	n.a.	101.163	32.484	98.53	n.a.	BMB
Total:			103.857	32.969	100.00	21.755	

(R) CWK 5/11/07

12 H7E040102 JV87G MSD 1/20 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87G MSD 1/20 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**315**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 10:45**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



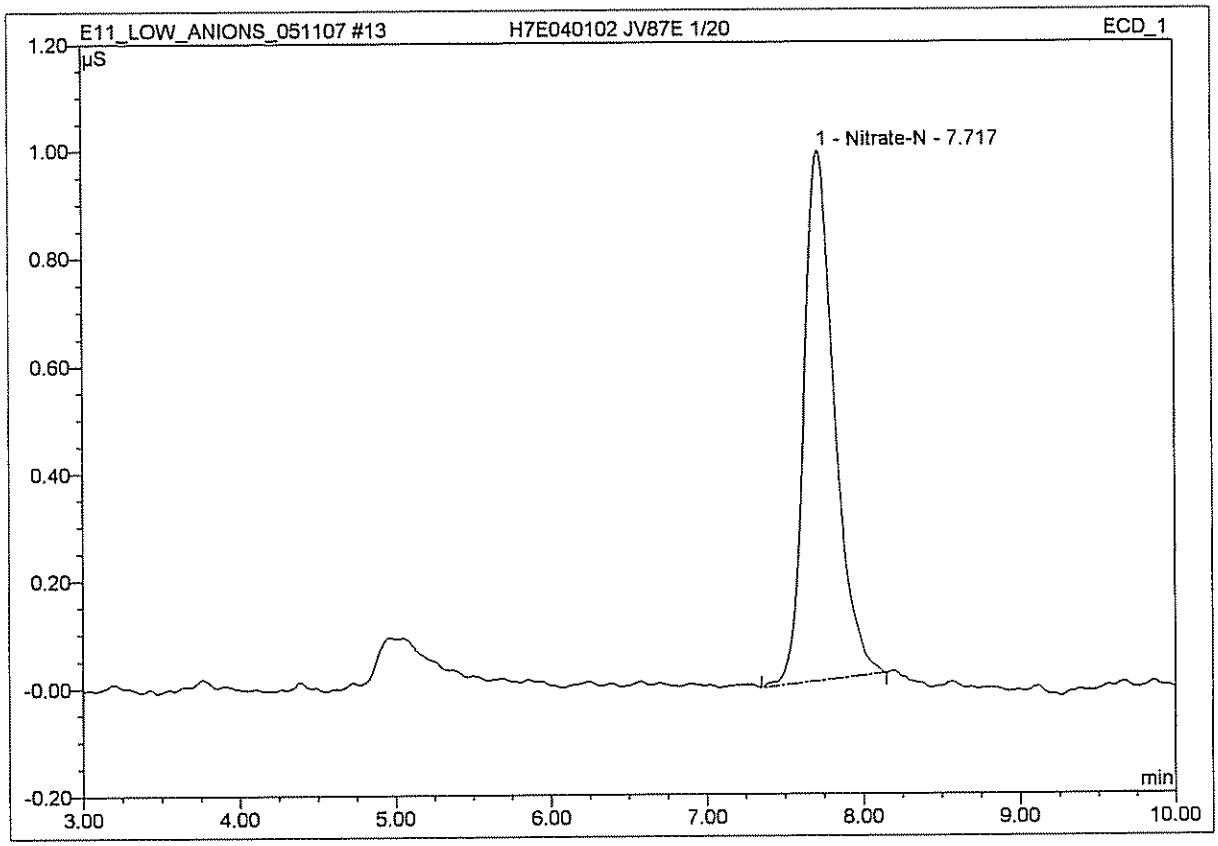
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.24	Fluoride	0.585	0.077	0.23	4.2106	BMB
2	4.69	Chloride	0.340	0.084	0.25	3.5747	BM
3	4.99	n.a.	0.050	0.011	0.03	n.a.	Rd
4	5.50	Nitrite-N	0.784	0.142	0.43	4.5472	MB
5	6.91	Bromide	0.117	0.023	0.07	3.9942	BMB
6	7.73	Nitrate-N	0.838	0.189	0.57	5.8035	BMB
7	11.68	n.a.	101.163	32.484	98.41	n.a.	BMB
Total:			103.876	33.010	100.00	22.130	

original

13 H7E040102 JV87E 1/20

QUAD

Sample Name:	**H7E040102 JV87E 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**316**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 11:02**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



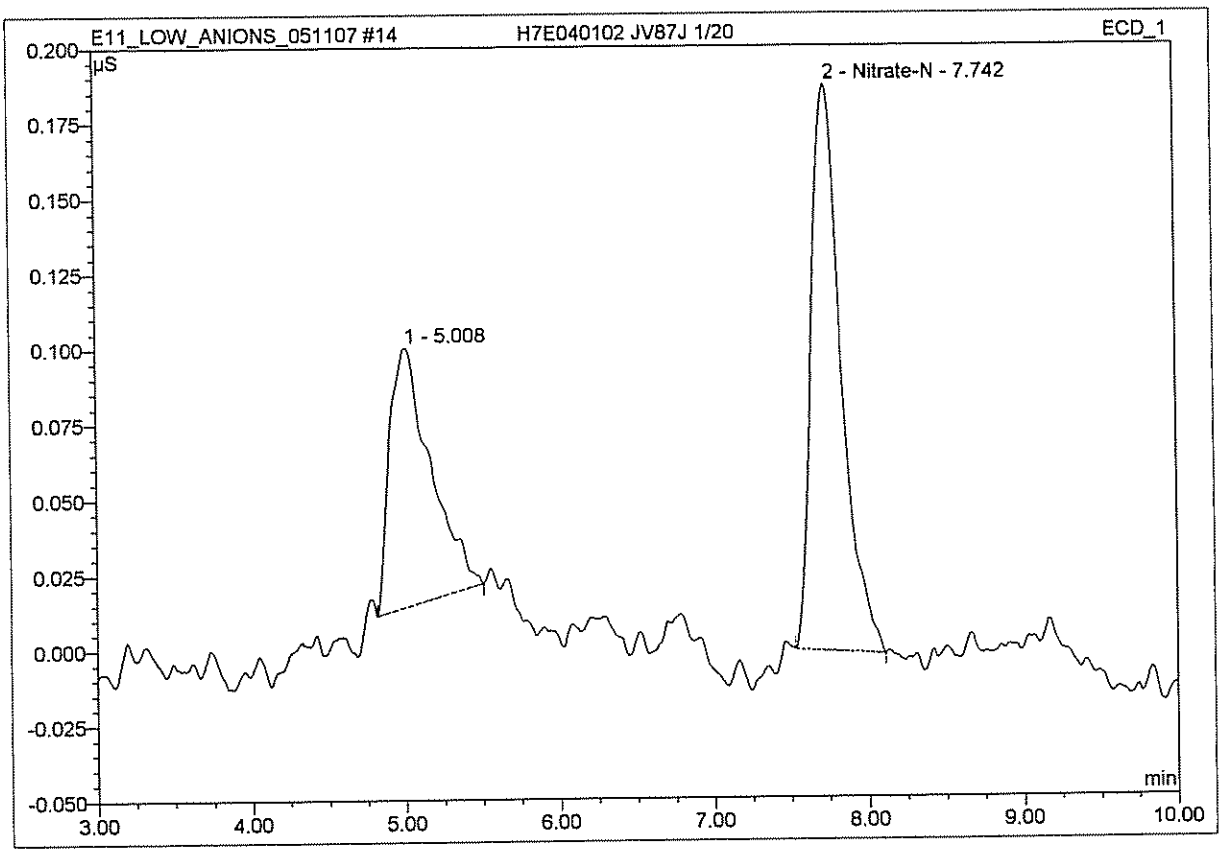
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	7.72	Nitrate-N	0.986	0.223	0.80	6.8085	BMB
2	11.68	n.a.	86.175	27.478	99.20	n.a.	BMB
Total:			87.161	27.701	100.00	6.808	

Cl- ND ✓

14 H7E040102 JV87J 1/20

QUAD

Sample Name:	**H7E040102 JV87J 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**317**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 11:19**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



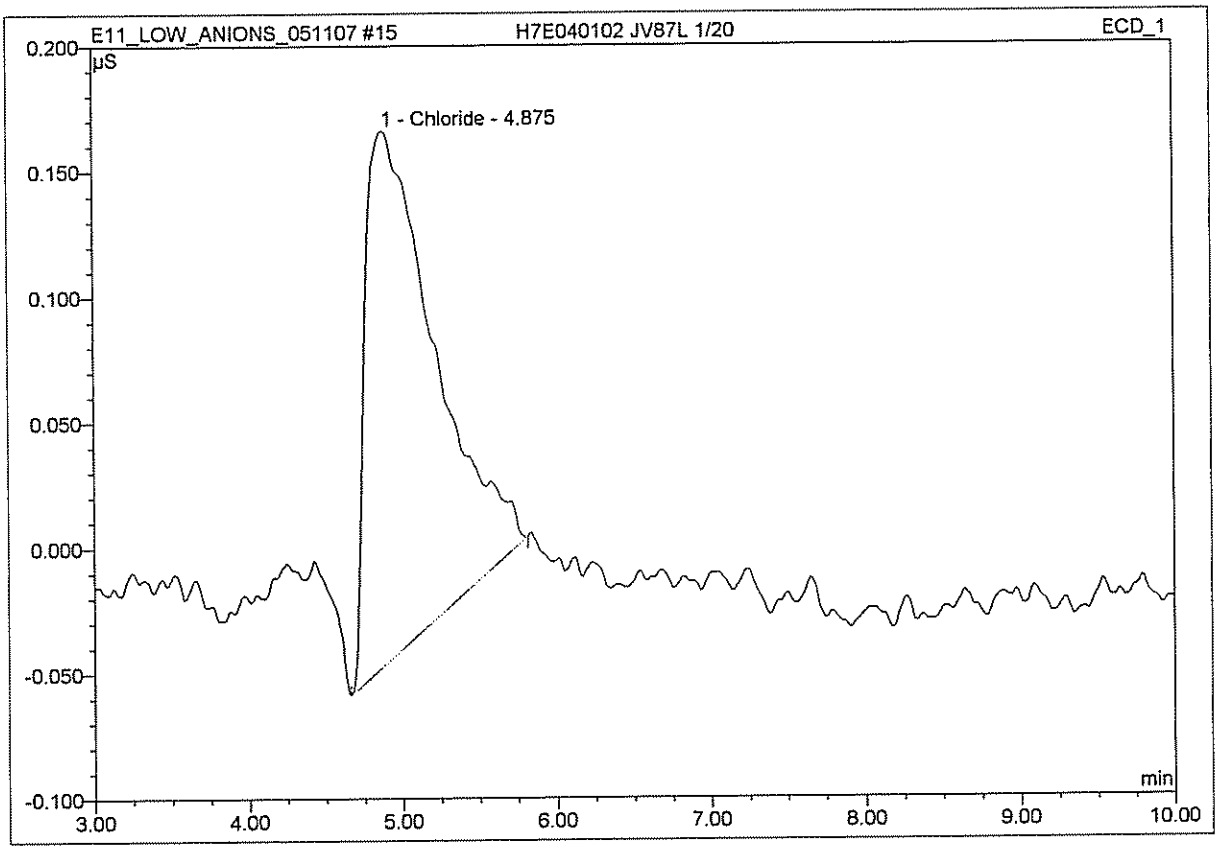
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	5.01	n.a.	0.086	0.027	0.09	n.a.	BMB
2	7.74	Nitrate-N	0.188	0.042	0.14	1.3207	BMB
3	11.68	n.a.	92.387	29.526	99.77	n.a.	BMB
Total:			92.661	29.595	100.00	1.321	

Cl- ND

15 H7E040102 JV87L 1/20

QUAD

Sample Name:	**H7E040102 JV87L 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**318**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 11:36**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	4.88	Chloride	0.213	0.111	0.15	2.2455	BMB
2	11.58	n.a.	216.215	75.199	99.85	n.a.	BMB
Total:			216.428	75.310	100.00	2.246	

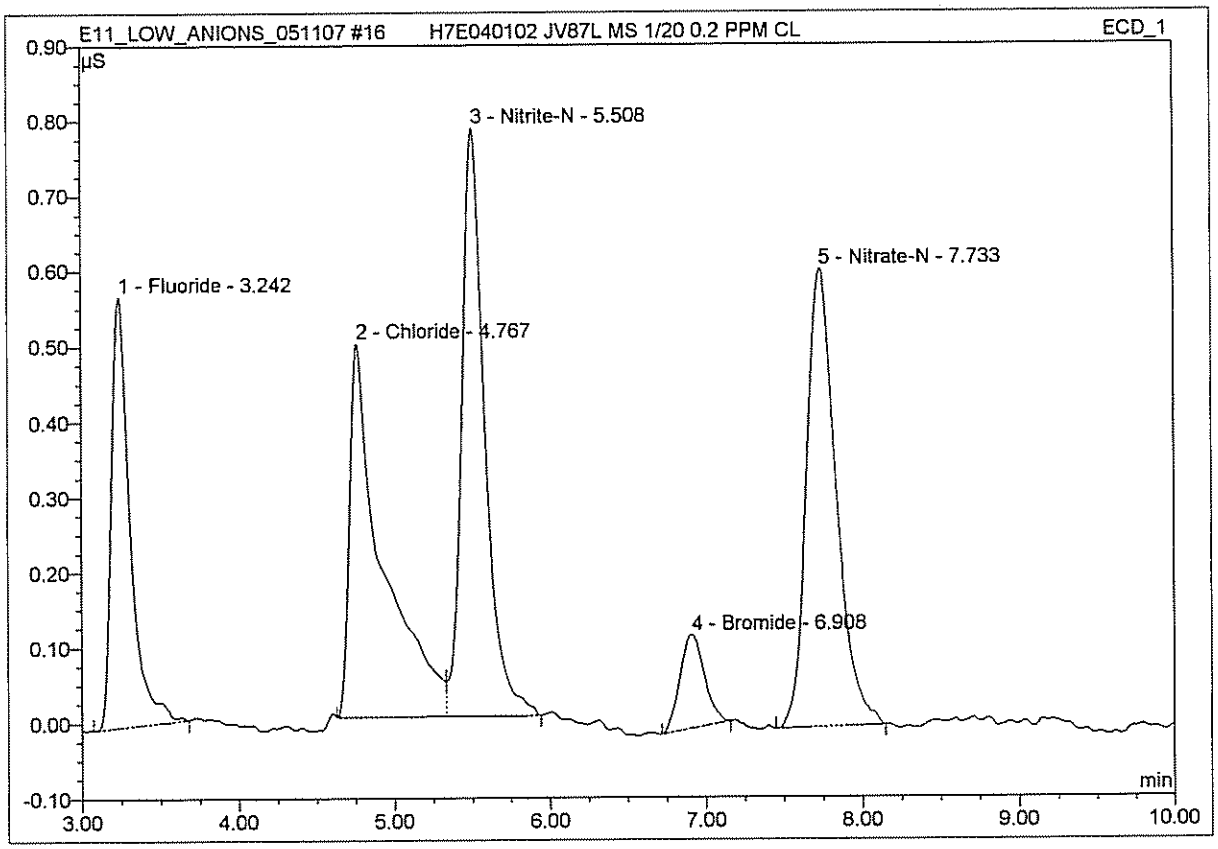
Peak Shape and RT do not match Chloride
Rerun at higher dilution

Not used

16 H7E040102 JV87L MS 1/20 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87L MS 1/20 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**318**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 11:54**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



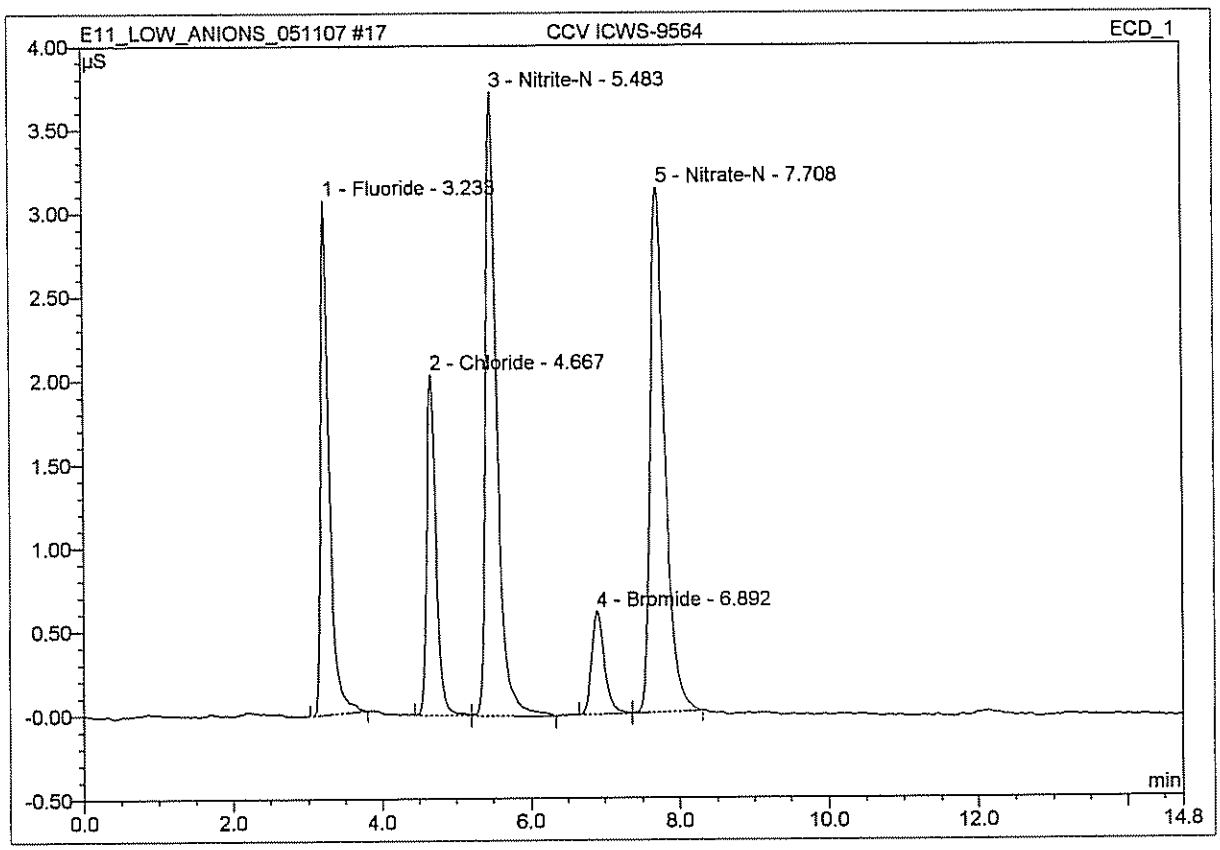
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.24	Fluoride	0.571	0.079	0.10	4.1138	BMB
2	4.77	Chloride	0.496	0.122	0.16	5.2018	BM
3	5.51	Nitrite-N	0.781	0.134	0.18	4.5297	MB
4	6.91	Bromide	0.124	0.023	0.03	4.2477	BMB
5	7.73	Nitrate-N	0.607	0.134	0.18	4.2255	BMB
6	11.59	n.a.	216.202	75.125	99.35	n.a.	BMB
Total:			218.781	75.616	100.00	22.319	

~130% R — NOT USED

17 CCV ICWS-9564

QUAD

Sample Name:	**CCV ICWS-9564**	*Injection Volume:*	**50.0**
Vial Number:	**320**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/11/2007 12:11**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



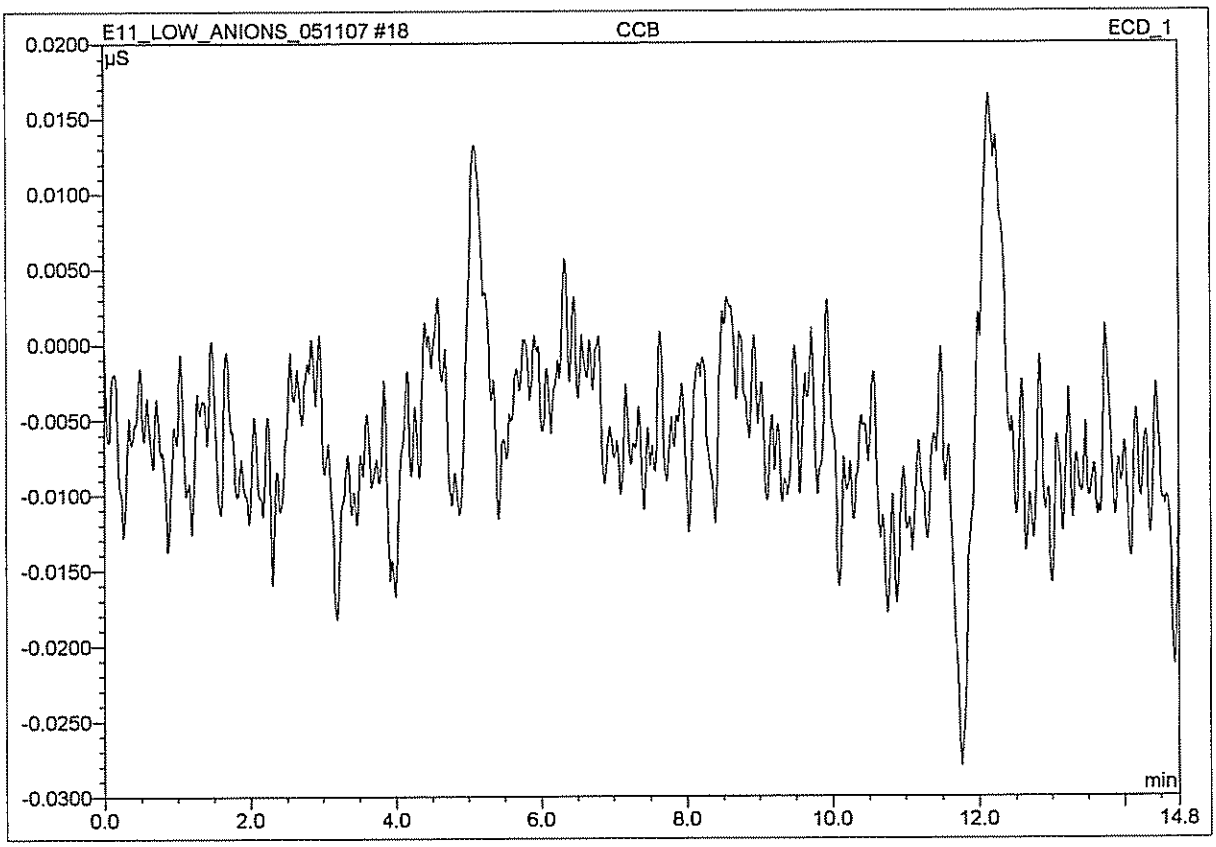
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	3.076	0.411	18.80	1.0512	BMB
2	4.67	Chloride	2.033	0.289	13.24	1.0378	BM
3	5.48	Nitrite-N	3.728	0.650	29.75	1.0423	MB
4	6.89	Bromide	0.616	0.122	5.58	1.0412	BMb
5	7.71	Nitrate-N	3.139	0.713	32.64	1.0423	bMB
Total:			12.592	2.186	100.00	5.215	

/103.8%

18 CCB

QUAD

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**321**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/11/2007 12:28**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



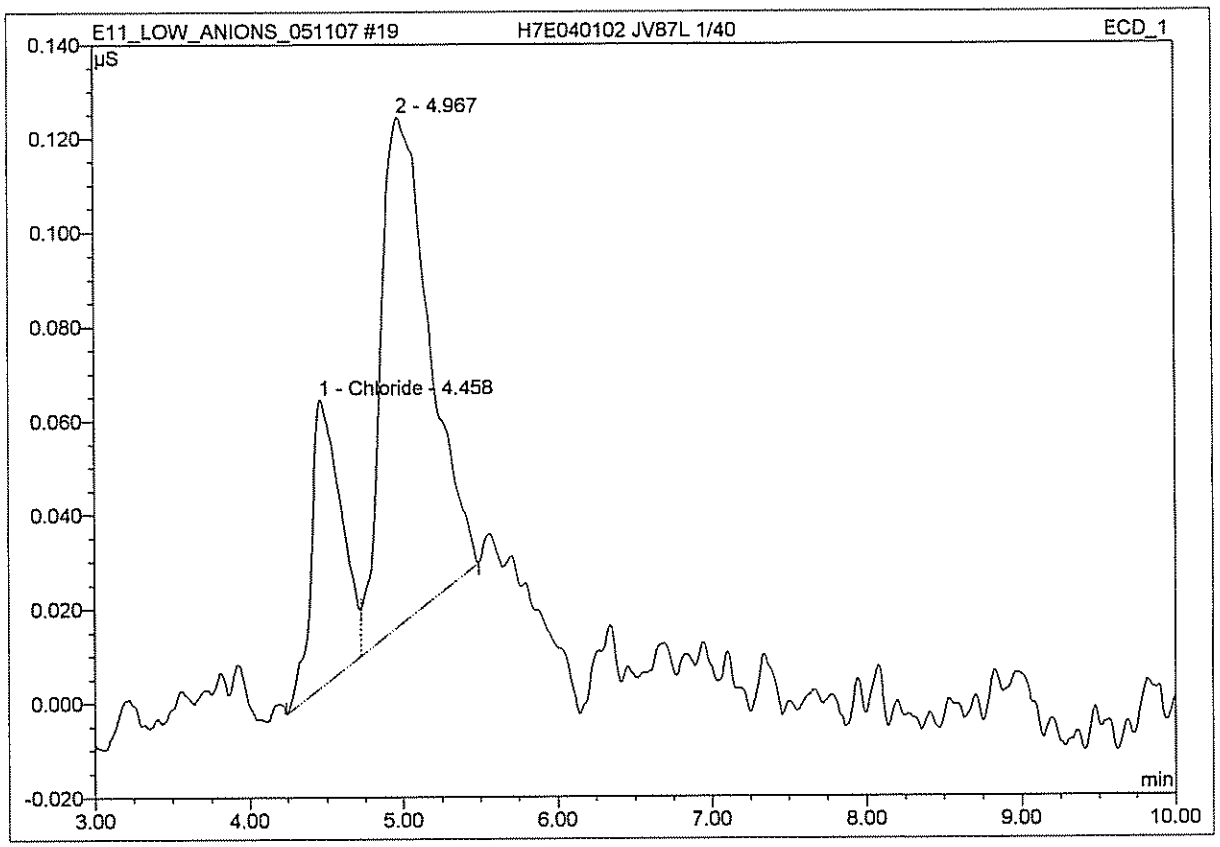
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
Total:			0.000	0.000	0.00	0.000	

ND

19 H7E040102 JV87L 1/40

QUAD

Sample Name:	**H7E040102 JV87L 1/40**	*Injection Volume:*	**50.0**
Vial Number:	**358**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**40.0000**
Recording Time:	**5/11/2007 12:45**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**

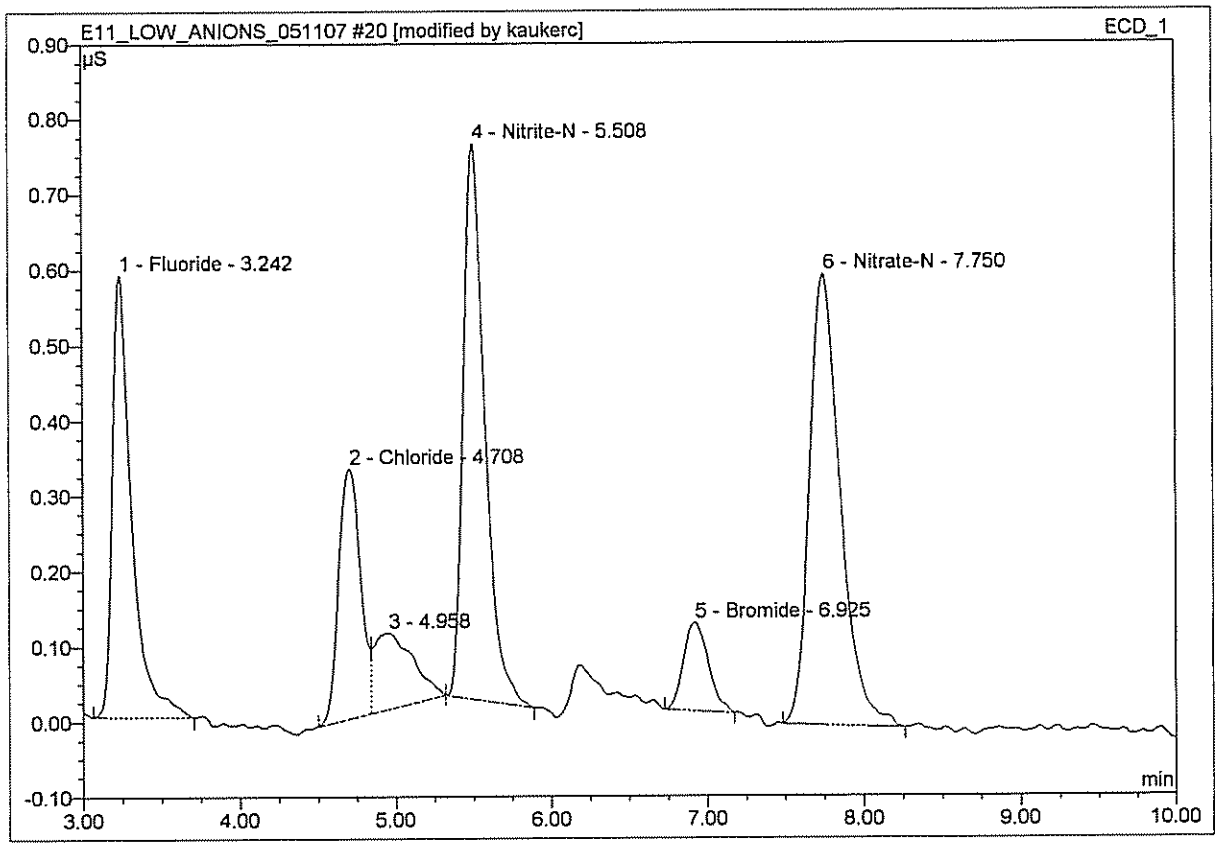


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	4.46	Chloride	0.061	0.014	0.04	1.2927	BM
2	4.97	n.a.	0.108	0.040	0.11	n.a.	MB
3	11.68	n.a.	107.880	34.874	99.85	n.a.	BMB
Total:			108.050	34.927	100.00	1.293	

20 H7E040102 JV87L MS 1/40 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87L MS 1/40 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**359**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**40.0000**
Recording Time:	**5/11/2007 13:02**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



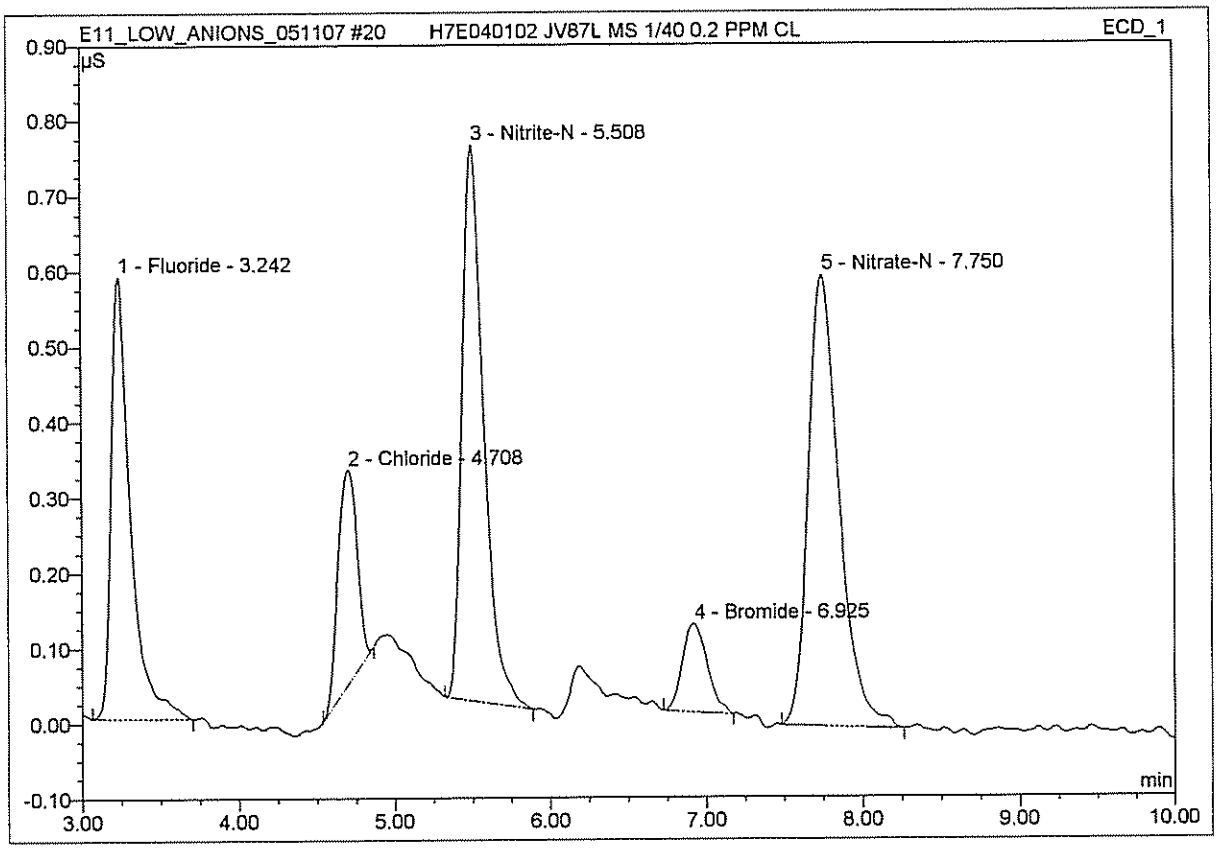
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.24	Fluoride	0.586	0.084	0.24	8.4451	BMB
2	4.71	Chloride	0.332	0.054	0.16	6.9852	BM *
3	4.96	n.a.	0.101	0.029	0.08	n.a.	Mb*
4	5.51	Nitrite-N	0.737	0.118	0.34	8.5601	bMB*
5	6.93	Bromide	0.117	0.022	0.06	8.0237	BMB
6	7.75	Nitrate-N	0.597	0.136	0.39	8.3143	BMB
7	11.68	n.a.	106.245	34.294	98.72	n.a.	BMB
Total:			108.716	34.738	100.00	40.328	

(B) AWK 5/11/07

20 H7E040102 JV87L MS 1/40 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87L MS 1/40 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**359**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**40.0000**
Recording Time:	**5/11/2007 13:02**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



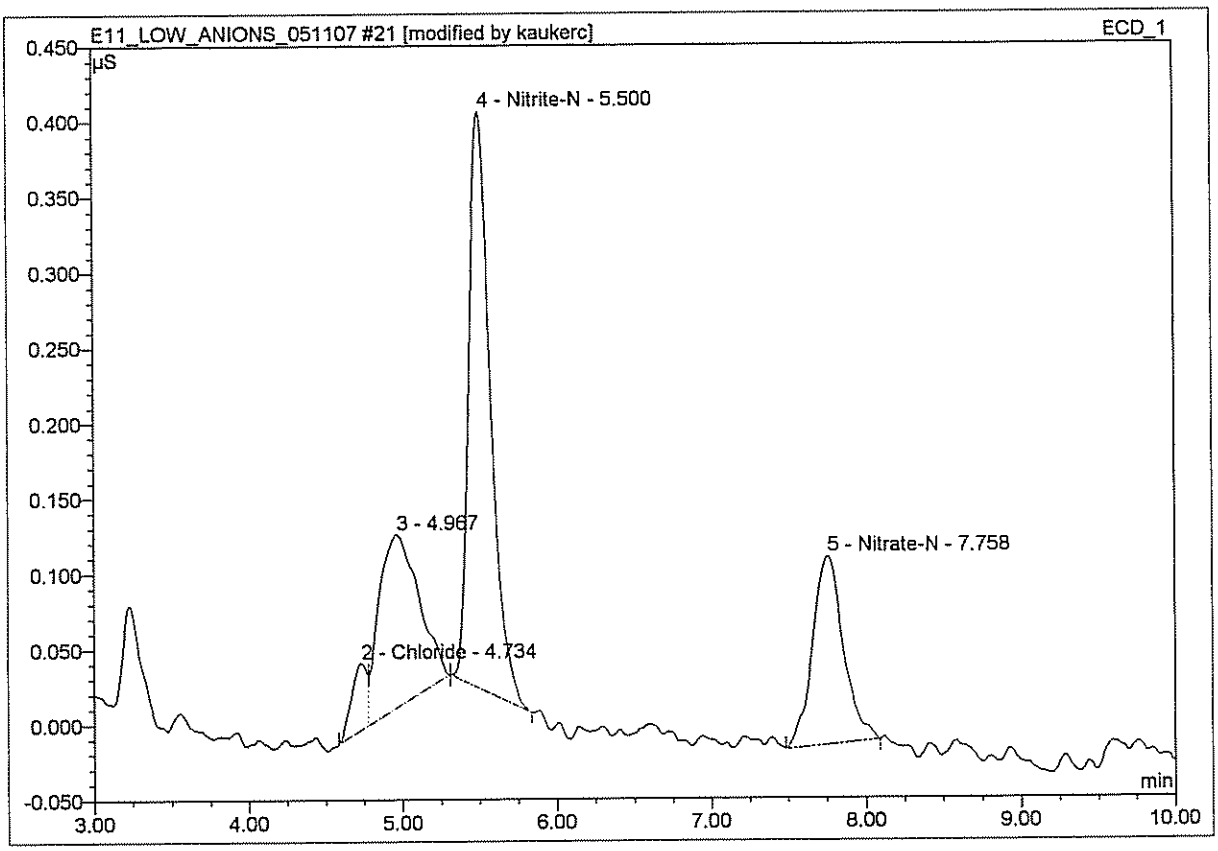
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.24	Fluoride	0.586	0.084	0.24	8.4451	BMB
2	4.71	Chloride	0.283	0.040	0.12	5.9506	BMB
3	5.51	Nitrite-N	0.737	0.118	0.34	8.5601	BMB
4	6.93	Bromide	0.117	0.022	0.06	8.0237	BMB
5	7.75	Nitrate-N	0.597	0.136	0.39	8.3143	BMB
6	11.68	n.a.	106.245	34.294	98.85	n.a.	BMB
Total:			108.565	34.695	100.00	39.294	

original

21 H7E040102 JV87H 1/20

QUAD

Sample Name:	**H7E040102 JV87H 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**360**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 13:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.23	n.a.	1.272	0.198	0.34	n.a.	BMB
2	4.73	Chloride	0.044	0.005	0.01	0.4646	BM *
3	4.97	n.a.	0.114	0.035	0.06	n.a.	Mb*
4	5.50	Nitrite-N	0.383	0.062	0.11	2.2318	bMB*
5	7.76	Nitrate-N	0.124	0.029	0.05	0.8746	BMB
6	11.74	n.a.	15.648	5.013	8.58	n.a.	BMB
7	21.43	n.a.	60.010	53.084	90.86	n.a.	BMB
Total:			77.596	58.426	100.00	3.571	

(No separation at 1/10 screening run)

(B) & (M)

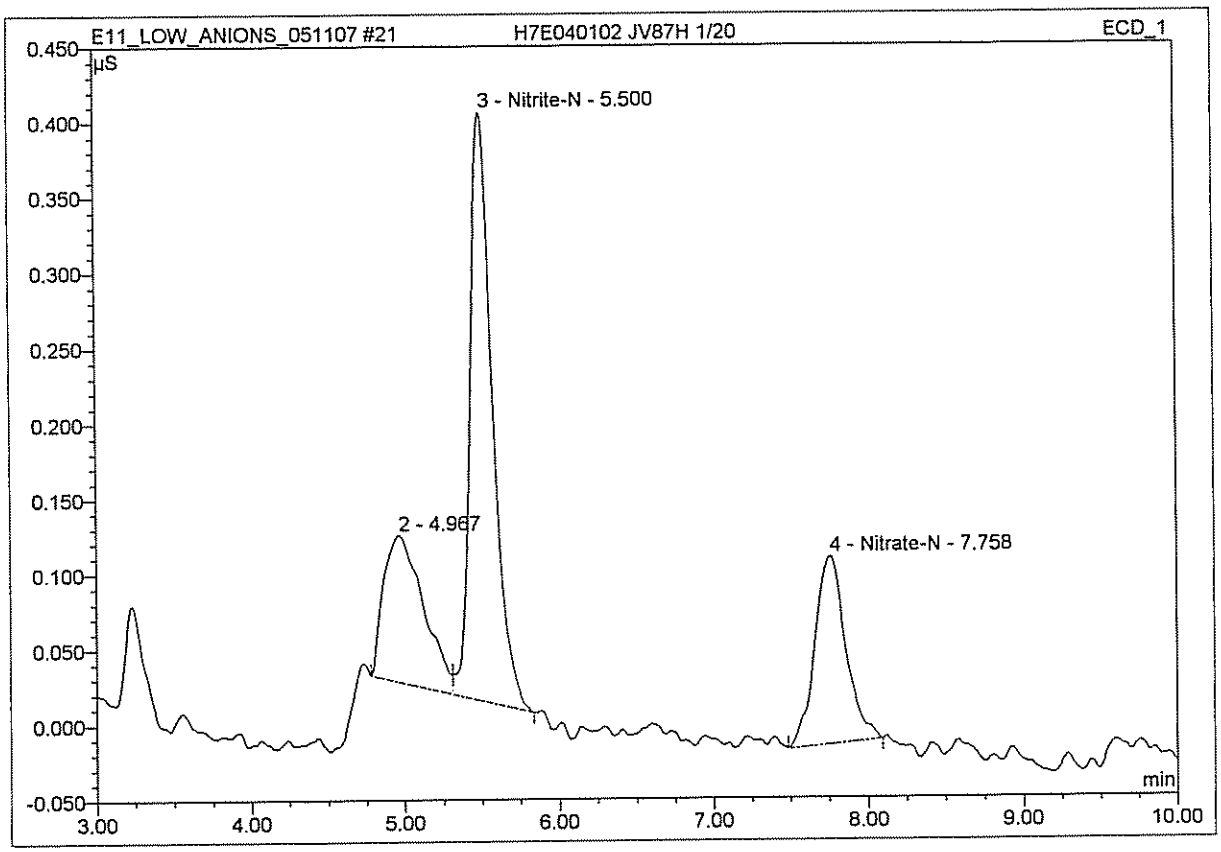
CWK 5/11/07

default_letter/Integration

21 H7E040102 JV87H 1/20

QUAD

Sample Name:	**H7E040102 JV87H 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**360**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 13:24**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



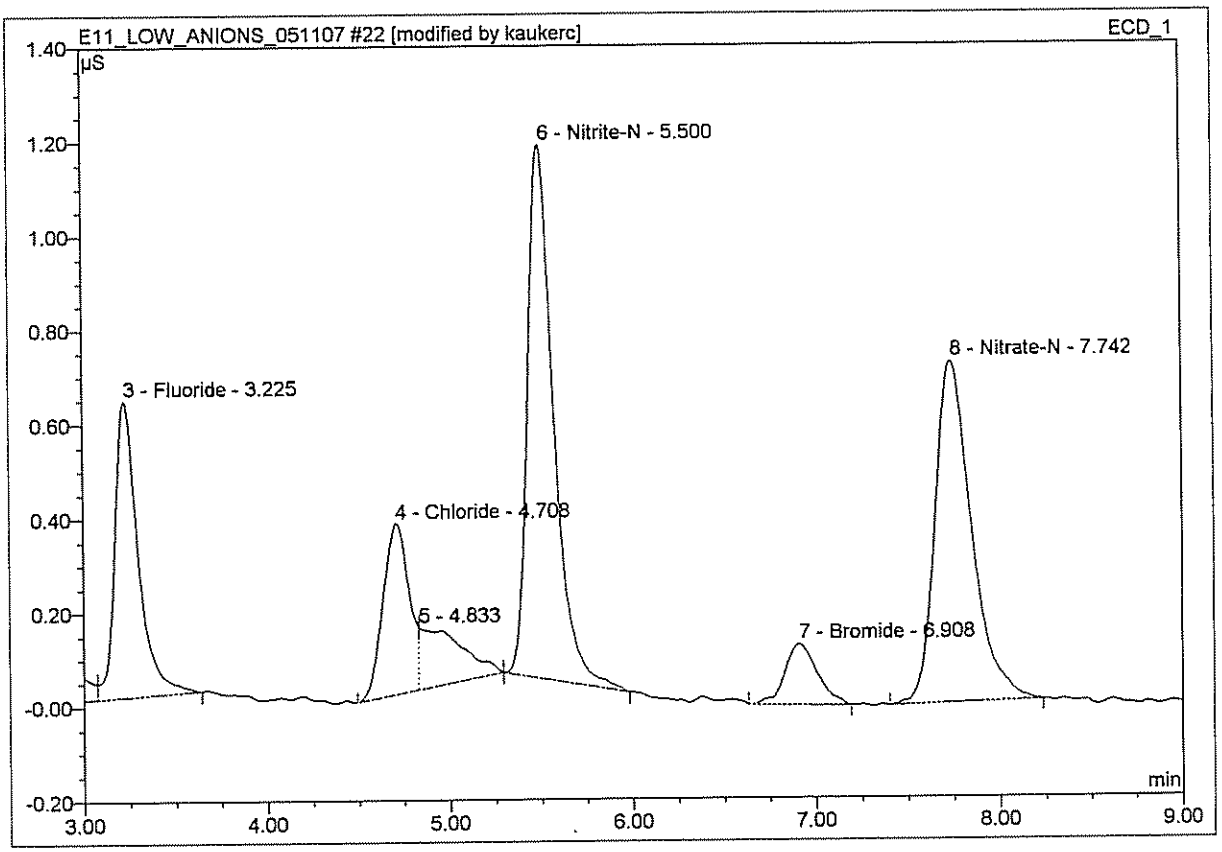
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.23	n.a.	1.272	0.198	0.34	n.a.	BMB
2	4.97	n.a.	0.097	0.029	0.05	n.a.	BM
3	5.50	Nitrite-N	0.391	0.065	0.11	2.2795	MB
4	7.76	Nitrate-N	0.124	0.029	0.05	0.8746	BMB
5	11.74	n.a.	15.648	5.013	8.58	n.a.	BMB
6	21.43	n.a.	60.010	53.084	90.87	n.a.	BMB
Total:			77.543	58.418	100.00	3.154	

original

22 H7E040102 JV87H MS 1/20 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87H MS 1/20 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**361**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 13:57**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.275	0.213	0.36	n.a.	BM
2	2.81	n.a.	0.119	0.022	0.04	n.a.	M
3	3.23	Fluoride	0.628	0.093	0.16	4.5220	MB
4	4.71	Chloride	0.363	0.061	0.10	3.8160	BM *
5	4.83	n.a.	0.132	0.033	0.06	n.a.	Mb*
6	5.50	Nitrite-N	1.133	0.187	0.32	6.5446	bMB
7	6.91	Bromide	0.130	0.027	0.05	4.4445	BMB
8	7.74	Nitrate-N	0.725	0.166	0.28	5.0308	BMB
9	11.74	n.a.	15.711	5.048	8.57	n.a.	BMB
10	21.43	n.a.	59.925	53.035	90.07	n.a.	BMB
Total:			80.142	58.885	100.00	24.358	

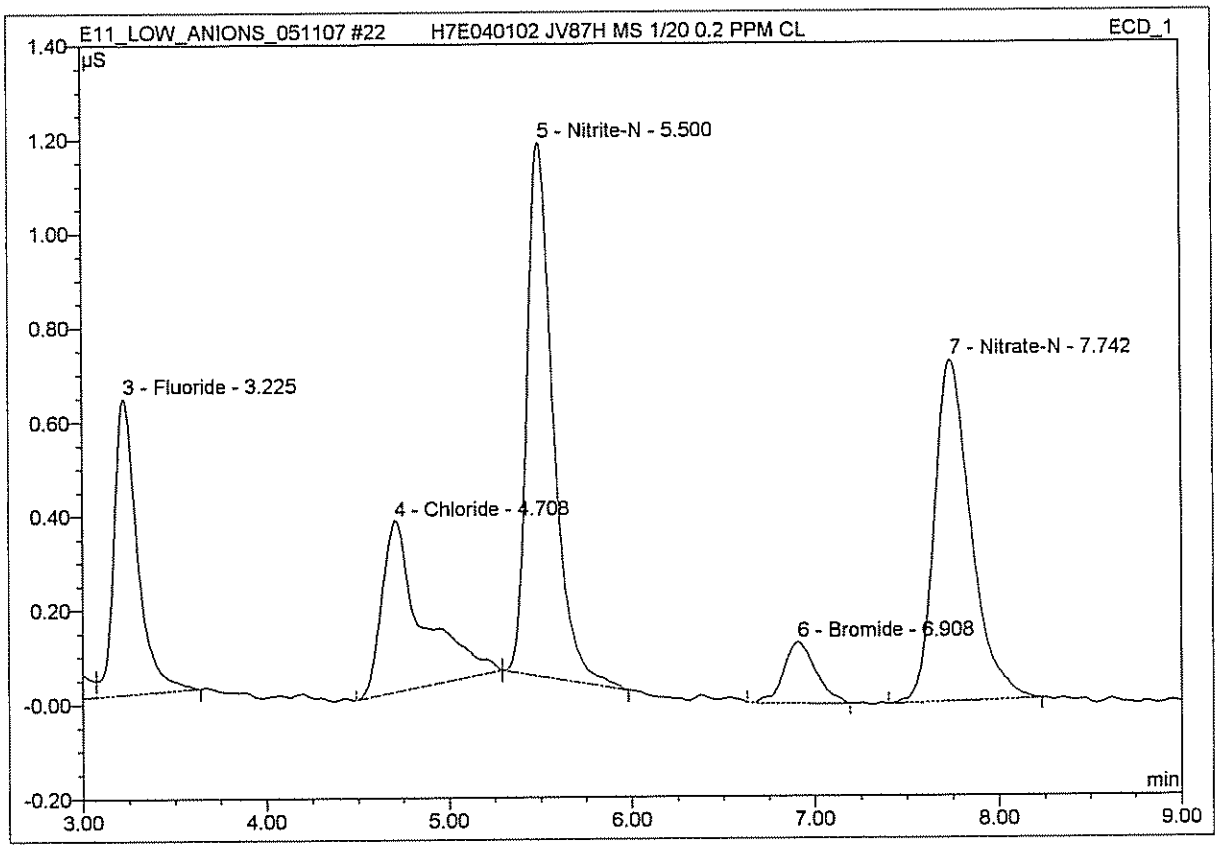
5 CWK 5-11-07

Chromeleon (c) Dionex 1996-2001
Version 6.50 SP10a Build 1065

22 H7E040102 JV87H MS 1/20 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87H MS 1/20 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**361**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 13:57**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



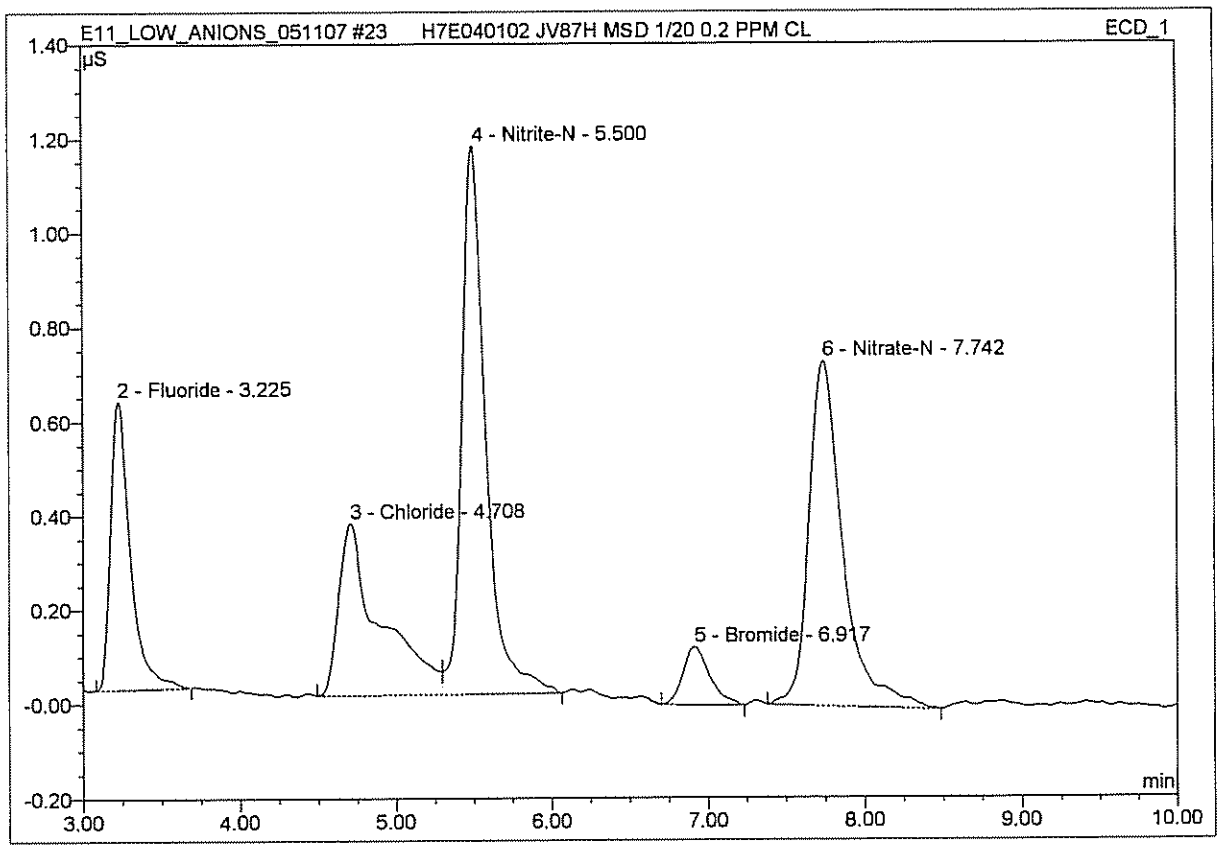
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.275	0.213	0.36	n.a.	BM
2	2.81	n.a.	0.119	0.022	0.04	n.a.	M
3	3.23	Fluoride	0.628	0.093	0.16	4.5220	MB
4	4.71	Chloride	0.363	0.094	0.16	3.8160	BMB
5	5.50	Nitrite-N	1.133	0.187	0.32	6.5446	bMB
6	6.91	Bromide	0.130	0.027	0.05	4.4445	BMB
7	7.74	Nitrate-N	0.725	0.166	0.28	5.0308	BMB
8	11.74	n.a.	15.711	5.048	8.57	n.a.	BMB
9	21.43	n.a.	59.925	53.035	90.07	n.a.	BMB
Total:			80.009	58.885	100.00	24.358	

original

23 H7E040102 JV87H MSD 1/20 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87H MSD 1/20 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**362**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 14:29**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**

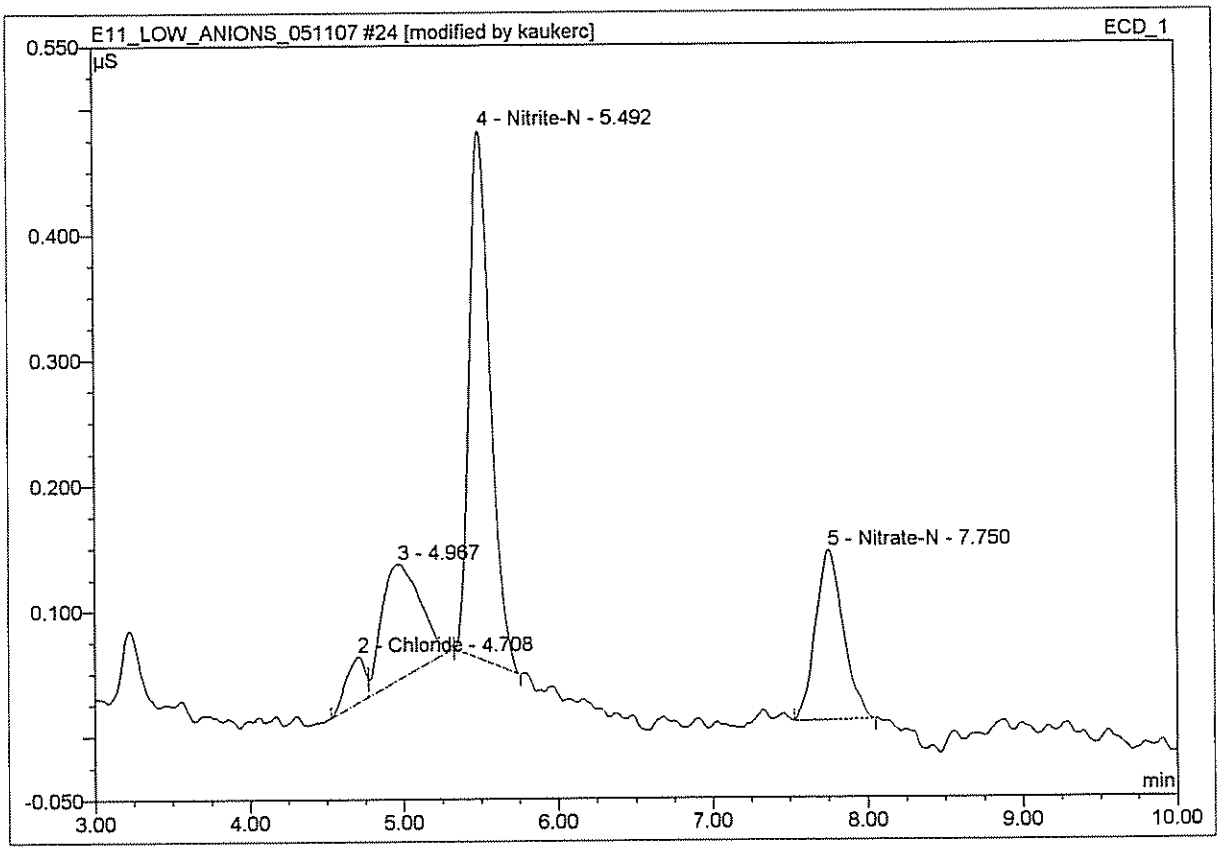


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.258	0.209	0.36	n.a.	BMB
2	3.23	Fluoride	0.611	0.089	0.15	4.3972	BMB
3	4.71	Chloride	0.365	0.112	0.19	3.8354	BM
4	5.50	Nitrite-N	1.162	0.206	0.35	6.7095	MB
5	6.92	Bromide	0.122	0.025	0.04	4.1855	BMB
6	7.74	Nitrate-N	0.732	0.183	0.31	5.0818	BMB
7	11.74	n.a.	15.427	4.978	8.44	n.a.	BMB
8	21.43	n.a.	60.019	53.194	90.17	n.a.	BMB
Total:			79.697	58.995	100.00	24.209	

24 H7E040102 JV87F 1/20

QUAD

Sample Name:	**H7E040102 JV87F 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**363**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 15:02**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.188	0.196	0.32	n.a.	BMB
2	4.71	Chloride	0.037	0.005	0.01	0.3872	BM *
3	4.97	n.a.	0.092	0.027	0.05	n.a.	Mb*
4	5.49	Nitrite-N	0.420	0.066	0.11	2.4496	bMB*
5	7.75	Nitrate-N	0.135	0.028	0.05	0.9500	BMB
6	11.73	n.a.	21.534	6.857	11.36	n.a.	BMB
7	21.43	n.a.	60.032	53.175	88.10	n.a.	BMB
Total:			83.439	60.355	100.00	3.787	

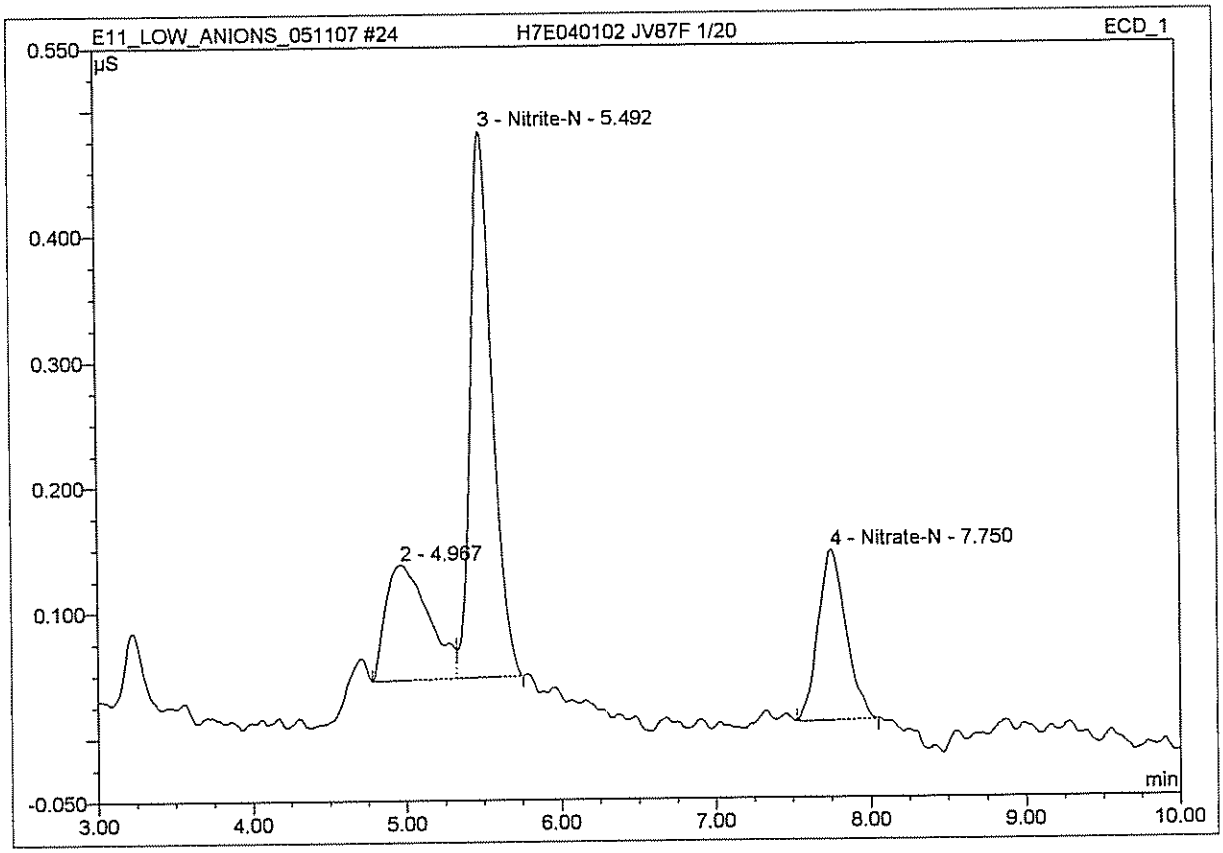
(No SEPARATION at 1/10 screening run)

(M & B CWK 5/14/07)

24 H7E040102 JV87F 1/20

QUAD

Sample Name:	**H7E040102 JV87F 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**363**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 15:02**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



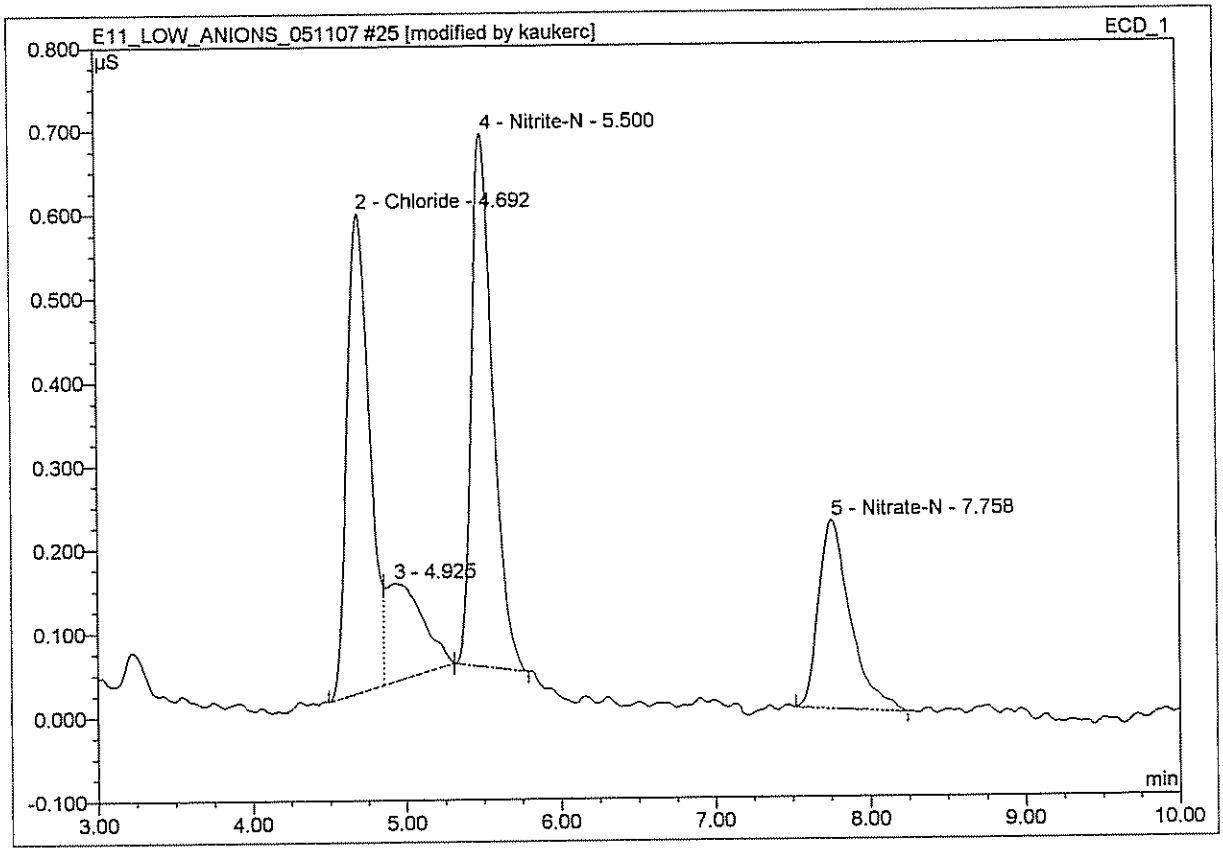
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.188	0.196	0.32	n.a.	BMB
2	4.97	n.a.	0.091	0.029	0.05	n.a.	BM
3	5.49	Nitrite-N	0.434	0.071	0.12	2.5296	MB
4	7.75	Nitrate-N	0.135	0.028	0.05	0.9500	BMB
5	11.73	n.a.	21.534	6.857	11.36	n.a.	BMB
6	21.43	n.a.	60.032	53.175	88.10	n.a.	BMB
Total:			83.415	60.356	100.00	3.480	

original

25 H7E040102 JV87K 1/20

QUAD

Sample Name:	**H7E040102 JV87K 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**364**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 15:34**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



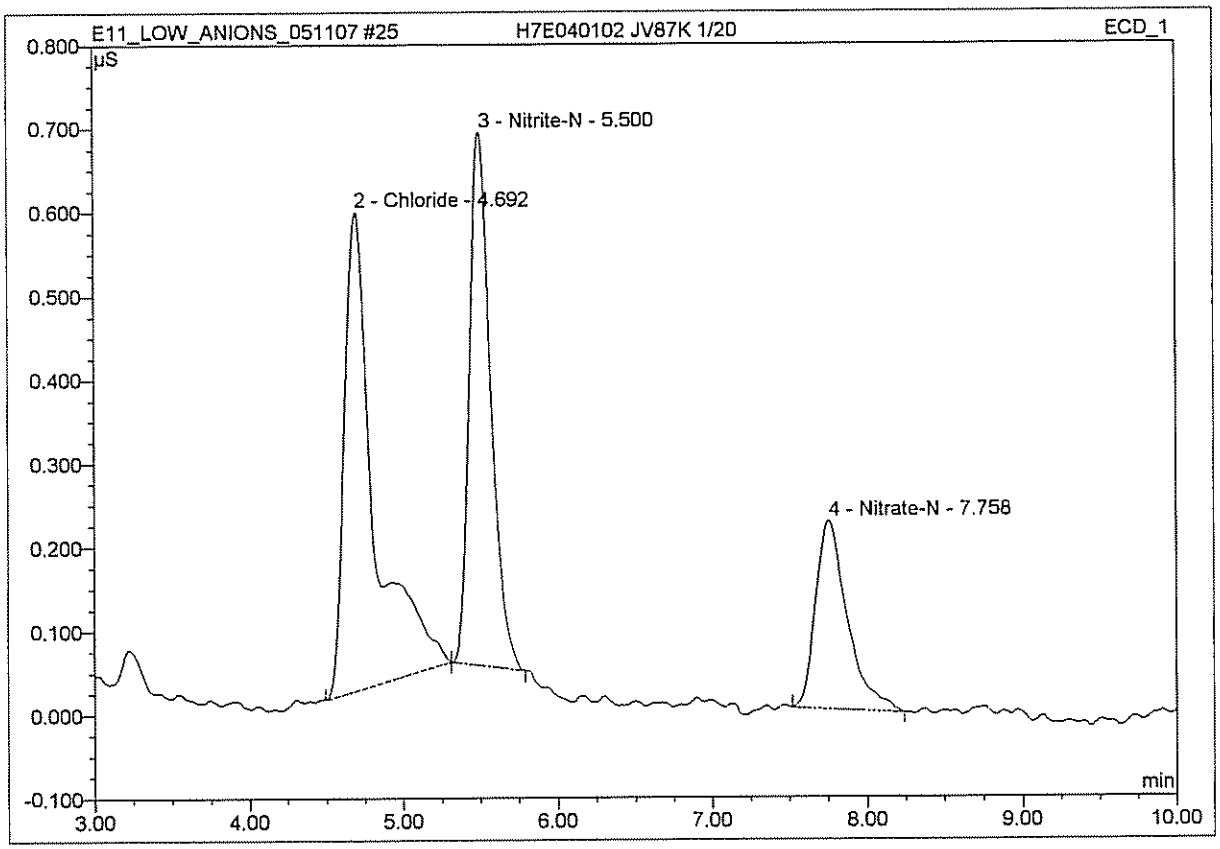
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.150	0.177	0.29	n.a.	BMB
2	4.69	Chloride	0.572	0.097	0.16	5.9875	BM *
3	4.93	n.a.	0.116	0.032	0.05	n.a.	Mb*
4	5.50	Nitrite-N	0.636	0.101	0.17	3.6954	bMB
5	7.76	Nitrate-N	0.224	0.053	0.09	1.5728	BMB
6	11.73	n.a.	24.190	7.716	12.62	n.a.	BMB
7	21.44	n.a.	59.923	52.974	86.63	n.a.	BMB
Total:			86.811	61.151	100.00	11.256	

(S) CWK 5/14/07

25 H7E040102 JV87K 1/20

QUAD

Sample Name:	**H7E040102 JV87K 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**364**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 15:34**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



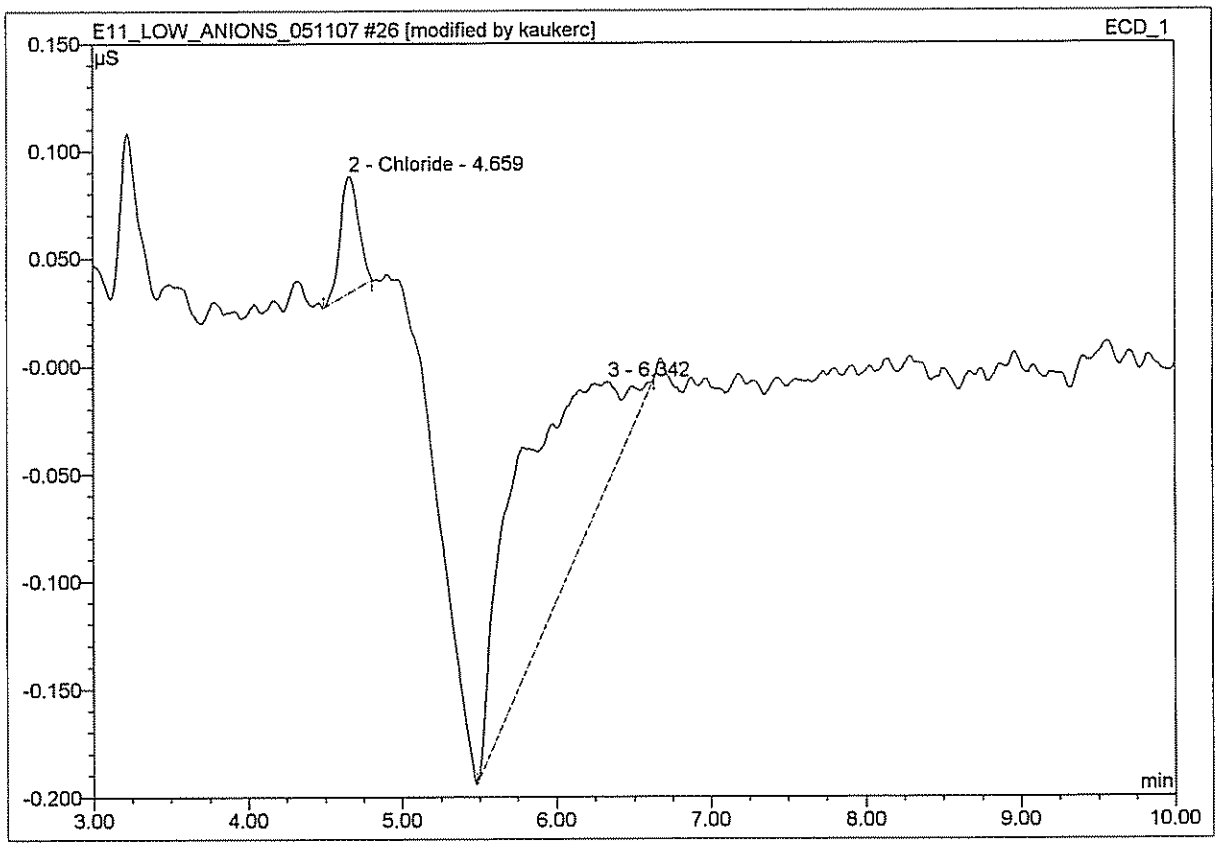
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.22	n.a.	1.150	0.177	0.29	n.a.	BMB
2	4.69	Chloride	0.572	0.129	0.21	5.9875	BMB
3	5.50	Nitrite-N	0.636	0.101	0.17	3.6954	bMB
4	7.76	Nitrate-N	0.224	0.053	0.09	1.5728	BMB
5	11.73	n.a.	24.190	7.716	12.62	n.a.	BMB
6	21.44	n.a.	59.923	52.974	86.63	n.a.	BMB
Total:			86.695	61.151	100.00	11.256	

original

26 H7E040102 JV87M 1/20

QUAD

Sample Name:	**H7E040102 JV87M 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**365**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 16:07**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



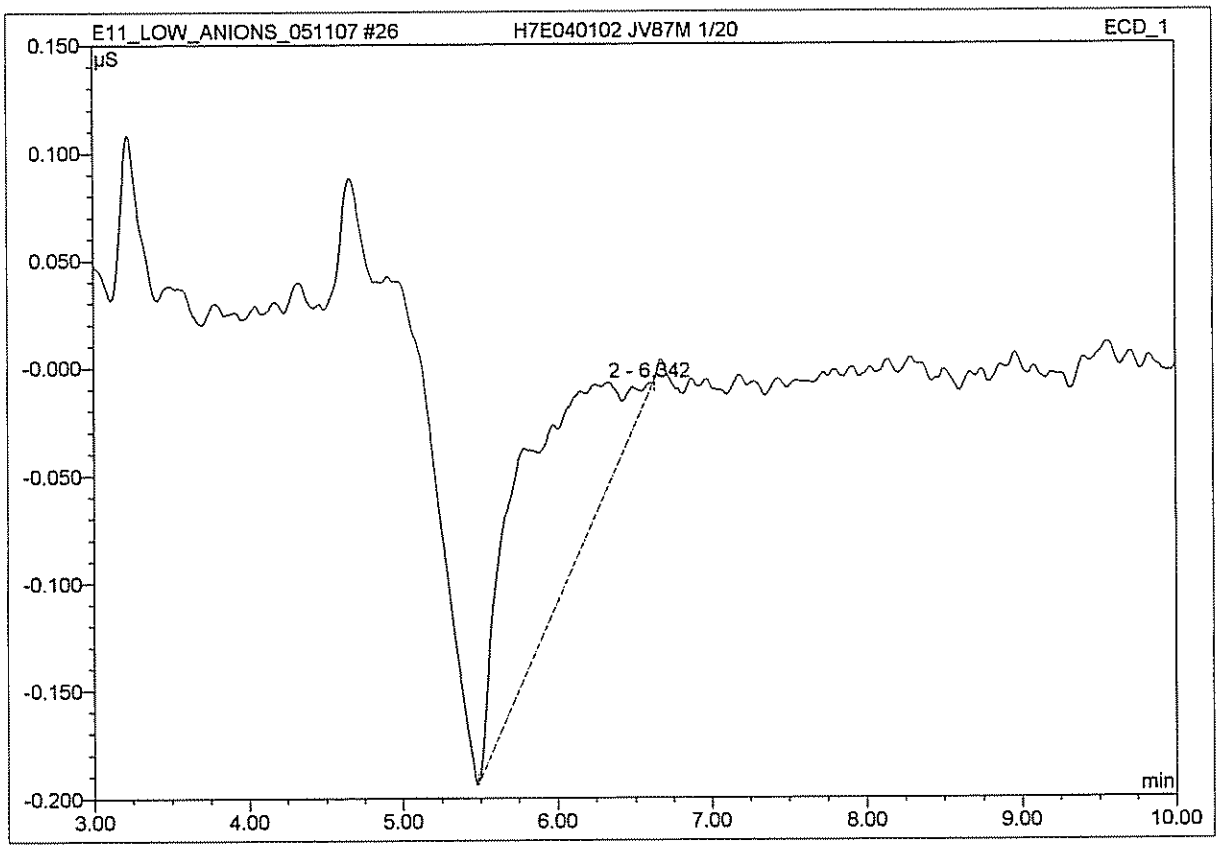
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.23	n.a.	1.279	0.221	0.41	n.a.	BMB
2	4.66	Chloride	0.054	0.007	0.01	0.5726	BMB*
3	6.34	n.a.	0.046	0.070	0.13	n.a.	BMB
4	11.73	n.a.	0.315	0.104	0.19	n.a.	BMB
5	21.44	n.a.	59.746	52.963	99.25	n.a.	BMB
Total:			61.441	53.366	100.00	0.573	

(M) CWK 5/14/07

26 H7E040102 JV87M 1/20

QUAD

Sample Name:	**H7E040102 JV87M 1/20**	*Injection Volume:*	**50.0**
Vial Number:	**365**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 16:07**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



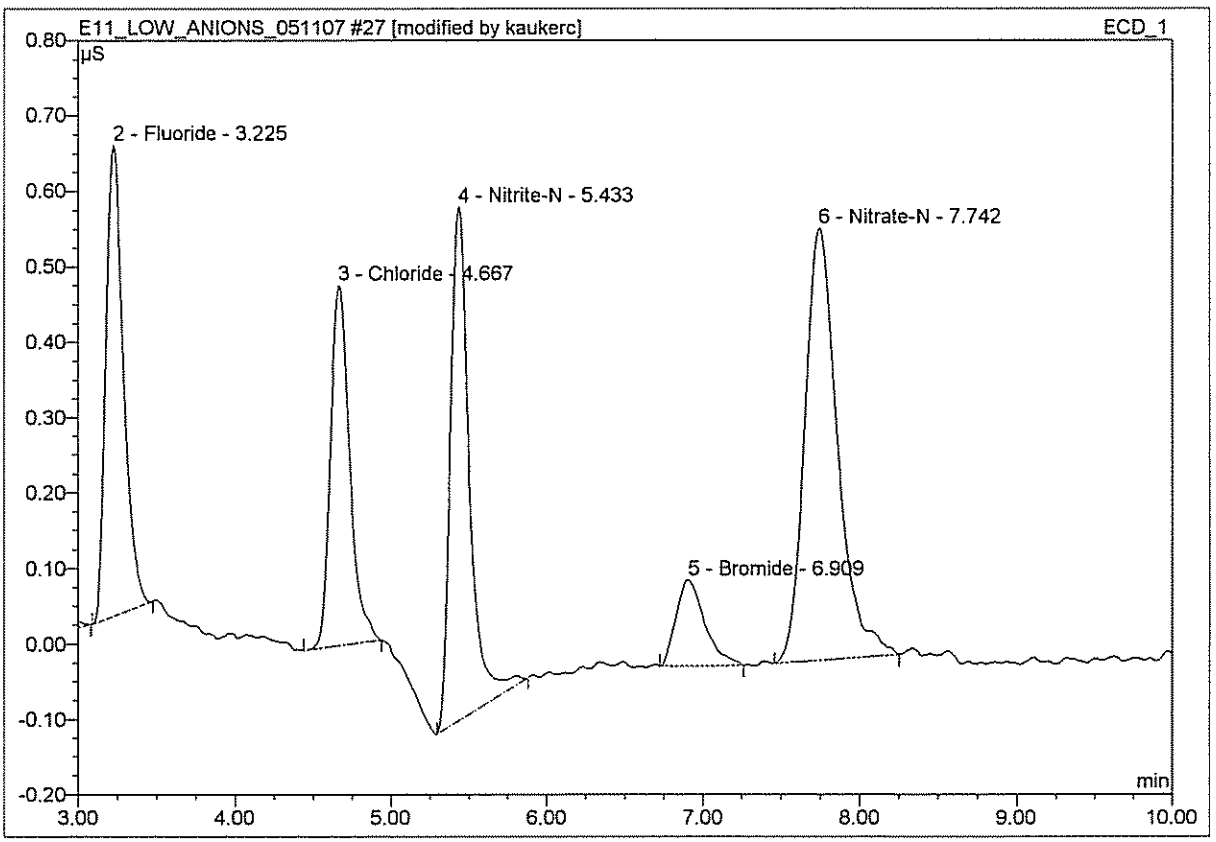
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.23	n.a.	1.279	0.221	0.41	n.a.	BMB
2	6.34	n.a.	0.046	0.070	0.13	n.a.	BMB
3	11.73	n.a.	0.315	0.104	0.19	n.a.	BMB
4	21.44	n.a.	59.746	52.963	99.26	n.a.	BMB
Total:			61.387	53.358	100.00	0.000	

original

27 H7E040102 JV87M MS 1/20 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87M MS 1/20 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**366**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 16:39**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



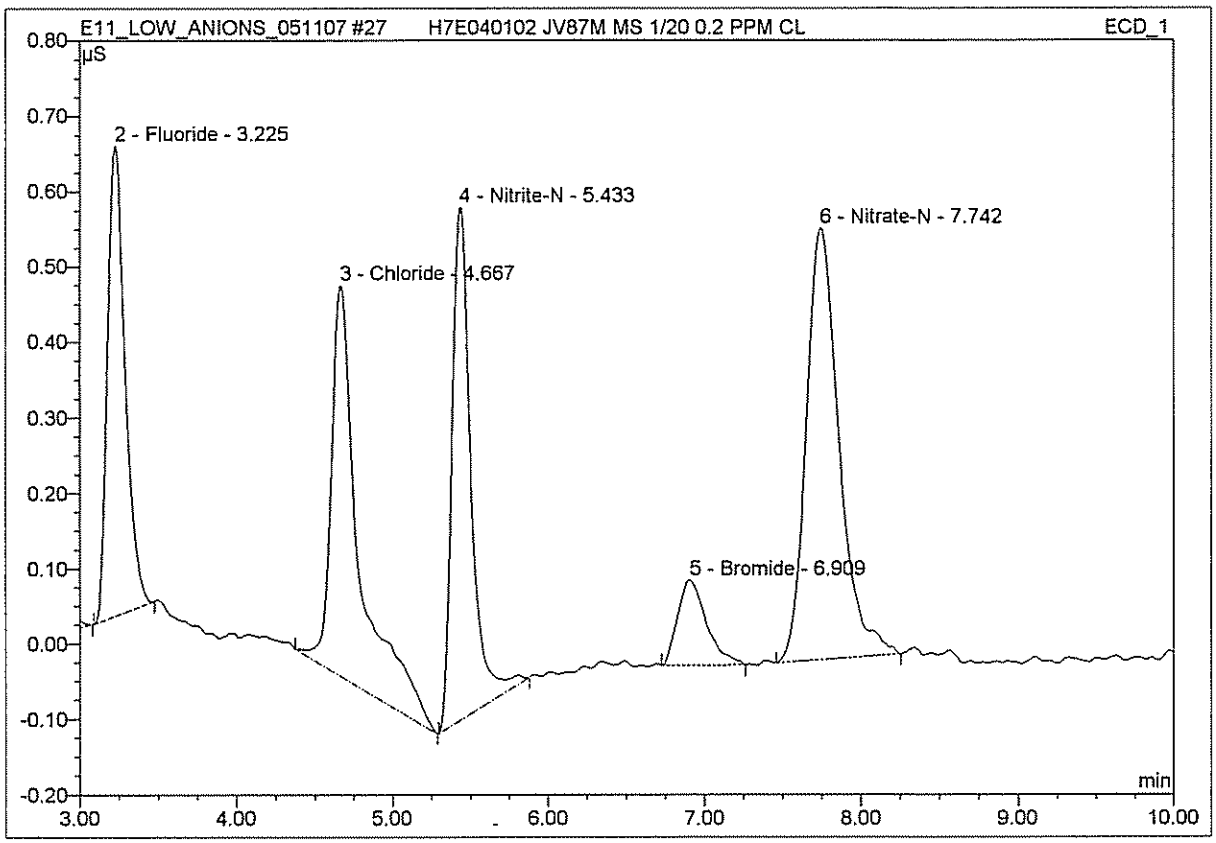
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.23	n.a.	1.294	0.235	0.43	n.a.	BMB
2	3.23	Fluoride	0.624	0.081	0.15	4.4915	BMB
3	4.67	Chloride	0.477	0.068	0.13	5.0084	BMB*
4	5.43	Nitrite-N	0.681	0.096	0.18	3.9589	BMB
5	6.91	Bromide	0.114	0.024	0.05	3.8980	BMB
6	7.74	Nitrate-N	0.573	0.139	0.26	3.9898	BMB
7	11.73	n.a.	0.333	0.112	0.21	n.a.	BMB
8	21.44	n.a.	59.890	53.174	98.60	n.a.	BMB
Total:			63.987	53.929	100.00	21.347	

(B) awk 5/14/07

27 H7E040102 JV87M MS 1/20 0.2 PPM CL

QUAD

Sample Name:	**H7E040102 JV87M MS 1/20 0.2 PPM CL**	*Injection Volume:*	**50.0**
Vial Number:	**366**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A_CI2**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**20.0000**
Recording Time:	**5/11/2007 16:39**	*Sample Weight:*	**1.0000**
Run Time (min):	**30.00**	*Sample Amount:*	**1.0000**



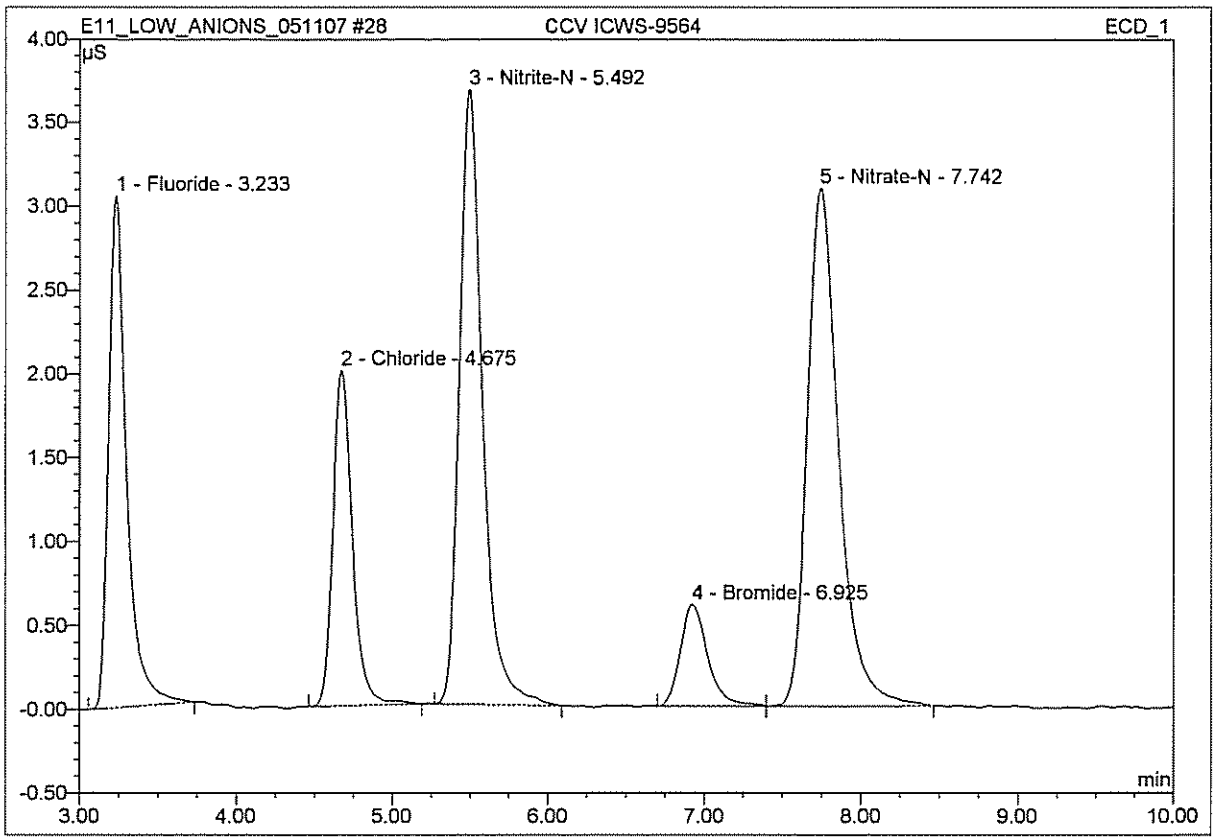
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	2.23	n.a.	1.294	0.235	0.43	n.a.	BMB
2	3.23	Fluoride	0.624	0.081	0.15	4.4915	BMB
3	4.67	Chloride	0.519	0.107	0.20	5.4359	BMB
4	5.43	Nitrite-N	0.681	0.096	0.18	3.9589	BMB
5	6.91	Bromide	0.114	0.024	0.05	3.8980	BMB
6	7.74	Nitrate-N	0.573	0.139	0.26	3.9898	BMB
7	11.73	n.a.	0.333	0.112	0.21	n.a.	BMB
8	21.44	n.a.	59.890	53.174	98.53	n.a.	BMB
Total:			64.028	53.968	100.00	21.774	

original

28 CCV ICWS-9564

QUAD

Sample Name:	**CCV ICWS-9564**	*Injection Volume:*	**50.0**
Vial Number:	**368**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/11/2007 17:11**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



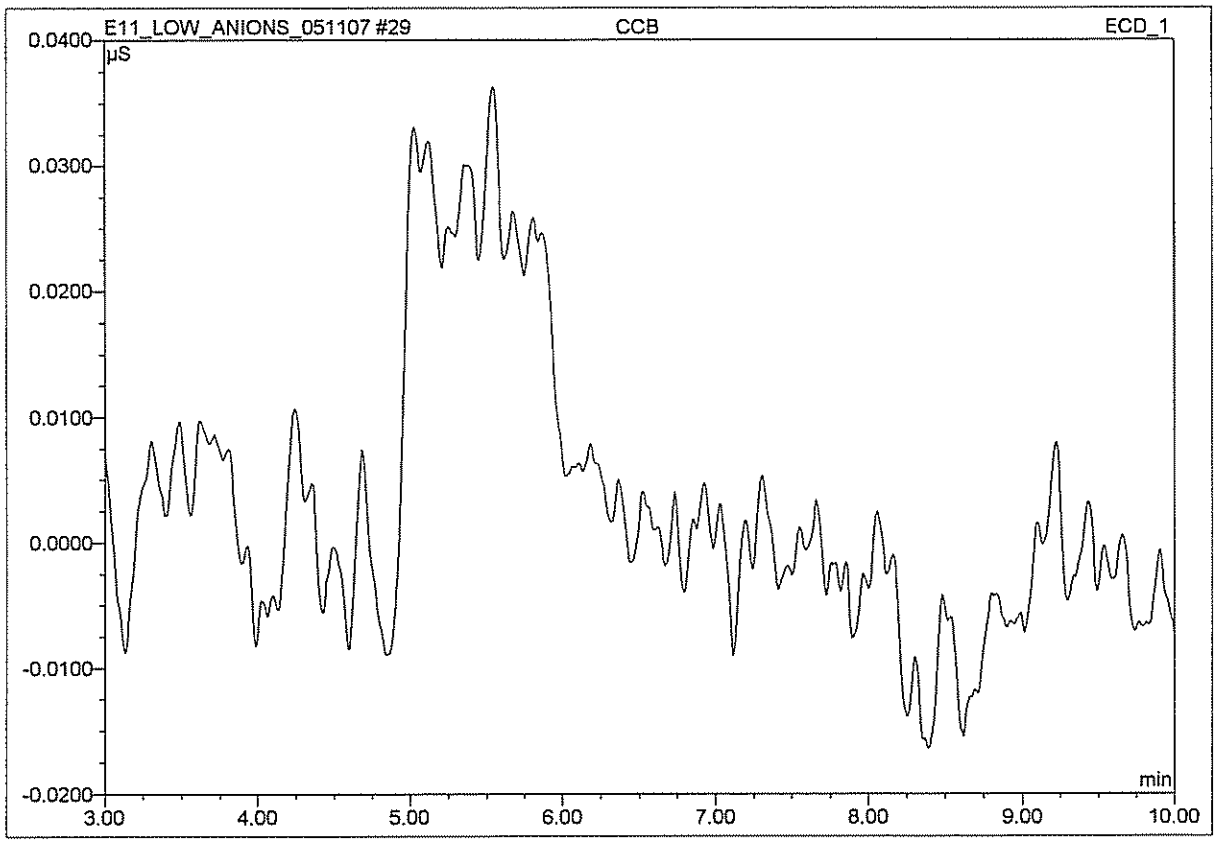
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
1	3.23	Fluoride	3.053	0.404	18.68	1.0440	BMB
2	4.68	Chloride	2.002	0.290	13.39	1.0223	BMB
3	5.49	Nitrite-N	3.668	0.631	29.14	1.0263	BMB
4	6.93	Bromide	0.607	0.124	5.71	1.0263	BMb
5	7.74	Nitrate-N	3.090	0.716	33.08	1.0269	bMB
Total:			12.420	2.165	100.00	5.146	

/ 102.2%

29 CCB

QUAD

Sample Name:	**CCB**	*Injection Volume:*	**50.0**
Vial Number:	**369**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**ANIONS_AS14A**	*Bandwidth:*	**n.a.**
Quantif. Method:	**ANIONS**	*Dilution Factor:*	**1.0000**
Recording Time:	**5/11/2007 17:29**	*Sample Weight:*	**1.0000**
Run Time (min):	**14.75**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount mg/L	Peak Type
Total:			0.000	0.000	0.00	0.000	

NP

STL Knoxville
Source Air Analysis Sample Information

Analyst	Date	Lot #	Work Order #	FH or BH	Impinger Volume (mL)	Impinger pH as received	Impinger pH after adjustment	Amount added to adjust pH
CWK	5/8/07	H7E040102	JV87E	FH	490ml	pH ≤2	—	—
			JV87G	FH	420ml	pH ≤2	—	—
			JV87J	FH	475ml	pH ≤2	—	—
			JV87L	FH (BIK)	195ml	pH ≤2	—	—
			JV87N	FH (DI BIK)	195ml	pH 7	—	—
			JV87F	BH	275ml	pH 9	—	—
			JV87H	BH	250ml	pH 9	—	—
			JV87K	BH	290ml	pH 9	—	—
			JV87M	BH (NaOH BIK)	200ml	pH 14	—	—

CWK
5/8/07

Comments: _____

WC076R0.doc, 5/12/04

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: May 1, 2007 Chemist: CWK Expiration Date: 6/30/07 (ICWI-9501)
8/15/07 (ICWI-9502)

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWI-9501	F-	17125	ERA	12/31/07	1,000ppm	10.0ml	100ml	100ppm
2. (Intermediate Cal. Source)	Cl-	36065		6/30/07				
3. (CCV)	NO2-N	17075		7/31/07				
4.	Br-	05017		1/31/09				
5.	NO3-N	17026		2/28/08				
6. ICWI-9502	F-	1-38F-2	SPEX	8/15/07				
7. (Intermediate 2nd source)	Cl-	1-45CL-2		1/30/08				
8. (LCS/LCSD)	NO2-N	1-13NO2N-2		9/15/07				
9.	Br-	1-55BR-2		4/15/08				
10.	NO3-N	1-51NO3N-2		3/30/08				
11.								
12.				CWK				
13.				5/1/07				
14.								

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 5/8/07 Chemist: CWK Expiration Date: 5/9/07

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9527	F-	ICWI -	9502	8/15/07	100 ppm	0.750 ml	100 ml	0.750 ppm
2. (ICV/LCS)	Cl-							
3.	NO2-N							
4.	Br-							
5.	NO3-N							
6. ICWS-9528	F-							
7. (ICV/LCSD)	Cl-							
8.	NO2-N							
9.	Br-							
10.	NO3-N							
11. ICWS-9529	F-	ICWI -	9501	6/30/07		1.00 ml		1.00 ppm
12. (CCV)	Cl-							
13.	NO2-N							
14.	Br-							
15.	NO3-N							

STL KNOXVILLE
PREPARATION OF FINAL WORKING STANDARD SOLUTIONS FROM VENDOR PREPARED STOCKS
WET CHEMISTRY

Date: 5/11/07 Chemist: CWK Expiration Date: 5/12/07

ID Number	Compound Name	Parent Lot Number	Parent Source	Parent Exp. Date	Parent Conc.	Aliquot Volume (ml)	Dilution Volume (ml)	Final Conc.
1. ICWS-9562	F-	ICWI-	9502	8/15/07	100ppm	0.750ml	100ml	0.750ppm
2. (ICV/LCS)	Cl-							
3.	NO2-N							
4.	Br-							
5.	NO3-N							
6. ICWS-9563	F-							
7. (ICV/LCSD)	Cl-							
8.	NO2-N							
9.	Br-							
10.	NO3-N							
11. ICWS-9564	F-	ICWI-	9501	6/30/07		1.00ml		1.00ppm
12. (CCV)	Cl-							
13.	NO2-N							
14.	Br-							
15.	NO3-N							

Sample Receipt Documentation

N7E040102

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 1 of 1	
Address:	Unit No.: Stack	Lab: Severn Trent Labs	
City: Hardin; State: MT; Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 1, 2, 3 and Blanks	Test Method: EPA Method 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Hydrogen Halides	Analysis: Halogens
Run1, Container 3	4/27/07	1155	0.1N H_2SO_4	1		X	
Run1, Container 4	4/27/07	1200	0.1N NaOH	1	Recd temp. Ambient		X
Run2, Container 3	4/27/07	1355	0.1N H_2SO_4	1	No Custody Seals	X	
Run2, Container 4	4/27/07	1400	0.1N NaOH	1	MFH 5-2-07		X
Run3, Container 3	4/27/07	1640	0.1N H_2SO_4	1	Fedex	X	
Run3, Container 4	4/27/07	1645	0.1N NaOH	1			X
Container 6	4/27/07	1450	0.1N H_2SO_4	1		X	
Container 7	4/27/07	1400	0.1N NaOH	1			X
ACID Container 8	4/27/07	1455	DI Water	1		X	X

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 6 Months

1. Recovered By: Billy J. Mullins, Jr.	Date: 4/27/07	Time: 1730	1. Relinquished By: Billy J. Mullins, Jr.	Date: 4/27/07	Time: 0815
2. Received By: Scott Jack	Date: 4/30/07	Time: 0900	2. Relinquished By: Scott Jack	Date: 4/30/07	Time: 0900
3. Received By: Matthew J. Normand	Date: 5-1-07	Time: 10:45	3. Relinquished By:	Date:	Time:

Comments: SHIP VIA FEDEX TO STLK 4/30/07

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: Air Sampling **Project:** _____ **Lot Number:** H7E040102

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	4h
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C) MPK 5-2-07	✓		✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?	✓			☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?			✓	If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC? MPK 5-2-07	✓	✓			

Quote #: 75154 PM Instructions: _____

Sample Receiving Associate: Matthew F Howard Date: 5-2-07

QA026R18.doc, 1/30/06

Appendix F:

EPA Test Methods 5, 17 (Particulate Matter), and ASTM D6784-02

(Ontario Hydro) Mercury Speciation Test Method Analytical Data

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 07-024

Date Analysis Completed: 5/11/07

Project Name: ADA-ES

Unit Tested: SDA Inlet Duct

Project Location: Hardin, MT

Ontario-Hydro Train

Run Number:	1	2	3
Particulate Matter on Filter (mg):	63.6 9,076.4	378.4 7,012.3	53.0 9,520.2
" " " Thimbles	85.9	1.3	1.2
Particulate Matter in Front Wash (mg):	3798	3038	1548
Total Particulate Matter in "Front-Half" – MF (mg):	12,925.9	10,422.0	11,114.4
Particulate Matter in "Back-Half" (mg):	—	—	—
Total Particulate Matter in Sample – MT (mg):	—	—	—

BCM 5/26/07

Severn Trent Laboratories
Analyst

Billy J. Mullins Date: 5/26/07
Data Checked By

Version No. 1 5/30/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method Ontario-Hydro
Thimbles
~~Stack Filters~~

Project No. 07-024
Project Name ADA-ES

Location Hardin, MT
Unit Tested SDA Inlet Duct

Desiccator Time In					
Desiccator Time Out					

Run No.	1	Filter No.	50	Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 11.7251
Initial Filter Weight (g) 2.6487
Total Particulate (mg) 9,076.4

Run No.	2	Filter No.	52	Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 9.8597
Initial Filter Weight (g) 2.8474
Total Particulate (mg) 7,012.3

Run No.	3	Filter No.	51	Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 12.3807
Initial Filter Weight (g) 2.8605
Total Particulate (mg) 9,520.2

Severn Trent Laboratories
Analyst

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method Ontario-Hydro

Stack Filters

Project No. 07-024
Project Name ADA-ES

Location Hardin, MT
Unit Tested SDA Inlet Duct

Desiccator Time In					
Desiccator Time Out					

Run No.	1	Filter No.	A-173	Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 0.4173
Initial Filter Weight (g) 0.3537
Total Particulate (mg) 63.6

Run No.	2	Filter No.	A-174	Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 0.7263
Initial Filter Weight (g) 0.3479
Total Particulate (mg) 378.4

Run No.	3	Filter No.	A-175	Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 0.4133
Initial Filter Weight (g) 0.3603
Total Particulate (mg) 53.0

Severn Trent Laboratories
Analyst

AIR SAMPLING ASSOCIATES, INC.

Filter Weight Log
EPA Method 5

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
A166	4/2/07 0800	0.3795 4/17/07 0810	0.3795 4/17/07 1423				0.3795
A167	4/2/07 0800	0.3752 4/17/07 0815	0.3751 4/17/07 1423	BM 4/17/07			0.3751
A168	4/2/07 0800	0.3880 4/17/07 0815	~~1423~~ 4/17/07 1422	0.3879			0.3879
A169	4/2/07 0800	0.3836 4/17/07 0815	0.3835 4/17/07 1422				0.3835
A170	4/2/07 0800	0.3849 4/17/07 0815	0.3848 4/17/07 1420				0.3848
A171	4/2/07 0800	0.3819 4/17/07 0816	0.3818 4/17/07 1420				0.3818
A172	4/2/07 0800	0.3762 4/17/07 0816	0.3762 4/17/07 1420				0.3762
A173	4/16/07 1500	0.3536 4/20/07 1511	0.3537 ✓ 4/20/07 2230				0.3537
A174	4/16/07 1500	0.3478 4/20/07 1512	0.3479 ✓ 4/20/07 2230				0.3479
A175	4/16/07 1500	0.3603 4/20/07 1513	0.3603 ✓ 4/20/07 2230				0.3603
A176	4/16/07 1500	0.3667 4/20/07 1514	0.3668 ✓ 4/20/07 2230				0.3668
A177	4/16/07 1500	0.3803 4/20/07 1515	0.3806 ✓ 4/20/07 2230				0.3806
A178	4/16/07 1500	0.3820 4/20/07 1516	0.3820 ✓ 4/20/07 2230				0.3820

BM

AIR SAMPLING ASSOCIATES, INC.

Thimble Tare Weight Log
EPA Method 17

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
45		2.7941	2.7944				2.7944
	9/29/06	10/2/06	10/3/06				
	1200	1635	1100				
46		2.7987	2.7990				2.7990
		10/2/06	10/3/06				
		1636	1101				
47		2.5514	2.5514				2.5514
		10/2/06	10/3/06				
		1637	1102				
48		2.7781	2.7785				2.7785
		10/2/06	10/3/06				
		1638	1103				
49		2.7795	2.7799				2.7799
		10/2/06	10/3/06				
		1639	1104				
50		2.6485	2.6487				2.6487
		10/2/06	10/3/06				
		1640	1105				
51		2.8600	2.8605				2.8605
		10/2/06	10/3/06				
		1641	1106				
52		2.8470	2.8474				2.8474
		10/2/06	10/3/06				
		1642	1107				
53		2.7349	2.7352				2.7352
		10/2/06	10/3/06				
		1643	1108				
54		3.5794	3.5795				3.5795
	11/20/06	11/21/06	11/22/06				
	1360	1350	0745				
55		2.8785	2.8788				2.8788
		11/21/06	11/22/06				
		1351	0746				
56		2.4725	2.4724				2.4724
		11/21/06	11/22/06				
		1352	0747				
57		2.9916	2.9911				2.9911
		11/21/06	11/22/06				
		1353	0748				
58		3.4660	3.4656				3.4656
		11/21/06	11/22/06				
		1354	0749				
59		3.1165	3.1160				3.1160
		11/21/06	11/22/06				
		1355	0750				

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 07-024

Date Analysis Completed: 5/11/07

Project Name: ADA-ES

Unit Tested: Stack

Project Location: Hardin, MT

Ontario-Hydro Train

Run Number:	1	2	3
Particulate Matter on Filter (mg):	18.8	19.5	18.9
Particulate Matter in Front Wash (mg):	24.8	13.6	54.3
Total Particulate Matter in "Front-Half" – MF (mg):	43.6	33.1	73.2
Particulate Matter in "Back-Half" (mg):	—	—	—
Total Particulate Matter in Sample – MT (mg):	—	—	—

Severn Trent Laboratories
Analyst

Billy J. Mullins **Date:** 5/26/07
Data Checked By

Version No. 1 5/30/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method Ontario-Hydro

Stack Filters

Project No. 07-024
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In					
Desiccator Time Out					

Run No.	1	Filter No.	A-176	Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 0.3856
Initial Filter Weight (g) 0.3668
Total Particulate (mg) 18.8

Run No.	2	Filter No.	A-177	Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 0.4001
Initial Filter Weight (g) 0.3806
Total Particulate (mg) 19.5

Run No.	3	Filter No.	A-178	Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) 0.4009
Initial Filter Weight (g) 0.3820
Total Particulate (mg) 18.9

Severn Trent Laboratories
Analyst

Return to Navigator

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STL

STL Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921

Tel: 865 291 3000 Fax: 865 584 4315
www.stl-inc.com

ANALYTICAL REPORT

PROJECT NO. 07-024

Hardin Montana - April 2007

Lot #: H7E040218

Bill Hefley

Air Sampling Associates, Inc.
407-2 B Holfords's Prairie Roa
Lewisville, TX 75056

SEVERN TRENT LABORATORIES, INC.

Terry Wasmund
Project Manager

May 21, 2007

ANALYTICAL METHODS SUMMARY

H7E040218

PARAMETER	ANALYTICAL METHOD
Mercury (Ontario Hydro)	ASTM D6784-02
Particulate Emissions	CFR60A 5

References:

ASTM Annual Book Of ASTM Standards.

CFR60A "Test Methods", 40 CFR, Part 60, Appendix A, July 1, 1993.

SAMPLE SUMMARY

H7E040218

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
JWAEW	001	HARDIN STACK RUN 1 FILTER A176	04/26/07	14:05
JWAFF	002	HARDIN STACK RUN 1 ACETONE	04/26/07	16:01
JWAFK	003	HARDIN STACK RUN 1 FH	04/26/07	16:01
JWAFR	004	HARDIN STACK RUN 1 KCL	04/26/07	13:50
JWAFW	005	HARDIN STACK RUN 1 HNO3/H2O2	04/26/07	13:32
JWAFX	006	HARDIN STACK RUN 1 KMNO4/H2SO4	04/26/07	13:43
JWAF5	007	HARDIN STACK RUN 2 FILTER A177	04/26/07	19:49
JWAGJ	008	HARDIN STACK RUN 2 ACETONE	04/26/07	19:57
JWAGK	009	HARDIN STACK RUN 2 FH	04/26/07	19:59
JWAGN	010	HARDIN STACK RUN 2 KCL	04/26/07	19:51
JWAGP	011	HARDIN STACK RUN 2 HNO3/H2O2	04/26/07	17:23
JWAGR	012	HARDIN STACK RUN 2 KMNO4/H2SO4	04/26/07	17:32
JWAG8	013	HARDIN STACK RUN 3 FILTER A178	04/26/07	22:11
JWAHC	014	HARDIN STACK RUN 3 ACETONE	04/26/07	22:13
JWAHE	015	HARDIN STACK RUN 3 FH	04/26/07	22:12
JWAHH	016	HARDIN STACK RUN 3 KCL	04/26/07	22:13
JWAHL	017	HARDIN STACK RUN 3 HNO3/H2O2	04/26/07	21:51
JWAHM	018	HARDIN STACK RUN 3 KMNO4/H2SO4	04/26/07	21:59
JWAH3	019	HARDIN SDA INLET DUCT RUN 1 FILTER (THIMBLE 50)	04/26/07	15:25
JWAH5	020	HARDIN SDA INLET DUCT RUN 1 FILTER (A173)	04/26/07	15:24
JWAH6	021	HARDIN SDA INLET DUCT RUN 1 ACETONE	04/26/07	15:52
JWAH7	022	HARDIN SDA INLET DUCT RUN 1 FH	04/26/07	15:54
JWAJA	023	HARDIN SDA INLET DUCT RUN 1 KCL	04/26/07	14:48
JWAJH	024	HARDIN SDA INLET DUCT RUN 1 HNO3/H2O2	04/26/07	14:32
JWAJR	025	HARDIN SDA INLET DUCT RUN 1 KMNO4,H2SO4	04/26/07	14:41
JWAJV	026	HARDIN SDA INLET DUCT RUN 2 FILTER (THIMBLE 52)	04/26/07	19:36
JWAJ5	027	HARDIN SDA INLET DUCT RUN 2 FILTER (A174)	04/26/07	19:18
JWAJ9	028	HARDIN SDA INLET DUCT RUN 2 ACETONE	04/26/07	19:44
JWAKF	029	HARDIN SDA INLET DUCT RUN 2 FH	04/26/07	19:46
JWAKG	030	HARDIN SDA INLET DUCT RUN 2 KCL	04/26/07	19:08
JWAKK	031	HARDIN SDA INLET DUCT RUN 2 HNO3/H2O2	04/26/07	18:43
JWAK0	032	HARDIN SDA INLET DUCT RUN 2 KMNO4/H2SO4	04/26/07	18:29
JWAK9	033	HARDIN SDA INLET DUCT RUN 3 FILTER (THIMBLE 51)	04/26/07	21:33
JWALL	034	HARDIN SDA INLET DUCT RUN 3 FILTER (A175)	04/26/07	21:29
JWALV	035	HARDIN SDA INLET DUCT RUN 3 ACETONE	04/26/07	21:47
JWAL3	036	HARDIN SDA INLET DUCT RUN 3 FH	04/26/07	21:50

(Continued on next page)

SAMPLE SUMMARY

H7E040218

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
JWAMG	037	HARDIN SDA INLET DUCT RUN 3 KCL	04/26/07	21:22
JWAMK	038	HARDIN SDA INLET DUCT RUN 3 HNO3/H2O2	04/26/07	21:06
JWAMP	039	HARDIN SDA INLET DUCT RUN 3 KMNO4/H2SO4	04/26/07	21:11
JWAM2	040	HARDIN SDA INLET+STACK RB 0.1N HNO3	04/26/07	22:17
JWAM8	041	HARDIN SDA INLET+STACK RB 1N KCL	04/26/07	17:43
JWAND	042	HARDIN SDA INLET+STACK RB HNO3/H2O2	04/26/07	17:46
JWANG	043	HARDIN SDA INLET+STACK RB KMNO4/H2SO4/HYDR	04/26/07	17:48
JWAPF	044	HARDIN SDA INLET+STACK RB QUARTZ FILTER	04/26/07	20:16
JWAPP	045	HARDIN SDA INLET+STACK RB THIMBLE 1	04/26/07	20:16

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

QC DATA ASSOCIATION SUMMARY

H7E040218

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	AIR	CFR60A 5		7130097	
002	AIR	CFR60A 5		7130097	
003	AIR	ASTM D6784-02		7134095	
004	AIR	ASTM D6784-02		7127427	7127247
005	AIR	ASTM D6784-02		7127421	7127246
006	AIR	ASTM D6784-02		7127428	7127248
007	AIR	CFR60A 5		7130097	
008	AIR	CFR60A 5		7130097	
009	AIR	ASTM D6784-02		7134095	
010	AIR	ASTM D6784-02		7127427	
011	AIR	ASTM D6784-02		7127421	
012	AIR	ASTM D6784-02		7127428	
013	AIR	CFR60A 5		7130097	
014	AIR	CFR60A 5		7130097	
015	AIR	ASTM D6784-02		7134095	
016	AIR	ASTM D6784-02		7127427	
017	AIR	ASTM D6784-02		7127421	
018	AIR	ASTM D6784-02		7127428	
019	AIR	CFR60A 5		7130097	
020	AIR	CFR60A 5		7130097	
021	AIR	CFR60A 5		7130097	

(Continued on next page)

QC DATA ASSOCIATION SUMMARY

H7E040218

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
022	AIR	ASTM D6784-02		7134095	
023	AIR	ASTM D6784-02		7127427	
024	AIR	ASTM D6784-02		7127421	
025	AIR	ASTM D6784-02		7127428	
026	AIR	CFR60A 5		7130097	
027	AIR	CFR60A 5		7130097	
028	AIR	CFR60A 5		7130097	
029	AIR	ASTM D6784-02		7134095	
030	AIR	ASTM D6784-02		7127427	
031	AIR	ASTM D6784-02		7127421	
032	AIR	ASTM D6784-02		7127428	
033	AIR	CFR60A 5		7130097	
034	AIR	CFR60A 5		7130097	
035	AIR	CFR60A 5		7130097	
036	AIR	ASTM D6784-02		7134095	
037	AIR	ASTM D6784-02		7127427	
038	AIR	ASTM D6784-02		7127421	
039	AIR	ASTM D6784-02		7127428	
040	AIR	ASTM D6784-02		7134095	
041	AIR	ASTM D6784-02		7127427	
042	AIR	ASTM D6784-02		7127421	

(Continued on next page)

QC DATA ASSOCIATION SUMMARY

H7E040218

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
043	AIR	ASTM D6784-02		7127428	
044	AIR	ASTM D6784-02		7134095	
045	AIR	ASTM D6784-02		7134095	

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The results reported herein are applicable to the samples submitted for analysis only.

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The original chain of custody documentation is included with this report.

Sample Receipt

Custody seals were not present upon sample receipt at STL Knoxville.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Metals

These stack gas samples were prepared and analyzed using STL Knoxville standard operating procedure KNOX-IP-0006 which is based on ASTM Method D6784-02, "Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)" with modifications from EPA Method 29. SW-846 Method 7470A, as incorporated in STL Knoxville standard operating procedure KNOX-MT-0009, was used to perform the final instrument analysis.

These front half samples were digested using a modified procedure of the Ontario Hydro SOP (KNOX-IP-0006). Samples (JWAH7) HARDIN SDA INLET DUCT RUN 1 FH, (JWAKF) HARDIN SDA INLET DUCT RUN 2 FH and (JWAL3) HARDIN INLET DUCT RUN 3 FH were received with a thimble, filter, 0.1N nitric acid probe rinse and an acetone rinse. Samples (JWAFK) HARDIN STACK RUN 1 FH, (JWAGK) HARDIN STACK RUN 2 FH and (JWAHE) HARDIN STACK RUN 3 FH were received with a filter, 0.1N nitric acid probe rinse and an acetone rinse.(JWAM2) HARDIN SDA INLET+STACK RB 0.1N HN03 is a reagent blank. (JWAPF) HARDIN SDA INLET+STACK RB QUARTZ FILTER and (JWAPP) HARDIN SDA INLET+STACK RB THIMBLE 1 are reagent blanks. A particulate

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analysis was performed prior to the metals preparation. Some of the samples had large quantities of particulate matter. Instead of taking portions of the particulate and probe rinses to digest the entire front half of each sample was digested. This was done using acid rinsed glass beakers labeled with the corresponding sample ID. For samples that had a thimble and a filter, the thimble and the filter were torn into pieces and placed in the beaker along with the ash, acetone rinse, and the nitric probe rinse. For samples that had a filter and no thimble, the filter was torn into pieces and placed in the beaker along with the acetone rinse and the nitric probe rinse. For the reagent blank samples; the thimble was torn into pieces and placed into a beaker, the filter was torn into pieces and placed into a beaker, and the 0.1N nitric rinse was poured into a beaker. Added to samples JWAFK, JWAGK, JWAHE, JWAH7, JWAKF, and JWAL3 was 6 mL concentrated HN03 and 3 mL conc. HCl. For sample JWAM2, 3 mL conc. HN03 added, and for JWAPF and JWAPP 3 mL conc. HN03 and 3 mL conc. HCl was added. The method blank, LCS and LCSD were also digested in beakers in which 20 mL 0.1N HN03 was added to each beaker along with 6 mL conc. HN03 and 3 mL conc. HCl. The LCS/LCSD were spiked with 50 uL of a Hg 10 ppm standard. To samples JWAPF and JWAPP an additional 100 mL of 0.1N HN03 was added to prevent the samples from going dry. All of the beakers were placed onto a hotplate at 90-95 degrees celsius. After a reduction in sample volume to 50 mL, the samples were removed from the hotplate and allowed to cool and then they were filtered thru Whatman 41 filter paper, if needed, and brought to a final volume of 100 mL with DI water. A portion of this digestate (50 mL) was taken for mercury prep and analysis.

Results were calculated using the following equation:

$$Hg,\ ug = (Hg,\ ug/L) * (\ Digestate\ \ Volume, L) * \left(\frac{Final\ Volume\ Hg\ Digestate\ \ (mL)}{Volume\ Digestate\ \ Used\ (mL)} \right) * Bench\ Dilution$$

Please note that the dilution factor reported on the sample result form for the front half samples is actually a combination of preparation factors and bench dilution factors.

For the 5%HNO_3/10%H_2O_2 impinger samples, a 10 milliliter portion of the sample as received was processed for mercury. The KCl and 4% $KMnO_4$/10%H_2SO_4 impinger samples were treated with hydroxylamine hydrochloride, followed by removal of a 25 mL portion of sample for mercury processing. Results were calculated using the equation listed below. For

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the KCl and 4% $KMnO_4$/10%H_2SO_4 impinger samples, the sample volume includes the volume of hydroxylamine hydrochloride added to the sample.

$$Hg,\ ug = (Hg, ug/L) * (Sample\ Volume, L) * \left(\frac{FinalVolume\ Hg\ Digestate\ (mL)}{Volume\ Sample\ Digested\ (mL)} \right) * Bench\ Dilution$$

Please note that the dilution factor reported on the sample result form for the back half impingers is actually the combination of preparation factors (not just a dilution factor) required by the method to convert the Hg reporting limits and method detection limits in concentration units from ug/L to a total ug unit:

$$DilutionFactor = (Volume, L) * \left(\frac{FinalVolume\ Hg\ Digestate\ (mL)}{Volume\ Sample\ Digested\ (mL)} \right) * Bench\ Dilution$$

The matrix spike/matrix spike duplicate recoveries for sample HARDIN STACK RUN 1 KMNO4/H2S04 were outside control limits for mercury because the native analyte concentration in the sample was at least four times greater than the spike level. The laboratory control sample showed acceptable results indicating that the analysis was in control.

Wet Chemistry

The measurement of the mass of particulate matter trapped by the particulate filter and probe rinse derived from an M-5 sampling train was performed using SOP number KNOX-WC-0006 (based on EPA Methods 0050 and 5). Microfiber filters, Petri dishes, and 150 mL beakers are carefully inspected and tare weighed to constant weight. After sample collection, the filters are dried, and then carefully weighed to constant weight to determine the mass of particulate matter trapped on the filters. The acetone probe rinse solution is evaporated to dryness, and then weighed to constant weight to determine the total particulate mass collected in the rinse. The total particulate mass collected by an M-5 train is the sum of the particulate filter and the acetone probe rinse residue weights.

Filter thimbles and disks that were not prepared by STL Knoxville were submitted for analysis. The reported weight is the gross weight, which includes the total weight of the filter and the entrained particulate material. Unfortunately, the laboratory information system will

PROJECT NARRATIVE
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not report sufficient digits to obtain a precise net particulate weight when the tare weight is subtracted from the gross weight. The actual raw data is tabulated below for the user's convenience.

Lot-Sample Number	Work Order Number	Client ID	Gross Weight Average (mg)
H7E040218-001	JWAEW1AA	HARDIN STACK RUN 1 FILTER A176	385.6
H7E040218-007	JWAF51AA	HARDIN STACK RUN 2 FILTER A177	400.1
H7E040218-013	JWAG81AA	HARDIN STACK RUN 3 FILTER A178	400.9
H7E040218-019	JWAH31AA	HARDIN SDA INLET DUCT RUN 1 FILTER (THIMBLE 50)	11725.1
H7E040218-020	JWAH51AA	HARDIN SDA INLET DUCT RUN 1 FILTER (A173)	417.3
H7E040218-026	JWAJV1AA	HARDIN SDA INLET DUCT RUN 2 FILTER (THIMBLE 52)	9859.7
H7E040218-027	JWAJ51AA	HARDIN SDA INLET DUCT RUN 2 FILTER (A174)	726.3
H7E040218-033	JWAK91AA	HARDIN SDA INLET DUCT RUN 3 FILTER (THIMBLE 51)	12380.7
H7E040218-034	JWALL1AA	HARDIN SDA INLET DUCT RUN 3 FILTER (A175)	413.3

The acetone probe rinse samples were extremely hygroscopic and gained weight in the dessicator. To obtain the most representative result, the average of the first two weights was reported. The inconsistency indicates that there may be a slight positive bias to the results.

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Sample Data Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 FH

TOTAL Metals

Lot-Sample #...: H7E04021B-003 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.011	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAFK1AA
		Dilution Factor: 0.1		Analysis Time..: 08:59	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-004 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	1.8	0.14	ug	ASTM D6784-02	05/09-05/10/07	JWAFR1AA
		Dilution Factor: 1.41		Analysis Time..: 09:01	MDL.....: 0.085	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-005 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.15	0.070	ug	ASTM D6784-02	05/09-05/10/07	JWAFW1AA
		Dilution Factor: 0.7		Analysis Time..: 08:36	MDL.....: 0.042	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-006 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	6.7	0.093	ug	ASTM D6784-02	05/09-05/10/07	JWAFX1AA
		Dilution Factor: 0.93		Analysis Time..: 09:27	MDL.....: 0.056	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 FH

TOTAL Metals

Lot-Sample #...: H7E040218-009 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.058	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAGK1AA
		Dilution Factor: 0.1		Analysis Time..: 08:53	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-010 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	1.8	0.14	ug	ASTM D6784-02	05/09-05/10/07	JWAGN1AA
		Dilution Factor: 1.41		Analysis Time..: 09:11	MDL.....: 0.085	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-011 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.19	0.073	ug	ASTM D6784-02	05/09-05/10/07	JWAGP1AA
		Dilution Factor: 0.73		Analysis Time..: 08:46	MDL.....: 0.044	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-012 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	7.3	0.10	ug	ASTM D6784-02	05/09-05/10/07	JWAGR1AA
		Dilution Factor: 1.02		Analysis Time..: 09:37	MDL.....: 0.061	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 FH

TOTAL Metals

Lot-Sample #...: H7E040218-015 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.029	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAHE1AA
		Dilution Factor: 0.1		Analysis Time..: 08:55	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-016 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	1.7	0.14	ug	ASTM D6784-02	05/09-05/10/07	JWAHH1AA
		Dilution Factor: 1.41		Analysis Time..: 09:12	MDL.....: 0.085	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-017 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.11	0.068	ug	ASTM D6784-02	05/09-05/10/07	JWAHL1AA
		Dilution Factor: 0.68		Analysis Time..: 08:48	MDL.....: 0.041	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-018 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	6.7	0.092	ug	ASTM D6784-02	05/09-05/10/07	JWAHM1AA
		Dilution Factor: 0.92		Analysis Time..: 09:39	MDL.....: 0.055	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 FH

TOTAL Metals

Lot-Sample #...: H7E040218-022 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	1.3	0.050	ug	ASTM D6784-02	05/16-05/17/07	JWAH71AA
		Dilution Factor: 0.5		Analysis Time..: 09:57	MDL.....: 0.030	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-023 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	0.65	0.11	ug	ASTM D6784-02	05/09-05/10/07	JWAJA1AA
		Dilution Factor: 1.06		Analysis Time..: 09:15	MDL.....: 0.064	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-024 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.13	0.068	ug	ASTM D6784-02	05/09-05/10/07	JWAJH1AA
		Dilution Factor: 0.68		Analysis Time..: 08:50	MDL.....: 0.041	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 KMNO4,H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-025 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	2.6	0.092	ug	ASTM D6784-02	05/09-05/10/07	JWAJR1AA
		Dilution Factor: 0.92		Analysis Time..: 09:41	MDL.....: 0.055	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 FH

TOTAL Metals

Lot-Sample #...: H7E040218-029 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.97	0.050	ug	ASTM D6784-02	05/16-05/17/07	JWAKF1AA
		Dilution Factor: 0.5		Analysis Time..: 09:55	MDL.....: 0.030	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-030 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	0.57	0.12	ug	ASTM D6784-02	05/09-05/10/07	JWAKG1AA
		Dilution Factor: 1.19		Analysis Time..: 09:17	MDL.....: 0.071	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-031 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.16	0.070	ug	ASTM D6784-02	05/09-05/10/07	JWAKK1AA
		Dilution Factor: 0.7		Analysis Time..: 08:52	MDL.....: 0.042	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-032 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	3.1	0.092	ug	ASTM D6784-02	05/09-05/10/07	JWAK01AA
		Dilution Factor: 0.92		Analysis Time..: 09:43	MDL.....: 0.055	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 FH

TOTAL Metals

Lot-Sample #...: H7E040218-036 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.98	0.050	ug	ASTM D6784-02	05/16-05/17/07	JWAL31AA
		Dilution Factor: 0.5		Analysis Time..: 09:59	MDL.....: 0.030	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-037 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	0.72	0.11	ug	ASTM D6784-02	05/09-05/10/07	JWAMG1AA
		Dilution Factor: 1.11		Analysis Time..: 09:19	MDL.....: 0.067	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-038 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.17	0.073	ug	ASTM D6784-02	05/09-05/10/07	JWAMK1AA
		Dilution Factor: 0.73		Analysis Time..: 08:54	MDL.....: 0.044	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-039 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	2.8	0.097	ug	ASTM D6784-02	05/09-05/10/07	JWAMP1AA
		Dilution Factor: 0.97		Analysis Time..: 09:45	MDL.....: 0.058	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB 0.1N HNO3

TOTAL Metals

Lot-Sample #...: H7E040218-040 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	ND	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAM21AA
		Dilution Factor: 0.1		Analysis Time..: 09:03	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB 1N KCL

TOTAL Metals

Lot-Sample #...: H7E040218-041 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	0.016	0.010	ug	ASTM D6784-02	05/09-05/10/07	JWAM81AA
		Dilution Factor: 0.1		Analysis Time..: 09:21	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-042 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.072	0.025	ug	ASTM D6784-02	05/09-05/10/07	JWAND1AA
		Dilution Factor: 0.25		Analysis Time..: 08:56	MDL.....: 0.015	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB KMNO4/H2SO4/HYDR

TOTAL Metals

Lot-Sample #...: H7E040218-043 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	ND	0.011	ug	ASTM D6784-02	05/09-05/10/07	JWANG1AA
		Dilution Factor: 0.11		Analysis Time..: 09:47	MDL.....: 0.0066	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB QUARTZ FILTER

TOTAL Metals

Lot-Sample #...: H7E040218-044 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	ND	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAPF1AA
		Dilution Factor: 0.1		Analysis Time..: 09:04	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB THIMBLE 1

TOTAL Metals

Lot-Sample #...: H7E040218-045 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.032	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAPP1AA
		Dilution Factor: 0.1		Analysis Time..: 09:07	MDL.....: 0.0060	

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H7E040218 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: H7E070000-421 **Prep Batch #...:** 7127421						
Mercury	ND	0.025	ug	ASTM D6784-02	05/09-05/10/07	JWFFG1AA
		Dilution Factor: 0.25				
		Analysis Time..: 08:30				
MB Lot-Sample #: H7E070000-427 **Prep Batch #...:** 7127427						
Mercury	ND	0.010	ug	ASTM D6784-02	05/09-05/10/07	JWFFK1AA
		Dilution Factor: 0.1				
		Analysis Time..: 08:58				
MB Lot-Sample #: H7E070000-428 **Prep Batch #...:** 7127428						
Mercury	ND	0.010	ug	ASTM D6784-02	05/09-05/10/07	JWFFN1AA
		Dilution Factor: 0.1				
		Analysis Time..: 09:23				
MB Lot-Sample #: H7E140000-095 **Prep Batch #...:** 7134095						
Mercury	ND	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWWQH1AA
		Dilution Factor: 0.1				
		Analysis Time..: 08:40				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: H7E040218 Matrix.....: AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #
Mercury	104	(80 - 120)			ASTM D6784-02	05/16-05/17/07	7134095
	102	(80 - 120)	1.6	(0-20)	ASTM D6784-02	05/16-05/17/07	7134095

Dilution Factor: 0.1 Analysis Time..: 08:43

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: H7E040218 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Mercury	0.500	0.519	ug	104		ASTM D6784-02	05/16-05/17/07	7134095
	0.500	0.511	ug	102	1.6	ASTM D6784-02	05/16-05/17/07	7134095

Dilution Factor: 0.1 Analysis Time..: 08:43

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: H7E070000-421 **Prep Batch #...:** 7127421					
Mercury	86	(80 - 120)	ASTM D6784-02	05/09-05/10/07	JWFFG1AC
		Dilution Factor: 0.25	Analysis Time..: 08:34		
LCS Lot-Sample#: H7E070000-427 **Prep Batch #...:** 7127427					
Mercury	95	(80 - 120)	ASTM D6784-02	05/09-05/10/07	JWFFK1AC
		Dilution Factor: 0.1	Analysis Time..: 08:59		
LCS Lot-Sample#: H7E070000-428 **Prep Batch #...:** 7127428					
Mercury	97	(80 - 120)	ASTM D6784-02	05/09-05/10/07	JWFFN1AC
		Dilution Factor: 0.1	Analysis Time..: 09:25		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: H7E070000-421 **Prep Batch #...:** 7127421							
Mercury	1.25	1.08	ug	86	ASTM D6784-02	05/09-05/10/07	JWFFG1AC
			Dilution Factor: 0.25		Analysis Time..: 08:34		
LCS Lot-Sample#: H7E070000-427 **Prep Batch #...:** 7127427							
Mercury	0.500	0.474	ug	95	ASTM D6784-02	05/09-05/10/07	JWFFK1AC
			Dilution Factor: 0.1		Analysis Time..: 08:59		
LCS Lot-Sample#: H7E070000-428 **Prep Batch #...:** 7127428							
Mercury	0.500	0.484	ug	97	ASTM D6784-02	05/09-05/10/07	JWFFN1AC
			Dilution Factor: 0.1		Analysis Time..: 09:25		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-005 Prep Batch #...: 7127421							
Mercury	98	(80 - 120)			ASTM D6784-02	05/09-05/10/07	JWAFW1AC
	101	(80 - 120)	2.5	(0-20)	ASTM D6784-02	05/09-05/10/07	JWAFW1AD

Dilution Factor: 0.7
Analysis Time..: 08:38

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H7E040218 **Matrix.....:** AIR
Date Sampled...: 04/26/07 **Date Received..:** 05/01/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-005 **Prep Batch #...:** 7127421									
Mercury									
	0.15	0.700	0.840	ug	98		ASTM D6784-02	05/09-05/10/07	JWAFW1AC
	0.15	0.700	0.861	ug	101	2.5	ASTM D6784-02	05/09-05/10/07	JWAFW1AD

Dilution Factor: 0.7
Analysis Time..: 08:38

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-004 Prep Batch #...: 7127427							
Mercury	102	(80 - 120)			ASTM D6784-02	05/09-05/10/07	JWAFR1AC
	95	(80 - 120)	3.1	(0-20)	ASTM D6784-02	05/09-05/10/07	JWAFR1AD

Dilution Factor: 1.41
Analysis Time..: 09:03

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H7E040218 **Matrix.....:** AIR
Date Sampled...: 04/26/07 **Date Received..:** 05/01/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-004 **Prep Batch #...:** 7127427									
Mercury									
	1.8	1.41	3.26	ug	102		ASTM D6784-02	05/09-05/10/07	JWAFR1AC
	1.8	1.41	3.16	ug	95	3.1	ASTM D6784-02	05/09-05/10/07	JWAFR1AD

Dilution Factor: 1.41
Analysis Time..: 09:03

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-006 Prep Batch #...: 7127428							
Mercury	NC,MSB	(80 - 120)			ASTM D6784-02	05/09-05/10/07	JWAFX1AC
	NC,MSB	(80 - 120)		(0-20)	ASTM D6784-02	05/09-05/10/07	JWAFX1AD

Dilution Factor: 0.93
Analysis Time..: 09:34

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated beeause the sample amount was greater than four times the spike amount.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-006 **Prep Batch #...:** 7127428									
Mercury									
	6.7	0.930	7.54	ug			ASTM D6784-02	05/09-05/10/07	JWAFX1AC
			Qualifiers: NC,MSB						
	6.7	0.930	8.01	ug			ASTM D6784-02	05/09-05/10/07	JWAFX1AD
			Qualifiers: NC,MSB						
			Dilution Factor: 0.93						
			Analysis Time..: 09:34						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated because the sample amount was greater than four times the spike amount.

STL Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M051707. PRN

Element	PDS JWAGKA	Original Sample JWAGK	Spike Added	Percent Recovery
Hg	1.56	0.52	1.0	104

Sample Data Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 FILTER A176

General Chemistry

Lot-Sample #...: H7E040218-001 Work Order #...: JWAEW Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	386	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-002 Work Order #...: JWAFF Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	24.8	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 FILTER A177

General Chemistry

Lot-Sample #...: H7E040218-007 Work Order #...: JWAF5 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	400	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-008 Work Order #...: JWAGJ Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	13.6	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 FILTER A178

General Chemistry

Lot-Sample #...: H7E040218-013 Work Order #...: JWAG8 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	401	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-014 Work Order #...: JWAHC Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	54.3	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 FILTER (THIMBLE 50)

General Chemistry

Lot-Sample #...: H7E040218-019 Work Order #...: JWAH3 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	11700	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 FILTER (A173)

General Chemistry

Lot-Sample #...: H7E040218-020 Work Order #...: JWAH5 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	417	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-021 Work Order #...: JWAH6 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	3790	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 FILTER (THIMBLE 52)

General Chemistry

Lot-Sample #...: H7E040218-026 Work Order #...: JWAJV Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	9860	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 FILTER (A174)

General Chemistry

Lot-Sample #...: H7E040218-027 Work Order #...: JWAJ5 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	726	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-028 Work Order #...: JWAJ9 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	3030	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 FILTER (THIMBLE 51)

General Chemistry

Lot-Sample #...: H7E040218-033 Work Order #...: JWAK9 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	12400	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 FILTER (A175)

General Chemistry

Lot-Sample #...: H7E040218-034 Work Order #...: JWALL Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	413	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-035 Work Order #...: JWALV Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	1540	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Sample Receipt Documentation

HTE 040218

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 1 of 7	
Address:	Unit No.: Stack	Lab: STL Knoxville	
City: Hardin, State: MT, Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 1	Test Method: ASTM D6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Part. Bond Hg	Oxidized Hg	Elemental Hg
Container 1	4/26/07	1405	—	1	Filter # A176	X	X		
Container 2	4/26/07	1604	—	1	0.1 N HNO_3 Front Wash		X		
Container 2a	4/26/07	1601	—	1	ACE Front Wash	X	X		
Container 3	4/26/07	1350	1 N KCl	1	Imps 1,2,3 Contents + Rinses			X	
Container 4	4/26/07	1332	5% HNO_3 - 10% H_2O_2	1	Imp 4 Contents + Rinse				X
Container 5	4/26/07	1343	4% $KMnO_4$ - 10% H_2SO_4	1	Imps 5,6,7 Contents + Rinse				X
			Rec'd temp. Ambient						
			7 Boxes Rec'd Fedex # 7929		7774 7919, 7986 6347 3017				
			MFH 5-2-07		7775 5240, 7916 7901 5901 7774 2023.				
					7775 1587				
					7996 3143 2360				

Special Instructions: No Custody Seals.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	4/26/07	1604	1. Relinquished By: Bill Mullins	4-26-07	2230
2. Received By: Billy J. Mullins, Jr.	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr.	4/30/07	0815
3. Received By: Scott Jack	4/30/07	0830	3. Relinquished By: Scott Jack	4/30/07	0830

Comments: SHIP VIA FEDEX TO STL K 4/30/07

Rec'd ~~Tau~~ By: Matthew Hickman 5-1-07 ~~5-2-07~~ 10:45

MFH 5-2-07 MFH 5-2-07

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

AIR SAMPLING ASSOCIATES, INC.

17JE040218

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 2 of 7	
Address:	Unit No.: Stack	Lab: STL Knoxville	
City: Hardin, State: MT, Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: ASTM D6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg
Container 1	4/26/07	1949	—	1	Filter # A177	X	X		
Container 2	4/26/07	1959	—	1	0.1 N HNO_3 Front Wash		X		
Container 2a	4/26/07	1957	—	1	ACE Front Wash	X	X		
Container 3	4/26/07	1951	1 N KCl	1	Imps 1,2,3 Contents + Rinses			X	
Container 4	4/26/07	1723	5% HNO_3 — 10% H_2O_2	1	Imp 4 Contents + Rinses				X
Container 5	4/26/07	1732	4% $KMnO_4$ — 10% H_2SO_4	1	Imps 5,6,7 contents + Rinse				X

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hatley	4/26/07	1959	1. Relinquished By: Bill Hatley	4-26-07	2230
2. Received By: Billy J. Mullins, Jr	4/27/07	2230	2. Relinquished By: Billy J. Mullins, Jr	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEX TO STLK 4/30/07

Rec'd By: [illegible] 5-1-07 10:45

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AIR SAMPLING ASSOCIATES, INC.

H7E040218

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 3 of 7	
Address:	Unit No.: Stack	Lab: STL Knoxville	
City: Hardin, State: MT, Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 3	Test Method: ASTM D6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg
Container 1	4-26-07	2211	—	1	Filter # A178	X	X		
Container 2	4/26/07	2212	—	1	0.1 N HNO_3 Front Wash		X		
Container 2a	4/26/07	2213	—	1	ACE Front Wash	X	X		
Container 3	4/26/07	2213	1N KCl	1	Imps 1,2,3 contents + Rinses			X	
Container 4	4/26/07	2151	5% HNO_3 - 10% H_2O_2	1	Imp 4 contents + Rinses				X
Container 5	4/26/07	2159	4% $KMnO_4$ 10% H_2SO_4	1	Imps 5,6,7 contents + Rinses				X

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyby	4/26/07	2213	1. Relinquished By: Bill Hyby	4-26-07	2230
2. Received By: Billy J. Mullins, Jr	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEX TO STLK 4/30/07

Rec'd By: [illegible] 5-1-07 10:45

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17E040218

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 4 of 7	
Address:	Unit No.: SDA Inlet	Lab: STL Knoxville	
City: Hardin / State: MT / Zip Code:	Project Manager: Bill Mulling	Lab Contact: Terry Wasmund	
Run No.: 1	Test Method: ASTM D 6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Container 1	4/26/07	1525	—	1	Thimble filter # 50	X	X			
Container 1a	4/26/07	1524	—	1	Back-up filter # A173	X	X			
Container 2	4/26/07	1554	—	1	0.1N HNO_3 Front Wash		X			
Container 2a	4/26/07	1552	—	1	ACE Front Wash	X	X			
Container 3	4/26/07	1448	1 N KCl	1	Imps. 1,2,3 contents + Rinses			X		
Container 4	4/26/07	1432	5% HNO_3 – 10% H_2O_2	1	Imp 4 contents + Rinse				X	
Container 5	4/26/07	1441	4% $KMnO_4$ – 10% H_2SO_4	1	Imps 5,6,7 Contents + Rinses				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mulling	4/26/07	1554	1. Relinquished By: Bill Mulling	4-26-07	2230
2. Received By: Billy J. Mullins, Jr	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEX TO STLK 4/30/07

Rec'd BY: [illegible] 5-1-07 10:45

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HJE040218

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 5 of 7	Analysis
Address:	Unit No.: SDA Inlet	Lab: STL Knoxville	
City: Hardin; State: MT; Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: ASTM D6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part Bound Hg	Oxidized Hg	Elemental Hg
Container 1	4/26/07	1936	—	1	Thimble Filter #	X	X		
Container 1a	4/26/07	1918	—	1	Back-up Filter #	X	X		
Container 2	4/26/07	1946	—	1	0.1N HNO_3 Front Wash		X		
Container 2a	4/26/07	1944	—	1	ACE Front Wash	X	X		
Container 3	4/26/07	1908	1N KCl	1	Imps 1,2,3 Contents + Rinse			X	
Container 4	4/26/07	1843	5% HNO_3 - 10% H_2O_2	1	Imp 4 contents + Rinse				X
Container 5	4/26/07	1829	4% $KMnO_4$ - 10% H_2SO_4	1	Imps 5,6,7 contents + Rinse				X

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyfy	4/26/07	1946	1. Relinquished By: Bill Hyfy	4-26-07	2230
2. Received By: Billy J. Mullins, Jr	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr	4/30/07	0815
3. Received By: Ron Tach	4/30/07	0830	3. Relinquished By: Ron Tach	4/30/07	0830

Comments: SHIP VIA FED EX TO STLK 4/30/07 RT

Matthew T Bowen 5-1-07 10:45

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AIR SAMPLING ASSOCIATES, INC.

H7E040218

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 6 of 7	Analysis
Address:	Unit No.: SDA Inlet	Lab: STL Knoxville	
City: Hardin, State: MT, Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 3	Test Method: ASTM D6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Container 1	4/26/07	2133	—	1	Thimble filter # 51	X	X			
Container 1a	4/26/07	2129	—	1	Back-up filter # A175	X	X			
Container 2	4/26/07	2150	—	1	0.1 N HNO_3 Front Wash		X			
Container 2a	4/26/07	2147	—	1	ACE Front Wash	X	X			
Container 3	4/26/07	2122	1 N KCl	1	Imps 1, 2, 3 contents + Rinses			X		
Container 4	4/26/07	2106	5% HNO_3 - 10% H_2O_2	1	Imp 4 Contents + Rinses				X	
Container 5	4/26/07	2111	4% $KMnO_4$ - 10% H_2SO_4	1	Imps 5, 6, 7 Contents + Rinses				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	4-26-07	2150	1. Relinquished By: Bill Mullins	4-26-07	2230
2. Received By: Billy J. Mullins, Jr	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEX TO STLK 4/30/07

Rec'd BY: Matthew J. Howard 5-1-07 10:45

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H7E-DH02/8

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 7 of 7	
Address:	Unit No.: SDA Inlet & Stack	Lab: STL Knoxville	
City: Hardin / State: MT / Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: Reagent Blanks	Test Method: ASTM D6784	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Container 7	4-26-07	2217	—	1	0.1 N HNO_3 Blank			X	X	
Container 8	4-26-07	1743	—	1	1 N KCl Blank - 50 ml			X		
Container 9	4-26-07	1746	—	1	5% HNO_3 - 10% H_2O_2 (50 ml)				X	
Container 10	4-26-07	1748	—	1	4% $KMnO_4$ - 10% H_2SO_4 (50 ml)				X	
Container 11	4-26-07	2218	—	1	Hydroxylamine Sulfate Blank			X	X	
Container 12	4-26-07	2016	—	4	Filter Blanks		X			

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyde	4-26-07	2218	1. Relinquished By: Bill Hyde	4-26-07	2230
2. Received By: Billy J. Mullins, Jr.	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr.	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEX TO STL K 4/30/07 [illegible]

Rec'd By: Matthew F. Hamel 5-1-07 10:45

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STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: _____ **Project:** _____ **Lot Number:** H7E040218

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)		✓		☐ 1a Do not match COC ☑ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	1b. Containers 7, 8, 9, 10, + 12 ~~do~~ For the Reagent Blanks did not have Reagent Blank listed on the Sample Label. NFS 5-2-07 4a
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?	✓			☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?			✓	If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: 75154 PM Instructions: _____

Sample Receiving Associate: [signature] Date: 5-2-07

QA026R18.doc, 1/30/06

Metals

Sample Results

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 FH

TOTAL Metals

Lot-Sample #...: H7E040218-003 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.011	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAFK1AA
		Dilution Factor: 0.1		Analysis Time..: 08:59	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-004 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	1.8	0.14	ug	ASTM D6784-02	05/09-05/10/07	JWAFR1AA
		Dilution Factor: 1.41		Analysis Time..: 09:01	MDL.....: 0.085	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-005 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.15	0.070	ug	ASTM D6784-02	05/09-05/10/07	JWAFW1AA
		Dilution Factor: 0.7		Analysis Time..: 08:36	MDL.....: 0.042	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-006 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	6.7	0.093	ug	ASTM D6784-02	05/09-05/10/07	JWAFX1AA
		Dilution Factor: 0.93		Analysis Time..: 09:27	MDL.....: 0.056	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 FH

TOTAL Metals

Lot-Sample #...: H7E040218-009 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.058	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAGK1AA
		Dilution Factor: 0.1		Analysis Time..: 08:53	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-010 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	1.8	0.14	ug	ASTM D6784-02	05/09-05/10/07	JWAGN1AA
		Dilution Factor: 1.41		Analysis Time..: 09:11	MDL.....: 0.085	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-011 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.19	0.073	ug	ASTM D6784-02	05/09-05/10/07	JWAGP1AA
		Dilution Factor: 0.73		Analysis Time..: 08:46	MDL.....: 0.044	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-012 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	7.3	0.10	ug	ASTM D6784-02	05/09-05/10/07	JWAGR1AA
		Dilution Factor: 1.02		Analysis Time..: 09:37	MDL.....: 0.061	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 FH

TOTAL Metals

Lot-Sample #...: H7E040218-015 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.029	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAHE1AA
		Dilution Factor: 0.1		Analysis Time..: 08:55	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-016 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	1.7	0.14	ug	ASTM D6784-02	05/09-05/10/07	JWAHH1AA
		Dilution Factor: 1.41		Analysis Time..: 09:12	MDL.....: 0.085	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-017 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.11	0.068	ug	ASTM D6784-02	05/09-05/10/07	JWAHL1AA
		Dilution Factor: 0.68		Analysis Time..: 08:48	MDL.....: 0.041	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-018 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	6.7	0.092	ug	ASTM D6784-02	05/09-05/10/07	JWAHM1AA
		Dilution Factor: 0.92		Analysis Time..: 09:39	MDL.....: 0.055	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 FH

TOTAL Metals

Lot-Sample #...: H7E040218-022 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	1.3	0.050	ug	ASTM D6784-02	05/16-05/17/07	JWAH71AA
		Dilution Factor: 0.5		Analysis Time..: 09:57	MDL.....: 0.030	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-023 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	0.65	0.11	ug	ASTM D6784-02	05/09-05/10/07	JWAJA1AA
		Dilution Factor: 1.06		Analysis Time..: 09:15	MDL.....: 0.064	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-024 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.13	0.068	ug	ASTM D6784-02	05/09-05/10/07	JWAJH1AA
		Dilution Factor: 0.68		Analysis Time..: 08:50	MDL.....: 0.041	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 KMNO4,H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-025 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	2.6	0.092	ug	ASTM D6784-02	05/09-05/10/07	JWAJR1AA
		Dilution Factor: 0.92		Analysis Time..: 09:41	MDL.....: 0.055	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 FH

TOTAL Metals

Lot-Sample #...: H7E040218-029 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.97	0.050	ug	ASTM D6784-02	05/16-05/17/07	JWAKF1AA
		Dilution Factor: 0.5		Analysis Time..: 09:55	MDL.....: 0.030	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-030 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	0.57	0.12	ug	ASTM D6784-02	05/09-05/10/07	JWAKG1AA
		Dilution Factor: 1.19		Analysis Time..: 09:17	MDL.....: 0.071	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-031 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.16	0.070	ug	ASTM D6784-02	05/09-05/10/07	JWAKK1AA
		Dilution Factor: 0.7		Analysis Time..: 08:52	MDL.....: 0.042	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-032 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	3.1	0.092	ug	ASTM D6784-02	05/09-05/10/07	JWAK01AA
		Dilution Factor: 0.92		Analysis Time..: 09:43	MDL.....: 0.055	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 FH

TOTAL Metals

Lot-Sample #...: H7E040218-036 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.98	0.050	ug	ASTM D6784-02	05/16-05/17/07	JWAL31AA
		Dilution Factor: 0.5		Analysis Time..: 09:59	MDL.....: 0.030	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 KCL

TOTAL Metals

Lot-Sample #...: H7E040218-037 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	0.72	0.11	ug	ASTM D6784-02	05/09-05/10/07	JWAMG1AA
		Dilution Factor: 1.11		Analysis Time..: 09:19	MDL.....: 0.067	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-038 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.17	0.073	ug	ASTM D6784-02	05/09-05/10/07	JWAMK1AA
		Dilution Factor: 0.73		Analysis Time..: 08:54	MDL.....: 0.044	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 KMNO4/H2SO4

TOTAL Metals

Lot-Sample #...: H7E040218-039 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	2.8	0.097	ug	ASTM D6784-02	05/09-05/10/07	JWAMP1AA
		Dilution Factor: 0.97		Analysis Time..: 09:45	MDL.....: 0.058	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB 0.1N HNO3

TOTAL Metals

Lot-Sample #...: H7E040218-040 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	ND	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAM21AA
		Dilution Factor: 0.1		Analysis Time..: 09:03	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB 1N KCL

TOTAL Metals

Lot-Sample #...: H7E040218-041 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127427						
Mercury	0.016	0.010	ug	ASTM D6784-02	05/09-05/10/07	JWAM81AA
		Dilution Factor: 0.1		Analysis Time..: 09:21	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB HNO3/H2O2

TOTAL Metals

Lot-Sample #...: H7E040218-042 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127421						
Mercury	0.072	0.025	ug	ASTM D6784-02	05/09-05/10/07	JWAND1AA
		Dilution Factor: 0.25		Analysis Time..: 08:56	MDL.....: 0.015	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB KMNO4/H2SO4/HYDR

TOTAL Metals

Lot-Sample #...: H7E040218-043 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7127428						
Mercury	ND	0.011	ug	ASTM D6784-02	05/09-05/10/07	JWANG1AA
		Dilution Factor: 0.11		Analysis Time..: 09:47	MDL.....: 0.0066	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB QUARTZ FILTER

TOTAL Metals

Lot-Sample #...: H7E040218-044 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	ND	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAPF1AA
		Dilution Factor: 0.1		Analysis Time..: 09:04	MDL.....: 0.0060	

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET+STACK RB THIMBLE 1

TOTAL Metals

Lot-Sample #...: H7E040218-045 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 7134095						
Mercury	0.032	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWAPP1AA
		Dilution Factor: 0.1		Analysis Time..: 09:07	MDL.....: 0.0060	

QC Summary

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: H7E070000-421 **Prep Batch #...:** 7127421						
Mercury	ND	0.025	ug	ASTM D6784-02	05/09-05/10/07	JWFFG1AA
		Dilution Factor: 0.25				
		Analysis Time..: 08:30				
MB Lot-Sample #: H7E070000-427 **Prep Batch #...:** 7127427						
Mercury	ND	0.010	ug	ASTM D6784-02	05/09-05/10/07	JWFFK1AA
		Dilution Factor: 0.1				
		Analysis Time..: 08:58				
MB Lot-Sample #: H7E070000-428 **Prep Batch #...:** 7127428						
Mercury	ND	0.010	ug	ASTM D6784-02	05/09-05/10/07	JWFFN1AA
		Dilution Factor: 0.1				
		Analysis Time..: 09:23				
MB Lot-Sample #: H7E140000-095 **Prep Batch #...:** 7134095						
Mercury	ND	0.010	ug	ASTM D6784-02	05/16-05/17/07	JWWQH1AA
		Dilution Factor: 0.1				
		Analysis Time..: 08:40				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: H7E040218 Matrix.....: AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #
Mercury	104	(80 - 120)			ASTM D6784-02	05/16-05/17/07	7134095
	102	(80 - 120)	1.6	(0-20)	ASTM D6784-02	05/16-05/17/07	7134095

Dilution Factor: 0.1 Analysis Time..: 08:43

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: H7E040218 Matrix.....: AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Mercury	0.500	0.519	ug	104		ASTM D6784-02	05/16-05/17/07	7134095
	0.500	0.511	ug	102	1.6	ASTM D6784-02	05/16-05/17/07	7134095

Dilution Factor: 0.1 Analysis Time..: 08:43

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H7E040218 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: H7E070000-421 **Prep Batch #...:** 7127421					
Mercury	86	(80 - 120)	ASTM D6784-02	05/09-05/10/07	JWFFG1AC
		Dilution Factor: 0.25	Analysis Time..: 08:34		
LCS Lot-Sample#: H7E070000-427 **Prep Batch #...:** 7127427					
Mercury	95	(80 - 120)	ASTM D6784-02	05/09-05/10/07	JWFFK1AC
		Dilution Factor: 0.1	Analysis Time..: 08:59		
LCS Lot-Sample#: H7E070000-428 **Prep Batch #...:** 7127428					
Mercury	97	(80 - 120)	ASTM D6784-02	05/09-05/10/07	JWFFN1AC
		Dilution Factor: 0.1	Analysis Time..: 09:25		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H7E040218 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: H7E070000-421 **Prep Batch #...:** 7127421							
Mercury	1.25	1.08	ug	86	ASTM D6784-02	05/09-05/10/07	JWFFG1AC
			Dilution Factor: 0.25		Analysis Time..: 08:34		
LCS Lot-Sample#: H7E070000-427 **Prep Batch #...:** 7127427							
Mercury	0.500	0.474	ug	95	ASTM D6784-02	05/09-05/10/07	JWFFK1AC
			Dilution Factor: 0.1		Analysis Time..: 08:59		
LCS Lot-Sample#: H7E070000-428 **Prep Batch #...:** 7127428							
Mercury	0.500	0.484	ug	97	ASTM D6784-02	05/09-05/10/07	JWFFN1AC
			Dilution Factor: 0.1		Analysis Time..: 09:25		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-005 Prep Batch #...: 7127421							
Mercury	98	(80 - 120)			ASTM D6784-02	05/09-05/10/07	JWAFW1AC
	101	(80 - 120)	2.5	(0-20)	ASTM D6784-02	05/09-05/10/07	JWAFW1AD

Dilution Factor: 0.7
Analysis Time..: 08:38

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H7E040218 **Matrix.....:** AIR
Date Sampled...: 04/26/07 **Date Received..:** 05/01/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-005 **Prep Batch #...:** 7127421									
Mercury									
	0.15	0.700	0.840	ug	98		ASTM D6784-02	05/09-05/10/07	JWAFW1AC
	0.15	0.700	0.861	ug	101	2.5	ASTM D6784-02	05/09-05/10/07	JWAFW1AD

Dilution Factor: 0.7
Analysis Time..: 08:38

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-004 Prep Batch #...: 7127427							
Mercury	102	(80 - 120)			ASTM D6784-02	05/09-05/10/07	JWAFR1AC
	95	(80 - 120)	3.1	(0-20)	ASTM D6784-02	05/09-05/10/07	JWAFR1AD

Dilution Factor: 1.41
Analysis Time..: 09:03

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-004 Prep Batch #...: 7127427									
Mercury									
	1.8	1.41	3.26	ug	102		ASTM D6784-02	05/09-05/10/07	JWAFR1AC
	1.8	1.41	3.16	ug	95	3.1	ASTM D6784-02	05/09-05/10/07	JWAFR1AD

Dilution Factor: 1.41
Analysis Time..: 09:03

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-006 Prep Batch #...: 7127428							
Mercury	NC,MSB	(80 - 120)			ASTM D6784-02	05/09-05/10/07	JWAFX1AC
	NC,MSB	(80 - 120)		(0-20)	ASTM D6784-02	05/09-05/10/07	JWAFX1AD

Dilution Factor: 0.93
Analysis Time..: 09:34

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated because the sample amount was greater than four times the spike amount.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H7E040218 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H7E040218-006 Prep Batch #...: 7127428									
Mercury									
	6.7	0.930	7.54	ug			ASTM D6784-02	05/09-05/10/07	JWAFX1AC
			Qualifiers: NC,MSB						
	6.7	0.930	8.01	ug			ASTM D6784-02	05/09-05/10/07	JWAFX1AD
			Qualifiers: NC,MSB						
			Dilution Factor: 0.93						
			Analysis Time..: 09:34						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated because the sample amount was greater than four times the spike amount.

STL Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M051707. PRN

Element	PDS JWAGKA	Original Sample JWAGK	Spike Added	Percent Recovery
Hg	1.56	0.52	1.0	104

Quality Control Results Mercury

STL Knoxville

Mercury Data Reporting Form

Initial Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051007.PRN

Elem	True Conc	Ck2icv 5/10/2007 8:10 AM Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	2.5	2.53	**101.2**										

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051007.PRN

Elem	True Conc	Ck3ccv 5/10/2007 8:16 AM		Ck3ccv 5/10/2007 8:42 AM		Ck3ccv 5/10/2007 9:05 AM		Ck3ccv 5/10/2007 9:30 AM		Ck3ccv 5/10/2007 9:52 AM		Ck3ccv 5/10/2007 10:18 AM	
		Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	5.0	5.32	**106.4**	5.37	**107.4**	5.30	**106.0**	5.23	**104.6**	5.25	**105.0**	5.32	**106.4**

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051007.PRN

Elem	True Conc	Ck3ccv 5/10/2007 10:43 AM		Ck3ccv 5/10/2007 11:09 AM		Ck3ccv 5/10/2007 11:20 AM							
		Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	5.0	5.27	**105.4**	5.24	**104.8**	5.32	**106.4**						

STL Knoxville

Mercury Data Reporting Form

Contract Required Detection Limit Standard(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051007.PRN

		CRA 5/10/2007 8:15 AM											
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	0.2	0.21	**105.5**										

STL Knoxville

Mercury Data Reporting Form

Initial Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051007.PRN

Elem	Reporting Limit	ICB 5/10/2007 8:13 AM											
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U										

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg Ana

Data File Name: M051007.PRN

Elem	Reporting Limit	Ck1ccb 5/10/2007 8:18 AM		Ck1ccb 5/10/2007 8:44 AM		Ck1ccb 5/10/2007 9:07 AM		Ck1ccb 5/10/2007 9:32 AM		Ck1ccb 5/10/2007 9:54 AM		Ck1ccb 5/10/2007 10:21 AM	
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051007.PRN

Elem	Reporting Limit	Ck1ccb 5/10/2007 10:45 AM		Ck1ccb 5/10/2007 11:12 AM		Ck1ccb 5/10/2007 11:22 AM							
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U	0.06	U	0.06	U						

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

STL Knoxville

Mercury Data Reporting Form

Instrument Detection Limits

Units: ug/L (ppb)

IDL Completion Date: 12/14/2006

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051007.PRN

Element	Wavelength (nm)	Reporting Limit	IDL
Hg	253.70	0.1	0.06

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Sample ID Nomenclature

The sample ID consists of 5 alpha-numeric characters followed by a suffix in the 6th position that designates the sample type:

Suffix	Sample Type:
B	Method Blank
C	Laboratory Control Sample
L	Laboratory Control Sample Duplicate
S	Matrix Spike
D	Matrix Spike Duplicate
X	Sample Duplicate
P	Serial Dilution
A	Post Digestion Spike
Z#	Dilution; # = Dilution Factor

STL Knoxville

Mercury Data Reporting Form

Initial Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051707.PRN

Elem	True Conc	Ck2icv 5/17/2007 8:19 AM Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	2.5	2.54	**101.6**										

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051707.PRN

Elem	True Conc	Ck3ccv 5/17/2007 8:25 AM		Ck3ccv 5/17/2007 8:49 AM		Ck3ccv 5/17/2007 9:13 AM		Ck3ccv 5/17/2007 9:39 AM		Ck3ccv 5/17/2007 10:07 AM			
		Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	5.0	5.06	**101.2**	5.24	**104.8**	5.16	**103.2**	5.26	**105.2**	5.23	**104.6**		

STL Knoxville

Mercury Data Reporting Form

Contract Required Detection Limit Standard(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051707.PRN

Elem	True Conc	CRA 5/17/2007 8:23 AM Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	0.2	0.20	**100.0**										

STL Knoxville

Mercury Data Reporting Form

Initial Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051707.PRN

Elem	Reporting Limit	ICB 5/17/2007 8:21 AM											
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U										

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

STL Knoxville

Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg Ana

Data File Name: M051707.PRN

Elem	Reporting Limit	Ck1ccb 5/17/2007 8:27 AM		Ck1ccb 5/17/2007 8:51 AM		Ck1ccb 5/17/2007 9:15 AM		Ck1ccb 5/17/2007 9:41 AM		Ck1ccb 5/17/2007 10:09 AM			
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.1	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U		

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

STL Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M051707. PRN

Element	PDS JWAGKA	Original Sample JWAGK	Spike Added	Percent Recovery
Hg	1.56	0.52	1.0	104

STL Knoxville

Mercury Data Reporting Form

Instrument Detection Limits

Units: ug/L (ppb)

IDL Completion Date: 12/14/2006

Instrument ID: Leeman HydraAA Hg An

Data File Name: M051707.PRN

Element	Wavelength (nm)	Reporting Limit	IDL
Hg	253.70	0.1	0.06

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Sample ID Nomenclature

The sample ID consists of 5 alpha-numeric characters followed by a suffix in the 6th position that designates the sample type:

Suffix	Sample Type:
B	Method Blank
C	Laboratory Control Sample
L	Laboratory Control Sample Duplicate
S	Matrix Spike
D	Matrix Spike Duplicate
X	Sample Duplicate
P	Serial Dilution
A	Post Digestion Spike
Z#	Dilution; # = Dilution Factor

Raw Data
Mercury

STL Knoxville
Mercury Analysis Cover Sheet

Scanned

Analyst	DKW	**Instrument**	**Leeman Hydra AA Mercury Analyzer**
Run Date	5/10/07	**Chart Name**	M051007

Daily Maintenance		**As Needed Maintenance**	
☑	Check tubing.	☐	Adjust/change Hg lamp.
☑	Check maintenance schedule flags.	☐	Clean or replace optical cell.
		☐	Lubricate pump and autosampler arm.
		☐	Change the drying tube.

```
--------------------------------------------------------------------------------
:       Instrument Upload                                   Run Log - Page  1 :
:       Started Fri May 11 09:10:41 2007 by WILBURND                          :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M051007.PRN;1                       :
--------------------------------------------------------------------------------
```

#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
1	CK2ICV	1.00	10-MAY-2007	08:10:56			HG
2	ICB	1.00	10-MAY-2007	08:13:07			HG
3	CRA	1.00	10-MAY-2007	08:15:03			HG
4	CK3CCV	1.00	10-MAY-2007	08:16:49			HG
5	CK1CCB	1.00	10-MAY-2007	08:18:39			HG
6	JWE4MBT	1.00	10-MAY-2007	08:20:37	7128346	H7E070000	HG
7	JWHCHCT	1.00	10-MAY-2007	08:22:24	7128346	H7E080000	HG
8	JV36RT	1.00	10-MAY-2007	08:24:13	7128346	H7E020140	HG
9	JV36RST	1.00	10-MAY-2007	08:26:00	7128346	H7E020140	HG
10	JV36RDT	1.00	10-MAY-2007	08:27:59	7128346	H7E020140	HG
11	JWFFGB	0.25	10-MAY-2007	08:30:38	7127421	H7E070000	HG
12	JWFFGC	0.25	10-MAY-2007	08:34:38	7127421	H7E070000	HG
13	JWAFW	0.70	10-MAY-2007	08:36:59	7127421	H7E040218	HG
14	JWAFWS	0.70	10-MAY-2007	08:38:46	7127421	H7E040218	HG
15	JWAFWD	0.70	10-MAY-2007	08:40:56	7127421	H7E040218	HG
16	CK3CCV	1.00	10-MAY-2007	08:42:43			HG
17	CK1CCB	1.00	10-MAY-2007	08:44:33			HG
18	JWAGP	0.73	10-MAY-2007	08:46:33	7127421	H7E040218	HG
19	JWAHL	0.68	10-MAY-2007	08:48:29	7127421	H7E040218	HG
20	JWAJH	0.68	10-MAY-2007	08:50:17	7127421	H7E040218	HG
21	JWAKK	0.70	10-MAY-2007	08:52:26	7127421	H7E040218	HG
22	JWAMK	0.73	10-MAY-2007	08:54:13	7127421	H7E040218	HG
23	JWAND	0.25	10-MAY-2007	08:56:14	7127421	H7E040218	HG
24	JWFFKB	0.10	10-MAY-2007	08:58:03	7127427	H7E070000	HG
25	JWFFKC	0.10	10-MAY-2007	08:59:51	7127427	H7E070000	HG
26	JWAFR	1.41	10-MAY-2007	09:01:42	7127427	H7E040218	HG
27	JWAFRS	1.41	10-MAY-2007	09:03:31	7127427	H7E040218	HG
28	CK3CCV	1.00	10-MAY-2007	09:05:20			HG
29	CK1CCB	1.00	10-MAY-2007	09:07:16			HG
30	JWAFRD	1.41	10-MAY-2007	09:09:23	7127427	H7E040218	HG
31	JWAGN	1.41	10-MAY-2007	09:11:10	7127427	H7E040218	HG
32	JWAHH	1.41	10-MAY-2007	09:12:57	7127427	H7E040218	HG
33	JWAJA	1.06	10-MAY-2007	09:15:15	7127427	H7E040218	HG
34	JWAKG	1.19	10-MAY-2007	09:17:04	7127427	H7E040218	HG
35	JWAMG	1.11	10-MAY-2007	09:19:22	7127427	H7E040218	HG
36	JWAM8	0.10	10-MAY-2007	09:21:29	7127427	H7E040218	HG
37	JWFFNB	0.10	10-MAY-2007	09:23:17	7127428	H7E070000	HG
38	JWFFNC	0.10	10-MAY-2007	09:25:30	7127428	H7E070000	HG
39	JWAFX	0.93	10-MAY-2007	09:27:42	7127428	H7E040218	HG
40	CK3CCV	1.00	10-MAY-2007	09:30:13			HG
41	CK1CCB	1.00	10-MAY-2007	09:32:13			HG
42	JWAFXS	0.93	10-MAY-2007	09:34:10	7127428	H7E040218	HG
43	JWAFXD	0.93	10-MAY-2007	09:35:57	7127428	H7E040218	HG
44	JWAGR	1.02	10-MAY-2007	09:37:47	7127428	H7E040218	HG

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:       Instrument Upload                                   Run Log - Page  2 :
:       Started Fri May 11 09:10:41 2007 by WILBURND                          :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M051007.PRN;1                       :
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#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
45	JWAHM	0.92	10-MAY-2007	09:39:37	7127428	H7E040218	HG
46	JWAJR	0.92	10-MAY-2007	09:41:25	7127428	H7E040218	HG
47	JWAK0	0.92	10-MAY-2007	09:43:24	7127428	H7E040218	HG
48	JWAMP	0.97	10-MAY-2007	09:45:13	7127428	H7E040218	HG
49	JWANG	0.11	10-MAY-2007	09:47:21	7127428	H7E040218	HG
50	JWJG6B	1.00	10-MAY-2007	09:49:08	7129089	H7E090000	HG
51	JWJG6C	1.00	10-MAY-2007	09:51:00	7129089	H7E090000	HG
52	CK3CCV	1.00	10-MAY-2007	09:52:51			HG
53	CK1CCB	1.00	10-MAY-2007	09:54:38			HG
54	JV7R5	2.10	10-MAY-2007	09:56:46	7129089	H7E030258	HG
55	JV7VF	2.20	10-MAY-2007	09:59:27	7129089	H7E030258	HG
56	JV7VFS	2.20	10-MAY-2007	10:01:28	7129089	H7E030258	HG
57	JV7VFD	2.20	10-MAY-2007	10:03:47	7129089	H7E030258	HG
58	JV7VL	2.10	10-MAY-2007	10:05:35	7129089	H7E030258	HG
59	JV7WG	2.10	10-MAY-2007	10:08:22	7129089	H7E030258	HG
60	JWFGW	2.20	10-MAY-2007	10:10:10	7129089	H7E070168	HG
61	JWFGWS	2.20	10-MAY-2007	10:12:30	7129089	H7E070168	HG
62	JWFGWD	2.20	10-MAY-2007	10:15:19	7129089	H7E070168	HG
63	JWFJD	2.10	10-MAY-2007	10:17:07	7129089	H7E070168	HG
64	CK3CCV	1.00	10-MAY-2007	10:18:57			HG
65	CK1CCB	1.00	10-MAY-2007	10:21:14			HG
66	JWFJ2	2.10	10-MAY-2007	10:23:01	7129089	H7E070168	HG
67	JWFKG	2.20	10-MAY-2007	10:25:50	7129089	H7E070168	HG
68	JWJG8B	0.10	10-MAY-2007	10:27:51	7129090	H7E090000	HG
69	JWJG8C	0.10	10-MAY-2007	10:29:42	7129090	H7E090000	HG
70	JV7TF	0.74	10-MAY-2007	10:31:38	7129090	H7E030258	HG
71	JV7VG	0.77	10-MAY-2007	10:33:49	7129090	H7E030258	HG
72	JV7VGS	0.77	10-MAY-2007	10:35:37	7129090	H7E030258	HG
73	JV7VGD	0.77	10-MAY-2007	10:37:29	7129090	H7E030258	HG
74	JV7VQ	0.77	10-MAY-2007	10:39:31	7129090	H7E030258	HG
75	JV7WH	0.76	10-MAY-2007	10:41:21	7129090	H7E030258	HG
76	CK3CCV	1.00	10-MAY-2007	10:43:21			HG
77	CK1CCB	1.00	10-MAY-2007	10:45:07			HG
78	JV880	0.27	10-MAY-2007	10:46:54	7129090	H7E030258	HG
79	JWFG1	0.80	10-MAY-2007	10:48:46	7129090	H7E070168	HG
80	JWFG1S	0.80	10-MAY-2007	10:50:45	7129090	H7E070168	HG
81	JWFG1D	0.80	10-MAY-2007	10:52:48	7129090	H7E070168	HG
82	JWFHN	0.20	10-MAY-2007	10:54:39	7129090	H7E070168	HG
83	JWFJE	0.77	10-MAY-2007	10:56:27	7129090	H7E070168	HG
84	JWFJ4	0.77	10-MAY-2007	10:58:28	7129090	H7E070168	HG
85	JWFKJ	0.80	10-MAY-2007	11:00:42	7129090	H7E070168	HG
86	JWE4MBT	1.00	10-MAY-2007	11:05:38	7128346	H7E070000	HG
87	JWFHN	0.20	10-MAY-2007	11:07:30	7129090	H7E070168	HG
88	CK3CCV	1.00	10-MAY-2007	11:09:49			HG

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--------------------------------------------------------------------------------
:       Instrument Upload                                   Run Log - Page  3 :
:       Started Fri May 11 09:10:41 2007 by WILBURND                          :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M051007.PRN;1                       :
--------------------------------------------------------------------------------
```

#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
89	CK1CCB	1.00	10-MAY-2007	11:12:26			HG
90	JWFG1Z10	8.00	10-MAY-2007	11:14:33	7129090	H7E070168	HG
91	JWFG1SZ10	8.00	10-MAY-2007	11:16:21	7129090	H7E070168	HG
92	JWFG1DZ10	8.00	10-MAY-2007	11:18:51	7129090	H7E070168	HG
93	CK3CCV	1.00	10-MAY-2007	11:20:39			HG
94	CK1CCB	1.00	10-MAY-2007	11:22:37			HG

---------- End of Report ----------

STL Knoxville

Method Information

Method Name: Ontario-Hydro Method **Element:** Hg **Chart Number:** m051007.prn

Instrument Calibrated Every ? Hours:	24	**Number of Calibration Standards:**	6
Correlation Coefficient >/=:	0.995	**Run ICV Immediately After Calibration?:**	Yes
CRA Required?:	Yes	**Number of Samples Between CCVs:**	10
Duplicate RPD:	20	**Calculate Duplicates by CLP or SW-846?:**	SW-846 Protocol

CRA Recovery Range:	30.5	**CRA Conc. (ug/L):**	0.2
ICV Recovery Range:	10.5	**ICV Conc. (ug/L):**	2.5
CCV Recovery Range:	20.5	**CCV Conc. (ug/L):**	5
LCS Recovery Range:	20.5	**LCS Spike Level (ug/L):**	5
MS/MSD Recovery Range:	20.5	**MS Spike Level (ug/L):**	1

Letter to Signify Blanks:	B	**Position to Signify Blanks:**	6
Letter to Signify LCS's:	C	**Position to Signify LCS's:**	6
Letter to Signify LCSD's:	L	**Position to Signify LCSD's:**	6
Letter to Signify Dilutions:	Z	**Position to Signify Dilutions:**	6
Letter to Signify Duplicates:	X	**Position to Signify Duplicates:**	6
Letter to Signify MS's:	S	**Position to Signify MS's:**	6
Letter to Signify MSD's:	D	**Position to Signify MSD's:**	6
Letters to Signify MSA's:	MSA+	**Position to Signify MSA's:**	6
Number of Additions:	3		

Calibration Standard Concentrations (ug/L)

Standard 1 Conc: 0.1	**Standard 2 Conc:** 0.2	**Standard 3 Conc:** 0.5	**Standard 4 Conc:** 1
Standard 5 Conc: 5	**Standard 6 Conc:** 10	**Standard 7 Conc:** 0	**Standard 8 Conc:** 0

ICB/CCB Check Level (ug/L): 0.099 **Prep Blank Check Level (ug/L):** 0.099 **Reporting Limit (ug/L):** 0.1

IDL (ug/L): 0.06 **Date of IDL:** 12/14/2006

STL Knoxville Mercury Data Review Checklist

Method: Ontario-Hydro Method

Analyst:	DKW			**Instrument:**	Leeman Hydra AA Mercury Analyzer		
Run Date:	May-10-07	**Calibration Number:**	1	**Chart Name:**	m051007.prn	**Element:**	Hg

A. Calibration/Instrument Run QC		**N/A**	**Yes**	**No**	**Comments**
1.	Instrument calibrated every 24 hours?		X		Calibration was 3 hours and 26 minutes long
2.	Instrument calibrated using a minimum of a blank and 5 standards?		X		
3.	Do standard absorbances increase as standard concentrations increase?		X		
4.	Instrument calibrated with standards at the SOP levels?		X		
5.	Correlation coefficient greater than or equal to 0.995?		X		Correlation coefficient was 0.9999
6.	ICV analyzed directly after calibration?		X		
7.	ICV within specified control limits?		X		
8.	ICB analyzed immediately after ICV?		X		
9.	ICB within acceptable range?		X		
10.	CRA analyzed at the beginning of the run?		X		
11.	CRA results within acceptable range?		X		
12.	All CCV's within specified control limits?		X		
13.	All CCB's within acceptable range?		X		
14.	All CCB's analyzed immediately after CCV's?		X		
B. Client Sample and QC Sample Results					
1.	Were all sample results within the linear range of the instrument ?			X	See Comments on Next Page
2.	Were there any samples with results more negative than Report Limit?		X		See Comments on Next Page
3.	Were samples analyzed within the holding time?		X		
C. Preparation/Matrix QC					
1.	Was one method blank prepared for each batch?		X		
2.	Were all method blanks less than the specified level?			X	See Comments on Next Page
3.	Was an LCS prepared for each batch?		X		
4.	Were all LCS recoveries within QC limits?		X		
5.	Were matrix spikes, sample duplicates and/or post-digestion spikes run at required frequency?		X		
6.	Were all matrix spike recoveries within QC limits?			X	See Comments on Next Page
7.	Were post-digestion spike recoveries within QC limits?	X			
8.	Were duplicate RPDs within QC limits?		X		
D. Other					
1.	Current IDL data on file?		X		
2.	Current MDL data on file?		X		
3.	Are all nonconformances documented appropriately? DKW 5/15/07	X	X		
4.	Were all project specific instructions followed?		X		NCM#: 08-0006992

Question Number:	Problem(s) Found:
B1	Sample JWFG1S at 5/10/2007 10:50:45 AM exceeded linear range and an acceptable dilution was NOT found. } DILUTED
B1	Sample JWFG1D at 5/10/2007 10:52:48 AM exceeded linear range and an acceptable dilution was NOT found. } DILUTED
B2	Sample JWFHN at 5/10/2007 10:54:39 AM: Original sample is more negative than report limit. Dilute sample and re-analyze. PREVEIOUS SAMPLE ABOVE CALIBRATION LIMIT. REANALYZED
C2	Method Blank JWE4MBT at 5/10/2007 8:20:37 AM had 0.92 ppb contamination. } TO BE RE-DIGESTED
C2	Method Blank JWE4MBT at 5/10/2007 11:05:38 AM had 0.95 ppb contamination. } TO BE RE-DIGESTED

STL Knoxville Mercury Data Review Checklist

C6 Matrix spike sample JV36RST at 5/10/2007 8:26:00 AM had 513.5% recovery.
C6 Matrix spike sample JV36RDT at 5/10/2007 8:27:59 AM had 532.5% recovery.
} TO BE RE-DIGESTED METHOD BLANK ELEVATED

C6 Matrix spike sample JWAFXD at 5/10/2007 9:35:57 AM had 144% recovery. MSB, NC

C6 Matrix spike sample JWFG1S at 5/10/2007 10:50:45 AM had 69.99% recovery.
C6 Matrix spike sample JWFG1D at 5/10/2007 10:52:48 AM had 19.99% recovery.
C6 Matrix spike sample JWFG1SZ10 at 5/10/2007 11:16:21 AM had 5.000% recovery.
C6 Matrix spike sample JWFG1DZ10 at 5/10/2007 11:18:51 AM had 8.000% recovery.
} MSB, NC

Analyst: DKW **Date:** 5/10/07

Analyst Comments:

STL KNOXVILLE

INTERMEDIATE STANDARD -- CALIBRATION

Stock Std Name: PLHG-2Y
Element: Hg
Stock Source: Spex
Stock Std Lot #: 12-1608HG
Stock Std Expiration Date: 4/30/2008
Stock Conc.: 1000 ppm
HNO_3 Lot B44032

Stock Vol (ml)/100ml: 1ml
Date Prepared: 5-1-07
Expiration Date: 6-1-07
QC Check: M050207
Initials: DKW
Matrix: 2% HNO_3

WORKING STANDARD -- CALIBRATION

One ml Intermediate Standard/100ml 0.15% Concentrated Nitric Acid

1.	I-CAL	3425-10-1	Initials	DKW	Date:	050107	Exp. Date:	050207	HN03 Lot: B44032
2.	I-CAL	3425-10-2	Initials	DKW	Date:	050707	Exp. Date:	050807	HN03 Lot: B44032
3.	I-CAL	3425-10-3	Initials	KND	Date:	5/8/07	Exp. Date:	5/9/07	HN03 Lot: B44032
4.	I-CAL	3425-10-4	Initials	DKW	Date:	050907	Exp. Date:	05/10/07	HN03 Lot: B44032
5.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
6.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
7.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
8.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
9.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
10.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
11.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
12.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
13.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
14.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
15.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
16.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
17.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
18.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
19.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
20.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
21.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
22.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
23.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
24.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
25.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:

STL KNOXVILLE

INTERMEDIATE STANDARD – VERIFICATION

Stock Std Name: ICP-080
Element: Hg
Stock Source: Ultra
Stock Std Lot #: F00424
Stock Std Expiration Date: 08-31-08
Stock Conc.: 1000 ppm
Acid Lot: B44032

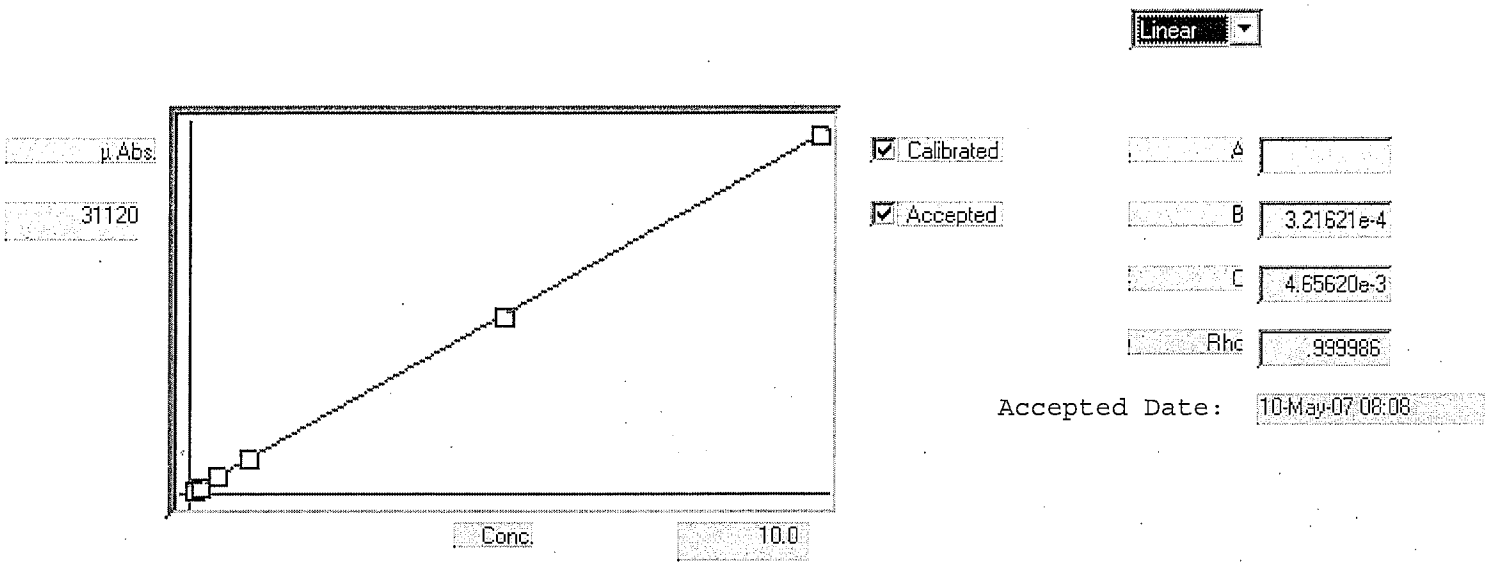
Stock Vol (ml)/100ml: 1.0 ml
Date Prepared: 5-1-07
Expiration Date: 6-1-07
QC Check: M050207
Initials: DKW
Matrix: 2% HNO_3

WORKING STANDARD – VERIFICATION

1 ml Intermediate Standard/100 ml 0.15 % Concentrated Nitric Acid

1. I-VER 3426-11-1	Initials DKW	Date: 050107	Exp. Date: 050207	HN03 Lot: B44032
2. I-VER 3426-11-2	Initials DKW	Date: 050807	Exp. Date: 050807	HN03 Lot: B44032
3. I-VER 3426-11-3	Initials DKW	Date: 050907	Exp. Date: 050907 10 DKW 5/9/07	HN03 Lot: B44032
4. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
5. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
6. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
7. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
8. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
9. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
10. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
11. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
12. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
13. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
14. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
15. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
16. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
17. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
18. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
19. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
20. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
21. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
22. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
23. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
24. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
25. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:

Protocol: 7ptcurve



S	Conc.	Calc.	Dev.	Mean	SD or %RSD	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
01	.00000	-.026	-.026	-95	1	-95				
02	.10000	.105	.005	313	0%	313				
03	.20000	.210	.010	639	0%	638				
04	.50000	.521	.021	1604	0%	1604				
05	1.0000	1.01	.008	3121	0%	3121				
06	5.0000	4.97	-.032	15433	0%	15433				
07	10.000	10.0	.014	31120	0%	31120				
08										
09										
10										

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Standard: 1 Rep: 1              Seq:  0       07:56:08 10 May 07   HG

Hg    .000    ppb      -95

*** Standard: 2 Rep: 1              Seq:  1       07:58:27 10 May 07   HG

Hg    .100    ppb      313

*** Standard: 3 Rep: 1              Seq:  2       08:00:17 10 May 07   HG

Hg    .200    ppb      638

*** Standard: 4 Rep: 1              Seq:  3       08:02:06 10 May 07   HG

Hg    .500    ppb      1604

*** Standard: 5 Rep: 1              Seq:  4       08:04:26 10 May 07   HG

Hg    1.00    ppb      3121

*** Standard: 6 Rep: 1              Seq:  5       08:06:26 10 May 07   HG

Hg    5.00    ppb      15433

*** Standard: 7 Rep: 1              Seq:  6       08:08:18 10 May 07   HG

Hg    10.0    ppb      31120

*** Check Standard: 2  Ck2icv       Seq:  7       08:10:56 10 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          101.     2.53    2.50  ppb         .000  %

*** Sample ID: ICB                  Seq:  8       08:13:07 10 May 07   HG
                            ICB
Hg    .049    ppb       .000  %   .049

*** Sample ID: CRA                  Seq:  9       08:15:03 10 May 07   HG
                            CRA
Hg    .211    ppb       .000  %   .211

*** Check Standard: 3  Ck3ccv       Seq:  10      08:16:49 10 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          106.     5.32    5.00  ppb         .000  %

*** Check Standard: 1  Ck1ccb       Seq:  11      08:18:39 10 May 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.008     .059     ppb        .000  %

*** Sample ID: JWE4MBT              Seq:  12      08:20:37 10 May 07   HG
                            7128346
REANALYZE Hg    .929    ppb       .000  %   .929

*** Sample ID: JWHCHCT              Seq:  13      08:22:24 10 May 07   HG

Hg    5.55    ppb       .000  %   5.55

*** Sample ID: JV36RT               Seq:  14      08:24:13 10 May 07   HG

Hg    .005    ppb       .000  %   .005

*** Sample ID: JV36RST              Seq:  15      08:26:00 10 May 07   HG

Hg    5.14    ppb       .000  %   5.14
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-------------------------------------------------------------------------------

*** Sample ID: JV36RDT                Seq:  16     08:27:59 10 May 07   HG

Hg    5.33    ppb       .000  %   5.33

*** Sample ID: JWFFGB                 Seq:  17     08:30:38 10 May 07   HG
                            7127421
Hg    .022    ppb       .000  %   .022

*** Sample ID: JWFFGC                 Seq:  18     08:34:38 10 May 07   HG

Hg    4.30    ppb       .000  %   4.30

*** Sample ID: JWAFW                  Seq:  19     08:36:59 10 May 07   HG

Hg    .216    ppb       .000  %   .216

*** Sample ID: JWAFWS                 Seq:  20     08:38:46 10 May 07   HG

Hg    1.20    ppb       .000  %   1.20

*** Sample ID: JWAFWD                 Seq:  21     08:40:56 10 May 07   HG

Hg    1.23    ppb       .000  %   1.23

*** Check Standard: 3  Ck3ccv         Seq:  22     08:42:43 10 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          107.    5.37    5.00  ppb        .000  %

*** Check Standard: 1  Ck1ccb         Seq:  23     08:44:33 10 May 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.046    .059    ppb        .000  %

*** Sample ID: JWAGP                  Seq:  24     08:46:33 10 May 07   HG

Hg    .262    ppb       .000  %   .262

*** Sample ID: JWAHL                  Seq:  25     08:48:29 10 May 07   HG

Hg    .169    ppb       .000  %   .169

*** Sample ID: JWAJH                  Seq:  26     08:50:17 10 May 07   HG

Hg    .198    ppb       .000  %   .198

*** Sample ID: JWAKK                  Seq:  27     08:52:26 10 May 07   HG

Hg    .224    ppb       .000  %   .224

*** Sample ID: JWAMK                  Seq:  28     08:54:13 10 May 07   HG

Hg    .235    ppb       .000  %   .235

*** Sample ID: JWAND                  Seq:  29     08:56:14 10 May 07   HG

Hg    .288    ppb       .000  %   .288

*** Sample ID: JWFFKB                 Seq:  30     08:58:03 10 May 07   HG
                            7127427
Hg    .005    ppb       .000  %   .005

*** Sample ID: JWFFKC                 Seq:  31     08:59:51 10 May 07   HG

Hg    4.74    ppb       .000  %   4.74
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Sample ID: JWAFR                    Seq:  32     09:01:42 10 May 07   HG

Hg    1.29    ppb       .000  %   1.29

*** Sample ID: JWAFRS                   Seq:  33     09:03:31 10 May 07   HG

Hg    2.31    ppb       .000  %   2.31

*** Check Standard: 3  Ck3ccv           Seq:  34     09:05:20 10 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          106.     5.30    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb           Seq:  35     09:07:16 10 May 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.008     .059     ppb        .000  %

*** Sample ID: JWAFRD                   Seq:  36     09:09:23 10 May 07   HG

Hg    2.24    ppb       .000  %   2.24

*** Sample ID: JWAGN                    Seq:  37     09:11:10 10 May 07   HG

Hg    1.29    ppb       .000  %   1.29

*** Sample ID: JWAHH                    Seq:  38     09:12:57 10 May 07   HG

Hg    1.18    ppb       .000  %   1.18

*** Sample ID: JWAJA                    Seq:  39     09:15:15 10 May 07   HG

Hg    .615    ppb       .000  %   .615

*** Sample ID: JWAKG                    Seq:  40     09:17:04 10 May 07   HG

Hg    .483    ppb       .000  %   .483

*** Sample ID: JWAMG                    Seq:  41     09:19:22 10 May 07   HG

Hg    .650    ppb       .000  %   .650

*** Sample ID: JWAM8                    Seq:  42     09:21:29 10 May 07   HG

Hg    .157    ppb       .000  %   .157

*** Sample ID: JWFFNB                   Seq:  43     09:23:17 10 May 07   HG
                              7127428
Hg   -.042    ppb       .000  %  -.042

*** Sample ID: JWFFNC                   Seq:  44     09:25:30 10 May 07   HG

Hg    4.84    ppb       .000  %   4.84

*** Sample ID: JWAFX                    Seq:  45     09:27:42 10 May 07   HG

Hg    7.17    ppb       .000  %   7.17

*** Check Standard: 3  Ck3ccv           Seq:  46     09:30:13 10 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          105.     5.23    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb           Seq:  47     09:32:13 10 May 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg          .002     .059     ppb        .000  %
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Sample ID: JWAFXS                Seq:  48     09:34:10 10 May 07   HG

Hg    8.11    ppb       .000  %   8.11

*** Sample ID: JWAFXD                Seq:  49     09:35:57 10 May 07   HG

Hg    8.61    ppb       .000  %   8.61

*** Sample ID: JWAGR                 Seq:  50     09:37:47 10 May 07   HG

Hg    7.12    ppb       .000  %   7.12

*** Sample ID: JWAHM                 Seq:  51     09:39:37 10 May 07   HG

Hg    7.24    ppb       .000  %   7.24

*** Sample ID: JWAJR                 Seq:  52     09:41:25 10 May 07   HG

Hg    2.88    ppb       .000  %   2.88

*** Sample ID: JWAK0                 Seq:  53     09:43:24 10 May 07   HG

Hg    3.35    ppb       .000  %   3.35

*** Sample ID: JWAMP                 Seq:  54     09:45:13 10 May 07   HG

Hg    2.89    ppb       .000  %   2.89

*** Sample ID: JWANG                 Seq:  55     09:47:21 10 May 07   HG

Hg    .009    ppb       .000  %   .009

*** Sample ID: JWJG6B                Seq:  56     09:49:08 10 May 07   HG
                            7129089
Hg   -.003    ppb       .000  %  -.003

*** Sample ID: JWJG6C                Seq:  57     09:51:00 10 May 07   HG

Hg    4.86    ppb       .000  %   4.86

*** Check Standard: 3  Ck3ccv        Seq:  58     09:52:51 10 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          105.    5.25    5.00  ppb        .000  %

*** Check Standard: 1  Ck1ccb        Seq:  59     09:54:38 10 May 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.018     .059    ppb        .000  %

*** Sample ID: JV7R5                 Seq:  60     09:56:46 10 May 07   HG

Hg    .006    ppb       .000  %   .006

*** Sample ID: JV7VF                 Seq:  61     09:59:27 10 May 07   HG

Hg    .011    ppb       .000  %   .011

*** Sample ID: JV7VFS                Seq:  62     10:01:28 10 May 07   HG

Hg    1.00    ppb       .000  %   1.00

*** Sample ID: JV7VFD                Seq:  63     10:03:47 10 May 07   HG

Hg    1.01    ppb       .000  %   1.01
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Sample ID: JV7VL                    Seq:  64     10:05:35 10 May 07   HG

Hg   -.031    ppb       .000  %  -.031

*** Sample ID: JV7WG                    Seq:  65     10:08:22 10 May 07   HG

Hg    .020    ppb       .000  %   .020

*** Sample ID: JWFGW                    Seq:  66     10:10:10 10 May 07   HG

Hg    .005    ppb       .000  %   .005

*** Sample ID: JWFGWS                   Seq:  67     10:12:30 10 May 07   HG

Hg    1.08    ppb       .000  %   1.08

*** Sample ID: JWFGWD                   Seq:  68     10:15:19 10 May 07   HG

Hg    1.09    ppb       .000  %   1.09

*** Sample ID: JWFJD                    Seq:  69     10:17:07 10 May 07   HG

Hg   -.019    ppb       .000  %  -.019

*** Check Standard: 3  Ck3ccv           Seq:  70     10:18:57 10 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          106.     5.32    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb           Seq:  71     10:21:14 10 May 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.034     .059     ppb        .000  %

*** Sample ID: JWFJ2                    Seq:  72     10:23:01 10 May 07   HG

Hg    .029    ppb       .000  %   .029

*** Sample ID: JWFKG                    Seq:  73     10:25:50 10 May 07   HG

Hg    .049    ppb       .000  %   .049

*** Sample ID: JWJG8B                   Seq:  74     10:27:51 10 May 07   HG
                              7129090
Hg    .012    ppb       .000  %   .012

*** Sample ID: JWJG8C                   Seq:  75     10:29:42 10 May 07   HG

Hg    5.05    ppb       .000  %   5.05

*** Sample ID: JV7TF                    Seq:  76     10:31:38 10 May 07   HG

Hg    .012    ppb       .000  %   .012

*** Sample ID: JV7VG                    Seq:  77     10:33:49 10 May 07   HG

Hg    .016    ppb       .000  %   .016

*** Sample ID: JV7VGS                   Seq:  78     10:35:37 10 May 07   HG

Hg    1.11    ppb       .000  %   1.11

*** Sample ID: JV7VGD                   Seq:  79     10:37:29 10 May 07   HG

Hg    .994    ppb       .000  %   .994
```

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Sample ID: JV7VQ                  Seq:  80     10:39:31 10 May 07   HG

Hg     .003    ppb       .000  %   .003

*** Sample ID: JV7WH                  Seq:  81     10:41:21 10 May 07   HG

Hg     .004    ppb       .000  %   .004

*** Check Standard: 3  Ck3ccv         Seq:  82     10:43:21 10 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          105.     5.27    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb         Seq:  83     10:45:07 10 May 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.015     .059     ppb        .000  %

*** Sample ID: JV880                  Seq:  84     10:46:54 10 May 07   HG

Hg     .011    ppb       .000  %   .011

*** Sample ID: JWFG1                  Seq:  85     10:48:46 10 May 07   HG

Hg     21.5    ppb       .000  %   21.5

*** Sample ID: JWFG1S                 Seq:  86     10:50:45 10 May 07   HG

Hg     22.2    ppb       .000  %   22.2

*** Sample ID: JWFG1D                 Seq:  87     10:52:48 10 May 07   HG

Hg     21.7    ppb       .000  %   21.7

*** Sample ID: JWFHN                  Seq:  88     10:54:39 10 May 07   HG

Hg    -.111    ppb       .000  %  -.111

*** Sample ID: JWFJE                  Seq:  89     10:56:27 10 May 07   HG

Hg     3.45    ppb       .000  %   3.45

*** Sample ID: JWFJ4                  Seq:  90     10:58:28 10 May 07   HG

Hg     .026    ppb       .000  %   .026

*** Sample ID: JWFKJ                  Seq:  91     11:00:42 10 May 07   HG

Hg     6.60    ppb       .000  %   6.60

*** Sample ID: JWE4MBT                Seq:  92     11:05:38 10 May 07   HG
                              RE-CHECK
Hg     .957    ppb       .000  %   .957

*** Sample ID: JWFHN                  Seq:  93     11:07:30 10 May 07   HG
                              RE-CHECK
Hg    -.027    ppb       .000  %  -.027

*** Check Standard: 3  Ck3ccv         Seq:  94     11:09:49 10 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          105.     5.24    5.00   ppb        .000  %

*** Check Standard: 1  Ck1ccb         Seq:  95     11:12:26 10 May 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg          .040     .059     ppb        .000  %
```

DILUTE

RE-ANALYZE PREVIOUS SAMPLE HIGH

Line	Conc.	Units	SD/RSD	1	2	3	4	5

*** Sample ID: JWFG1Z10 Seq: 96 11:14:33 10 May 07 HG

Hg	2.15	ppb	.000	%	2.15

*** Sample ID: JWFG1SZ10 Seq: 97 11:16:21 10 May 07 HG

Hg	2.20	ppb	.000	%	2.20

*** Sample ID: JWFG1DZ10 Seq: 98 11:18:51 10 May 07 HG

Hg	2.23	ppb	.000	%	2.23

*** Check Standard: 3 Ck3ccv Seq: 99 11:20:39 10 May 07 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD	
Hg		106.	5.32	5.00	ppb	.000	%

*** Check Standard: 1 Ck1ccb Seq: 100 11:22:37 10 May 07 HG

Line	Flag	Found	Range(+/-)	Units	SD/RSD	
Hg		.038	.059	ppb	.000	%

STL Knoxville
Mercury Analysis Cover Sheet

Analyst	DKW	**Instrument**	**Leeman Hydra AA Mercury Analyzer**
Run Date	05/17/07	**Chart Name**	M051707

Daily Maintenance		**As Needed Maintenance**	
☑	Check tubing.	☐	Adjust/change Hg lamp.
☑	Check maintenance schedule flags.	☐	Clean or replace optical cell.
		☐	Lubricate pump and autosampler arm.
		☐	Change the drying tube.

```
-----------------------------------------------------------------------------
:       Instrument Upload                                   Run Log - Page  1 :
:       Started Thu May 17 08:55:28 2007 by WILBURND                          :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M051707.PRN;1                       :
-----------------------------------------------------------------------------
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#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
1	CK2ICV	1.00	17-MAY-2007	08:19:54			HG
2	ICB	1.00	17-MAY-2007	08:21:41			HG
3	CRA	1.00	17-MAY-2007	08:23:27			HG
4	CK3CCV	1.00	17-MAY-2007	08:25:13			HG
5	CK1CCB	1.00	17-MAY-2007	08:27:29			HG
6	JWXH9BT	1.00	17-MAY-2007	08:29:25	7135462	H7E140000	HG
7	JW2DACT	1.00	17-MAY-2007	08:31:26	7135462	H7E150000	HG
8	JWQNGT	1.00	17-MAY-2007	08:33:14	7135462	H7E110126	HG
9	JWPEDT	1.00	17-MAY-2007	08:35:02	7135462	H7E100314	HG
10	JWPEDST	1.00	17-MAY-2007	08:37:20	7135462	H7E100314	HG
11	JWPEDDT	1.00	17-MAY-2007	08:39:09	7135462	H7E100314	HG
12	JWWQHB	0.10	17-MAY-2007	08:40:57	7134095	H7E140000	HG
13	JWWQHC	0.10	17-MAY-2007	08:43:16	7134095	H7E140000	HG
14	JWWQHL	0.10	17-MAY-2007	08:45:44	7134095	H7E140000	HG
15	JWAKF	0.50	17-MAY-2007	08:47:32	7134095	H7E040218	HG
16	CK3CCV	1.00	17-MAY-2007	08:49:30			HG
17	CK1CCB	1.00	17-MAY-2007	08:51:46			HG
18	JWAGK	0.10	17-MAY-2007	08:53:36	7134095	H7E040218	HG
19	JWAHE	0.10	17-MAY-2007	08:55:22	7134095	H7E040218	HG
20	JWAH7	0.50	17-MAY-2007	08:57:31	7134095	H7E040218	HG
21	JWA~~KF~~ FK Dew 5/18/07	0.10	17-MAY-2007	08:59:18	7134095	H7E040218	HG
22	JWAL3	0.50	17-MAY-2007	09:01:05	7134095	H7E040218	HG
23	JWAM2	0.10	17-MAY-2007	09:03:03	7134095	H7E040218	HG
24	JWAPF	0.10	17-MAY-2007	09:04:56	7134095	H7E040218	HG
25	JWAPP	0.10	17-MAY-2007	09:07:43	7134095	H7E040218	HG
26	JW2DPB	1.00	17-MAY-2007	09:09:41	7136046	H7E160000	HG
27	JW2DPC	1.00	17-MAY-2007	09:11:28	7136046	H7E160000	HG
28	CK3CCV	1.00	17-MAY-2007	09:13:16			HG
29	CK1CCB	1.00	17-MAY-2007	09:15:24			HG
30	JW2DPL	1.00	17-MAY-2007	09:17:22	7136046	H7E160000	HG
31	JWFGE	1.00	17-MAY-2007	09:19:33	7136046	H7E070168	HG
32	JWFG8	1.00	17-MAY-2007	09:21:19	7136046	H7E070168	HG
33	JWFH4	1.00	17-MAY-2007	09:23:31	7136046	H7E070168	HG
34	JWFJN	1.00	17-MAY-2007	09:27:16	7136046	H7E070168	HG
35	JWFKE	1.00	17-MAY-2007	09:29:04	7136046	H7E070168	HG
36	JWFMK	1.00	17-MAY-2007	09:30:55	7136046	H7E070168	HG
37	JWFGEA	1.00	17-MAY-2007	09:34:05	7136046	H7E070168	HG
38	JWAFKA	1.00	17-MAY-2007	09:36:07	7134095	H7E040218	HG
39	JWM3FBT	1.00	17-MAY-2007	09:37:59	7136191	H7E100000	HG
40	CK3CCV	1.00	17-MAY-2007	09:39:52			HG
41	CK1CCB	1.00	17-MAY-2007	09:41:40			HG
42	JW2WCCT	1.00	17-MAY-2007	09:43:29	7136191	H7E160000	HG
43	JWMXKT	1.00	17-MAY-2007	09:45:16	7136191	H7E100161	HG
44	JWMXKST	1.00	17-MAY-2007	09:47:35	7136191	H7E100161	HG

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:       Instrument Upload                                    Run Log - Page  2 :
:       Started Thu May 17 08:55:28 2007 by WILBURND                           :
:       Data File: UPL$KNX_DATA_ROOT:<LHG>M051707.PRN;1                        :
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#	WorkOrder	Dilution	Date	Time	Batch	Lot	Instrument
45	JWMXKDT	1.00	17-MAY-2007	09:50:34	7136191	H7E100161	HG
46	TEST	1.00	17-MAY-2007	09:53:05			HG
47	JWAKFZ5	1.00	17-MAY-2007	09:55:07	7134095	H7E040218	HG
48	JWAH7Z5	1.00	17-MAY-2007	09:57:05	7134095	H7E040218	HG
49	JWAL3Z5	1.00	17-MAY-2007	09:59:12	7134095	H7E040218	HG
50	JWAGKA	1.00	17-MAY-2007	10:05:48	7134095	H7E040218	HG
51	CK3CCV	1.00	17-MAY-2007	10:07:37			HG
52	CK1CCB	1.00	17-MAY-2007	10:09:23			HG

---------- End of Report ----------

STL KNOXVILLE

INTERMEDIATE STANDARD -- CALIBRATION

Stock Std Name: PLHG-2Y
Element: Hg
Stock Source: Spex
Stock Std Lot #: 12-1684G
Stock Std Expiration Date: 4/30/2008
Stock Conc.: 1000 ppm
HNO_3 Lot B44032

Stock Vol (ml)/100ml: 1ml
Date Prepared: 5-1-07
Expiration Date: 6-1-07
QC Check: H050207
Initials: DKW
Matrix: 2% HNO_3

WORKING STANDARD -- CALIBRATION

One ml Intermediate Standard/100ml 0.15% Concentrated Nitric Acid

1.	I-CAL	3425-10-1	Initials	DKW	Date:	050107	Exp. Date:	050207	HN03 Lot: B44032
2.	I-CAL	3425-10-2	Initials	DKW	Date:	050707	Exp. Date:	050807	HN03 Lot: B44032
3.	I-CAL	3425-10-3	Initials	KND	Date:	5/8/07	Exp. Date:	5/9/07	HN03 Lot: B44032
4.	I-CAL	3425-10-4	Initials	DKW	Date:	050907	Exp. Date:	05/10/07	HN03 Lot: B44032
5.	I-CAL	3425-10-5	Initials	DKW	Date:	051007	Exp. Date:	05/11/07	HN03 Lot: B44032
6.	I-CAL	3425-10-6 DKW 051407	Initials	DKW	Date:	051407	Exp. Date:	051507	HN03 Lot: B44032
7.	I-CAL	3425-10-7	Initials	DKW	Date:	051607	Exp. Date:	051707	HN03 Lot: B44032
8.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
9.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
10.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
11.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
12.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
13.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
14.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
15.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
16.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
17.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
18.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
19.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
20.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
21.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
22.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
23.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
24.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:
25.	I-CAL		Initials		Date:		Exp. Date:		HN03 Lot:

STL KNOXVILLE

INTERMEDIATE STANDARD -- VERIFICATION

Stock Std Name: ICP-080
Element: Hg
Stock Source: Ultra
Stock Std Lot #: F00424
Stock Std Expiration Date: 08-31-08
Stock Conc.: 1000 ppm
Acid Lot: B44032

Stock Vol (ml)/100ml: 1.0 ml
Date Prepared: 5-1-07
Expiration Date: 6-1-07
QC Check: M050207
Initials: DKW
Matrix: 2% HNO_3

WORKING STANDARD -- VERIFICATION

1 ml Intermediate Standard/100 ml 0.15 % Concentrated Nitric Acid

1. I-VER 3426-11-1	Initials DKW	Date: 050107	Exp. Date: 050207	HN03 Lot: B44032
2. I-VER 3426-11-2	Initials DKW	Date: 050807	Exp. Date: 050807	HN03 Lot: B44032
3. I-VER 3426-11-3	Initials DKW	Date: 050907	Exp. Date: 050907 10 DKW 5/9/07	HN03 Lot: B44032
4. I-VER 3426-11-4	Initials DKW	Date: 051007	Exp. Date: 051107	HN03 Lot: B44032
5. I-VER 3426-11-5	Initials DKW	Date: 051407	Exp. Date: 051507	HN03 Lot: B44032
6. I-VER 3426-11-6	Initials DKW	Date 051607	Exp. Date: 051707	HN03 Lot: B44032
7. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
8. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
9. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
10. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
11. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
12. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
13. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
14. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
15. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
16. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
17. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
18. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
19. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
20. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
21. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
22. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
23. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
24. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:
25. I-VER	Initials	Date:	Exp. Date:	HN03 Lot:

STL Knoxville

Method Information

Method Name: Ontario-Hydro Method **Element:** Hg **Chart Number:** m051707.prn

Instrument Calibrated Every ? Hours:	24	**Number of Calibration Standards:**	6
Correlation Coefficient >/=:	0.995	**Run ICV Immediately After Calibration?:**	Yes
CRA Required?:	Yes	**Number of Samples Between CCVs:**	10
Duplicate RPD:	20	**Calculate Duplicates by CLP or SW-846?:**	SW-846 Protocol

CRA Recovery Range:	30.5	**CRA Conc. (ug/L):**	0.2
ICV Recovery Range:	10.5	**ICV Conc. (ug/L):**	2.5
CCV Recovery Range:	20.5	**CCV Conc. (ug/L):**	5
LCS Recovery Range:	20.5	**LCS Spike Level (ug/L):**	5
MS/MSD Recovery Range:	20.5	**MS Spike Level (ug/L):**	1

Letter to Signify Blanks:	B	**Position to Signify Blanks:**	6
Letter to Signify LCS's:	C	**Position to Signify LCS's:**	6
Letter to Signify LCSD's:	L	**Position to Signify LCSD's:**	6
Letter to Signify Dilutions:	Z	**Position to Signify Dilutions:**	6
Letter to Signify Duplicates:	X	**Position to Signify Duplicates:**	6
Letter to Signify MS's:	S	**Position to Signify MS's:**	6
Letter to Signify MSD's:	D	**Position to Signify MSD's:**	6
Letters to Signify MSA's:	MSA+	**Position to Signify MSA's:**	6
Number of Additions:	3		

Calibration Standard Concentrations (ug/L)

Standard 1 Conc: 0.1	**Standard 2 Conc:** 0.2	**Standard 3 Conc:** 0.5	**Standard 4 Conc:** 1
Standard 5 Conc: 5	**Standard 6 Conc:** 10	**Standard 7 Conc:** 0	**Standard 8 Conc:** 0

ICB/CCB Check Level (ug/L): 0.099 **Prep Blank Check Level (ug/L):** 0.099 **Reporting Limit (ug/L):** 0.1

IDL (ug/L): 0.06 **Date of IDL:** 12/14/2006

STL Knoxville Mercury Data Review Checklist

Method: Ontario-Hydro Method

Analyst:	DKW			**Instrument:**	Leeman Hydra AA Mercury Analyzer		
Run Date:	May-17-07	**Calibration Number:**	1	**Chart Name:**	m051707.prn	**Element:**	Hg

A. Calibration/Instrument Run QC		**N/A**	**Yes**	**No**	**Comments**
1.	Instrument calibrated every 24 hours?		X		Calibration was 2 hours and 3 minutes long
2.	Instrument calibrated using a minimum of a blank and 5 standards?		X		
3.	Do standard absorbances increase as standard concentrations increase?		X		
4.	Instrument calibrated with standards at the SOP levels?		X		
5.	Correlation coefficient greater than or equal to 0.995?		X		Correlation coefficient was 0.9999
6.	ICV analyzed directly after calibration?		X		
7.	ICV within specified control limits?		X		
8.	ICB analyzed immediately after ICV?		X		
9.	ICB within acceptable range?		X		
10.	CRA analyzed at the beginning of the run?		X		
11.	CRA results within acceptable range?		X		
12.	All CCV's within specified control limits?		X		
13.	All CCB's within acceptable range?		X		
14.	All CCB's analyzed immediately after CCV's?		X		
B. Client Sample and QC Sample Results					
1.	Were all sample results within the linear range of the instrument ?			X	See Comments on Next Page
2.	Were there any samples with results more negative than Report Limit?			X	
3.	Were samples analyzed within the holding time?		X		
C. Preparation/Matrix QC					
1.	Was one method blank prepared for each batch?		X		
2.	Were all method blanks less than the specified level?		X		
3.	Was an LCS prepared for each batch?		X		
4.	Were all LCS recoveries within QC limits?		X		
5.	Were matrix spikes, sample duplicates and/or post-digestion spikes run at required frequency?		X		
6.	Were all matrix spike recoveries within QC limits?			X	See Comments on Next Page
7.	Were post-digestion spike recoveries within QC limits?		X		
8.	Were duplicate RPDs within QC limits?		X		
D. Other					
1.	Current IDL data on file?		X		
2.	Current MDL data on file?		X		
3.	Are all nonconformances documented appropriately?		X		
4.	Were all project specific instructions followed?		X		NCM#: 08-0007007

Question Number:	Problem(s) Found:
B1	Sample JWAFKA at 5/17/2007 9:36:07 AM exceeded linear range and an acceptable dilution was NOT found.
C6	Matrix spike sample JWPEDST at 5/17/2007 8:37:20 AM had ~~506%~~ recovery.
C6	Matrix spike sample JWPEDDT at 5/17/2007 8:39:09 AM had ~~512%~~ recovery.
C6	Matrix spike sample JWMXKST at 5/17/2007 9:47:35 AM had ~~577.7%~~ recovery.
C6	Matrix spike sample JWMXKDT at 5/17/2007 9:50:34 AM had ~~550.7%~~ recovery.

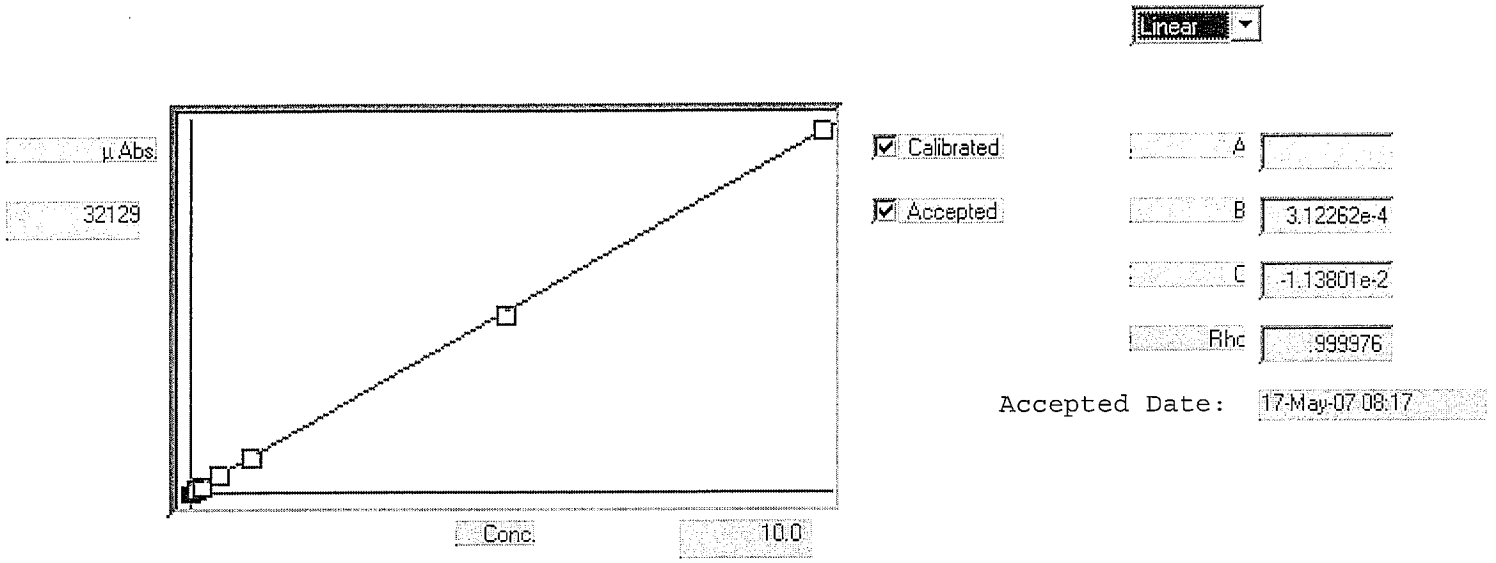
TCLP SAMPLES

STL Knoxville Mercury Data Review Checklist

Analyst: DKW **Date:** 5/18/05

Analyst Comments:

Protocol: 7ptcurve



S	Conc.	Calc.	Dev.	Mean	SD or %RSD	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
01	.00000					0B~□„c				
02	.10000	.088	-.012	318	0%	317				
03	.20000	.217	.017	730	0%	730				
04	.50000	.516	.016	1690	0%	1690				
05	1.0000	1.02	.019	3299	0%	3299				
06	5.0000	4.95	-.049	15891	0%	15891				
07	10.000	10.0	.021	32129	0%	32129				
08										
09										
10										

Line Conc. Units SD/RSD 1 2 3 4 5

*** Standard: 1 Rep: 1 Seq: 81 08:06:10 17 May 07 HG

Hg .000 ppb 0

*** Standard: 2 Rep: 1 Seq: 82 08:08:01 17 May 07 HG

Hg .100 ppb 317

*** Standard: 3 Rep: 1 Seq: 83 08:09:48 17 May 07 HG

Hg .200 ppb 730

*** Standard: 4 Rep: 1 Seq: 84 08:11:36 17 May 07 HG

Hg .500 ppb 1690

*** Standard: 5 Rep: 1 Seq: 85 08:13:53 17 May 07 HG

Hg 1.00 ppb 3299

*** Standard: 6 Rep: 1 Seq: 86 08:15:50 17 May 07 HG

Hg 5.00 ppb 15891

*** Standard: 7 Rep: 1 Seq: 87 08:17:39 17 May 07 HG

Hg 10.0 ppb 32129

*** Check Standard: 2 Ck2icv Seq: 88 08:19:54 17 May 07 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		102.	2.54	2.50	ppb	.000 %

*** Sample ID: ICB Seq: 89 08:21:41 17 May 07 HG

ICB

Hg -.028 ppb .000 % -.028

*** Sample ID: CRA Seq: 90 08:23:27 17 May 07 HG

CRA

Hg .200 ppb .000 % .200

*** Check Standard: 3 Ck3ccv Seq: 91 08:25:13 17 May 07 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		101.	5.06	5.00	ppb	.000 %

*** Check Standard: 1 Ck1ccb Seq: 92 08:27:29 17 May 07 HG

Line	Flag	Found	Range(+/-)	Units	SD/RSD
Hg		-.023	.059	ppb	.000 %

*** Sample ID: JWXH9BT Seq: 93 08:29:25 17 May 07 HG

7135462

Hg .017 ppb .000 % .017

*** Sample ID: JW2DACT Seq: 94 08:31:26 17 May 07 HG

Hg 5.03 ppb .000 % 5.03

*** Sample ID: JWQNGT Seq: 95 08:33:14 17 May 07 HG

Hg -.031 ppb .000 % -.031

*** Sample ID: JW~~PEDT~~ 64X DKW 5/18/07 Seq: 96 08:35:02 17 May 07 HG

Hg -.006 ppb .000 % -.006

Line	Conc.	Units	SD/RSD	1	2	3	4	5
*** Sample ID: JW~~PED~~ST 6HX DKW 5/18/07					Seq: 97	08:37:20 17 May 07	HG	
Hg	5.06	ppb	.000 %	5.06				
*** Sample ID: JW~~PED~~DT 6HX DKW 5/18/07					Seq: 98	08:39:09 17 May 07	HG	
Hg	5.12	ppb	.000 %	5.12				
*** Sample ID: JWWQHB					Seq: 99	08:40:57 17 May 07	HG	
			7134095 OH FH					
Hg	-.003	ppb	.000 %	-.003				
*** Sample ID: JWWQHC					Seq: 100	08:43:16 17 May 07	HG	
Hg	5.19	ppb	.000 %	5.19				
*** Sample ID: JWWQHL					Seq: 101	08:45:44 17 May 07	HG	
Hg	5.11	ppb	.000 %	5.11				
*** Sample ID: JWA~~KF~~ #KF DKW 5/17/07					Seq: 102	08:47:32 17 May 07	HG	
Hg	10.2	ppb	.000 %	10.2				

*** Check Standard: 3 Ck3ccv Seq: 103 08:49:30 17 May 07 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		105.	5.24	5.00	ppb	.000 %

*** Check Standard: 1 Ck1ccb Seq: 104 08:51:46 17 May 07 HG

Line	Flag	Found	Range(+/-)	Units	SD/RSD
Hg		-.014	.059	ppb	.000 %

*** Sample ID: JWAGK					Seq: 105	08:53:36 17 May 07	HG	
Hg	.582	ppb	.000 %	.582				
*** Sample ID: JWAHE					Seq: 106	08:55:22 17 May 07	HG	
Hg	.286	ppb	.000 %	.286				
*** Sample ID: JWAH7					Seq: 107	08:57:31 17 May 07	HG	
Hg	14.0	ppb	.000 %	14.0				
*** Sample ID: JWA~~KF~~ FK DKW 5/17/07					Seq: 108	08:59:18 17 May 07	HG	
Hg	.113	ppb	.000 %	.113				
*** Sample ID: JWAL3					Seq: 109	09:01:05 17 May 07	HG	
Hg	10.2	ppb	.000 %	10.2				
*** Sample ID: JWAM2					Seq: 110	09:03:03 17 May 07	HG	
Hg	-.026	ppb	.000 %	-.026				
*** Sample ID: JWAPF					Seq: 111	09:04:56 17 May 07	HG	
Hg	.035	ppb	.000 %	.035				
*** Sample ID: JWAPP					Seq: 112	09:07:43 17 May 07	HG	
Hg	.322	ppb	.000 %	.322				

```
Line   Conc.  Units     SD/RSD      1       2       3       4       5
-----------------------------------------------------------------------------

*** Sample ID: JW2DPB                    Seq:  113    09:09:41 17 May 07   HG
                              7136046
Hg    .005    ppb       .000  %   .005

*** Sample ID: JW2DPC                    Seq:  114    09:11:28 17 May 07   HG

Hg    5.20    ppb       .000  %   5.20

*** Check Standard: 3  Ck3ccv            Seq:  115    09:13:16 17 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          103.    5.16    5.00  ppb        .000  %

*** Check Standard: 1  Ck1ccb            Seq:  116    09:15:24 17 May 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.018     .059    ppb        .000  %

*** Sample ID: JW2DPL                    Seq:  117    09:17:22 17 May 07   HG

Hg    5.08    ppb       .000  %   5.08

*** Sample ID: JWFGE                     Seq:  118    09:19:33 17 May 07   HG

Hg    .066    ppb       .000  %   .066

*** Sample ID: JWFG8                     Seq:  119    09:21:19 17 May 07   HG

Hg   -.006    ppb       .000  %  -.006

*** Sample ID: JWFH4                     Seq:  120    09:23:31 17 May 07   HG

Hg    .104    ppb       .000  %   .104

*** Sample ID: JWFJN                     Seq:  121    09:27:16 17 May 07   HG

Hg    .022    ppb       .000  %   .022

*** Sample ID: JWFKE                     Seq:  122    09:29:04 17 May 07   HG

Hg    .085    ppb       .000  %   .085

*** Sample ID: JWFMK                     Seq:  123    09:30:55 17 May 07   HG

Hg   -.001    ppb       .000  %  -.001

*** Sample ID: JWFGEA                    Seq:  124    09:34:05 17 May 07   HG
                              PDS
Hg    1.14    ppb       .000  %   1.14
                    KF
*** Sample ID: JWA~~FKA~~ DKW 5/17/07     Seq:  125    09:36:07 17 May 07   HG
                              PDS
Hg    10.3    ppb       .000  %   10.3
NOT DILUTED USED ANOTHER SAMPLE FOR PDS
*** Sample ID: JWM3FBT                   Seq:  126    09:37:59 17 May 07   HG
                              7136191
Hg   -.024    ppb       .000  %  -.024

*** Check Standard: 3  Ck3ccv            Seq:  127    09:39:52 17 May 07   HG
Line  Flag  %Rcv.   Found    True  Units      SD/RSD
Hg          105.    5.26    5.00  ppb        .000  %

*** Check Standard: 1  Ck1ccb            Seq:  128    09:41:40 17 May 07   HG
Line  Flag  Found Range(+/-) Units      SD/RSD
Hg         -.044     .059    ppb        .000  %
```

Line	Conc.	Units	SD/RSD		1	2	3	4	5

*** Sample ID: JW2WCCT Seq: 129 09:43:29 17 May 07 HG

Hg 5.42 ppb .000 % 5.42

*** Sample ID: JWMXKT Seq: 130 09:45:16 17 May 07 HG

Hg .023 ppb .000 % .023

*** Sample ID: JWMXKST Seq: 131 09:47:35 17 May 07 HG

Hg 5.80 ppb .000 % 5.80

*** Sample ID: JWMXKDT Seq: 132 09:50:34 17 May 07 HG

Hg 5.53 ppb .000 % 5.53

*** Sample ID: TEST BLANK Seq: 133 09:53:05 17 May 07 HG

TCLP

Hg .011 ppb .000 % .011

*** Sample ID: JWA~~K~~FZ5 FKF DKW 5/17/07 Seq: 134 09:55:07 17 May 07 HG

Hg 1.94 ppb .000 % 1.94

*** Sample ID: JWAH7Z5 Seq: 135 09:57:05 17 May 07 HG

Hg 2.66 ppb .000 % 2.66

*** Sample ID: JWAL3Z5 Seq: 136 09:59:12 17 May 07 HG

Hg 1.96 ppb .000 % 1.96

*** Sample ID: JWAGKA Seq: 137 10:05:48 17 May 07 HG

PDS

Hg 1.56 ppb .000 % 1.56

*** Check Standard: 3 Ck3ccv Seq: 138 10:07:37 17 May 07 HG

Line	Flag	%Rcv.	Found	True	Units	SD/RSD
Hg		105.	5.23	5.00	ppb	.000 %

*** Check Standard: 1 Ck1ccb Seq: 139 10:09:23 17 May 07 HG

Line	Flag	Found	Range(+/-)	Units	SD/RSD
Hg		-.039	.059	ppb	.000 %

Miscellaneous Data

STL Knoxville Mercury Data Review / Narrative Checklist
Methods 7470A/7471A and 245.1/245.5 - KNOX-MT-0009, Rev 6 and KNOX-MT-0010, Rev 5

Lot / SDG #: H7E040218

A. Review of QuantIMS / QDS Results	NA	Yes	No	Why is data reportable?
1. Were QuantIMS LIM L40 reports, Lot Summary and any applicable QAS reviewed?		✓		
2. Were all prep sheets, prep spreadsheets and any existing NCMs reviewed?		✓		
3. Were manual calculations of results and RLs performed for each sample, blank, LCS, LCSD, MS, MSD and DUP? (Document 1 calculation per batch.)		✓		
4. Were elements with negative results >RL reported as ND G?	✓			
5. For each sample, blank, LCS, LCSD, MS, MSD and DUP, were flags, units, DFs, prep date, date/time of analysis verified to be correct?	✓	✓		
6. Were spike amounts verified for each LCS/MS? (Document 1 manual calculation.)	May 14,10	✓		
7. Were method blank results within limits? (Waters/Soils/Waste for 01/DQ < ½ RL) (4U/Air/PM10/JN Waste <RL)	MH	✓		☐ **[mb3] No analyte >QC limit in associated samples.*** ☐ **[mb5] Insufficient sample for reanalysis.***
8. LCS or LCS/LCSD within QC limits? (90-110%R)		✓		☐ **[lcs2] Insufficient sample for reanalysis.** ☐ **[lcs3] LCS%R >QC limits & sample results < RL.***
9. MS/MSD or MS/DUP run at required frequency?		✓		☐ [lcsd] Insufficient sample – lcs/lcsd analyzed.
10. MS %R or MS/MSD %R & RPD within QC limits?			✓	☐ [ms1] ☐ [msd1] LCS acceptable - matrix effects. ☐ [ms2] ☑ [msd2] Native analyte > 4x spike level. ☐ [ms3] ☐ [msd3] Matrix effects & native >4x spike. ☐ [batch] Batch QC on client's sample outside limits.
11. DUP RPD within limits? (0-20 RPD for results ≥5xRL; +RL if result <5xRL)	✓			☐ [rpd] LCS acceptable. Results indicate sample heterogeneity.
12. Were J flags added to the DUP as needed?	✓			
13. Is DUP RPD=0 for two ND results and RPD=200 for one ND and a positive result?	✓			
14. Are all results present for all samples?		✓		
15. Were the samples analyzed within the holding time?		✓		☐ [ht1] HT expired upon receipt ☐ *[ht2] Analysis requested after HT expired.* ☐ See comments section below.

Data Reviewer: [signature] Date: May 18, 07

Calculation Checks / Comments:

Batch: 7127421 JWAGP: 0.262 µg/L x 0.145L x 50ml/10ml = 0.19 µg RL: 0.1 µg/L x 0.145L x 50ml/10ml = 0.0725 µg

7127427 JWAFR: 1.29 µg/L x 0.705L x 50ml/25ml = 1.82 µg RL: 0.1 µg/L x 0.705L x 50ml/25ml = 0.141 µg

7127426 JWAHM: 7.24 µg/L x 0.460L x 50ml/25ml = 6.66 µg RL: 0.1 µg/L x 0.460L x 50ml/25ml = 0.092 µg

7134095 JWAGK: 0.582 µg/L x 0.1L = 0.058 µg RL: 0.1 µg/L x 0.1L = 0.01L

*Such action must be taken in consultation with client.

NOTE: Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomaly.

STL Knoxville Mercury Data Review / Narrative Checklist
Methods 7470A/7471A and 245.1/245.5 - KNOX-MT-0009, Rev 6 and KNOX-MT-0010, Rev 5

Lot / SDG #: H7E040218

B. Review of QC Summary Forms *Note:* Y=Yes, N=No, NA=Not Applicable	Chart # M051007	Chart # M051705	Chart #	Chart #	Why is data reportable?
1. ICV within limits? (7470A/7471A = 90-110%R) (245.1/245.5 = 95-105%R)	Y	Y			
2. CCV within limits? (7470A/7471A = 80-120%R) (245.1/245.5 = 90-110%R)*	Y	Y			If no, list details: _____ ☐ CCV reanalyzed one time; reanalysis within limits.
3. ICB/CCB within limits? (Water/Soil/Waste for 01/DQ/4U <MDL) (Air/PM10/JN Waste <RL)	Y	Y			If no, list details: _____ ☐ CCB reanalyzed one time; reanalysis within limits.
4. Reporting Limit Check Standard (CRA) within limits? (70-130%R)	Y	Y			
5. PDS or PDS/PDSD run at required frequency?	N/A	Y			
6. PDS/PDSD within limits? (75-125%R) **Reminder:** Place copy of PDS results in Sample Data Summary and QC Summary sections of report.	N/A	Y			☐ [pds1] ☐ [pdsd1] LCS acceptable - matrix effects. ☐ [pds2] ☐ [pdsd2] Native analyte > 4x spike level. ☐ [pds3] ☐ [pdsd3] Matrix effects & native >4x spike.
7. Are the IDLs on summary forms current?	Y	Y			
8. Are the QC summary forms correct?	Y	Y			

Data Reviewer: [signature] Date: May 18-07

Comments:

*Such action must be taken in consultation with client.

NOTE: Nonconformance memos are required for **bold** and *italicized* [autotext] statements: **Bold** = deficiency, *italicized* = anomaly.

NTM May 11, 07

STL Knoxville Metals Final Deliverable Data Review / Narrative Checklist

Lot / SDG #:	H7E040218				
Report Type:	☐ Report (COA)	☑ Level 4 Package	☐ QDS Package	☐ Forms Only	☐ Other _____

Review of Final Deliverable	NA	Yes	No	
1. Are all nonconformances documented and discussed in narrative? (Reminder: Place copy of all NCMs in front of deliverable.)		✓		List NCM #: 06-0007007
2. For air train samples, was the appropriate autotext selected for the narrative? (Reminder: Review the autotext and make all appropriate changes.)		✓		☐ [MMT1] Multi-metals trains analyzed for ICP & Hg. ☐ [MMT2] Multi-metals trains analyzed for ICP only. ☐ [MMT3] Multi-metals trains analyzed for Hg only. ☐ [MMT4] Combined FH/BH analyzed for ICP only. ☐ [OH] Ontario-Hydro train. ☑ [OH thimble] Ontario-Hydro train with thimble-FH.
3. For PM10 projects, was the appropriate autotext selected for the narrative?	✓			☐ [pm10] PM10 filters analyzed for ICP & Hg. ☐ [pm10icp] PM10 filters analyzed for ICP only.
4. Was a Filter Lot Check report included for PM10 filters?	✓			☐ [fb1] Filter Lot Check Report in Misc. Section. ☐ [fb2] Filter Lot Check Report after LCS report.
5. For low-level waste samples, was the JN autotext selected for the narrative?	✓			☐ [JN] Low-level waste prep.
6. Is the narrative complete and does it contain the appropriate deviations noted on the analyst DRCs, ICP DRC, and Hg DRC?		✓		
7. Were all client/project specific requirements met? (As described in the QuantIMS-LIM L40 reports, Lot Summary or Client Analysis Summary, and any applicable QAS.)		✓		
8. Are the original DRCs behind narrative with copy in report?		✓		
9. Are results present for all samples?		✓		
10. Is the final deliverable in the proper format?		✓		
11. Were the ICP and Hg charts and cover pages scanned? (Check .pdf files.)		✓		

Data Reviewer: [signature] Date: May 18 07

Comments:

STL Knoxville
Ontario-Hydro Air Train - SOP KNOX-IP-0006rev2
Back Half Mercury Sample Preparation Worksheet

Batch Number: 7127428
Prep Date: 05/09/2007 0800
Comp Date: 05/09/2007 1200

Pre-prep Performed by: N/A — Date:
1st Level Review/Relinquished by: DKW — Date: 5/10/2007
2nd Level Review/Received by: KWD — Date: 5/11/07

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	PDS	Total Sample Volume (L)	Sample pH	Volume NH_2OH Added (L)	Final Hg Digestate Volume (ml)	Volume Sample Used (ml)	Hg Bench Dilution Factor	QuantIMS Upload Dilution Factor	QuantIMS Upload Multiplier
H7E040218	6		DZLO	HARDIN STACK RUN 1 KMNO4/H2SO4	JWAFX		0.440	<2	0.025	50.0	25.0	1	0.93	0.93
H7E040218	6	D	DZLO	HARDIN STACK RUN 1 KMNO4/H2SO4	JWAFX		0.440	<2	0.025	50.0	25.0	1	0.93	0.93
H7E040218	6	S	DZLO	HARDIN STACK RUN 1 KMNO4/H2SO4	JWAFX		0.440	<2	0.025	50.0	25.0	1	0.93	0.93
H7E040218	12		DZLO	HARDIN STACK RUN 2 KMNO4/H2SO4	JWAGR		0.480	<2	0.030	50.0	25.0	1	1.02	1.02
H7E040218	18		DZLO	HARDIN STACK RUN 3 KMNO4/H2SO4	JWAHM		0.435	<2	0.025	50.0	25.0	1	0.92	0.92
H7E040218	25		DZLO	HARDIN SDA INLET DUCT RUN 1 KMNO4,H2SO4	JWAJR		0.435	<2	0.025	50.0	25.0	1	0.92	0.92
H7E040218	32		DZLO	HARDIN SDA INLET DUCT RUN 2 KMNO4/H2SO4	JWAK0		0.430	<2	0.030	50.0	25.0	1	0.92	0.92
H7E040218	39		DZLO	HARDIN SDA INLET DUCT RUN 3 KMNO4/H2SO4	JWAMP		0.455	<2	0.030	50.0	25.0	1	0.97	0.97
H7E040218	43		DZLO	HARDIN SDA INLET+STACK RB KMNO4/H2SO4/H	JWANG		0.050	<2	0.005	50.0	25.0	1	0.11	0.11
H7E070000	428	B	DZLO	INTRA-LAB BLANK	JWFFN		0.050			50.0	25.0	1	0.10	0.10
H7E070000	428	C	DZLO	INTRA-LAB CHECK	JWFFN		0.050			50.0	25.0	1	0.10	0.10

		Expiration Date
Hg LCS/LCSD Spike: 2.5 mL of	I-CAL-3425-10-4	5/10/2007
Hg MS/MSD Spike: 0.5 mL of	I-CAL-3425-10-4	5/10/2007

Comments:

* = Sample chosen for PDS.
** = Sample chosen for PDS/PDSD.

Pre-prep KMnO4 Lot #: N/A

QuantIMS Upload Dilution Factor *and* QuantIMS Multiplier = (Total Sample Volume (L) + Volume NH_2OH Added (L)) x Final Hg Digestate Volume (ml) / Volume Sample Used (ml) x Hg Bench Dilution Factor

STL Knoxville
Mercury Air Prep Spiking Form

Analyst: DKW Date: 050907 Batch: 7127428

Bath A Temp: 95°C
Bath B Temp: 95°C
(Acceptance range 90°–95°C)

☐ Hg in PM10 filters: KNOX-IP-0003, Rev. 4
☐ MMT train: KNOX-MT-0006, Rev. 10
☑ Ontario Hydro: KNOX-IP-0006, Rev. 3

Standard Type	Standard ID	Intermediate Std.		Volume Used (ml)	Final Volume (ml)	Final Concentration (ug/L)
		Source	Conc.(ug/L)			
Calibration Std 1	N/A		N/A	N/A	50	Blank
Calibration Std 2	I-CAL-3425-10-4	SPEX	100	0.05	50	0.1
Calibration Std 3	I-CAL-		100	0.1	50	0.2
Calibration Std 4	I-CAL-		100	0.25	50	0.5
Calibration Std 5	I-CAL-		100	0.5	50	1.0
Calibration Std 6	I-CAL-		100	2.5	50	5.0
Calibration Std 7	I-CAL-		100	5.0	50	10.0

Standard Type	Standard ID	Intermediate Std.		Amount Used (ml)	Final Volume (ml)	Final Conc. (ug/L)
		Source	Conc.(ug/L)			
ICV	I-VER-3426-11-3	ULTRA	100	1.25	50	2.5
CCV	I-CAL-3425-10-4	SPEX	100	2.5	50	5.0
CRA	I-CAL-		100	0.1	50	0.2

Standard Type	Standard ID	Intermediate Std.		Amount Used @ ICP prep/final volume	ICP Sample Volume used @ Hg prep (ml)	Final Conc. @ Hg prep (ug/L)	Final Amount (ug)
		Source	Conc.(ug/L)				
Air (PM10) LCS	I-CAL-		10,000	0.250 ml/50ml	5.0	5.0	11.25
Air (PM10) MS	I-CAL-		10,000	0.050 ml/50ml	5.0	1.0	2.25

REAGENTS			
Conc. H_2SO_4 Lot #:	C15045	5% $KMnO_4$ ID #:	B-3122-13-D
Conc. HNO_3 Lot #:	B44032	5% $K_2S_2O_8$ ID #:	D-2638-18-E
Conc. HCL Lot #:	C42A22	$SnCl_2$ Solution ID #:	A-3382-26-D
12% $NaCl{\cdot}NH_2OH{\cdot}HCL$ ID #:	C-3267-4-C		

STL Knoxville
Ontario-Hydro Air Train - SOP KNOX-IP-0006rev2
Back Half Mercury Sample Preparation Worksheet

Batch Number: 7127427
Prep Date: 05/09/2007 0800
Comp Date: 05/09/2007 1200

Pre-prep Performed by: N/A — Date: _____
1st Level Review/Relinquished by: DKW — Date: 5/10/2007
2nd Level Review/Received by: KWD — Date: 5/11/07

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	PDS	Total Sample Volume (L)	Sample pH	Volume NH_2OH Added (L)	Final Hg Digestate Volume (ml)	Volume Sample Used (ml)	Hg Bench Dilution Factor	QuantIMS Upload Dilution Factor	QuantIMS Upload Multiplier
H7E040218	4		GNLO	HARDIN STACK RUN 1 KCL	JWAFR		0.700	<2	0.005	50.0	25.0	1	1.41	1.41
H7E040218	4	D	GNLO	HARDIN STACK RUN 1 KCL	JWAFR		0.700	<2	0.005	50.0	25.0	1	1.41	1.41
H7E040218	4	S	GNLO	HARDIN STACK RUN 1 KCL	JWAFR		0.700	<2	0.005	50.0	25.0	1	1.41	1.41
H7E040218	10		GNLO	HARDIN STACK RUN 2 KCL	JWAGN		0.700	<2	0.005	50.0	25.0	1	1.41	1.41
H7E040218	16		GNLO	HARDIN STACK RUN 3 KCL	JWAHH		0.700	<2	0.005	50.0	25.0	1	1.41	1.41
H7E040218	23		GNLO	HARDIN SDA INLET DUCT RUN 1 KCL	JWAJA		0.525	<2	0.005	50.0	25.0	1	1.06	1.06
H7E040218	30		GNLO	HARDIN SDA INLET DUCT RUN 2 KCL	JWAKG		0.590	<2	0.005	50.0	25.0	1	1.19	1.19
H7E040218	37		GNLO	HARDIN SDA INLET DUCT RUN 3 KCL	JWAMG		0.550	<2	0.005	50.0	25.0	1	1.11	1.11
H7E040218	41		GNLO	HARDIN SDA INLET+STACK RB 1N KCL	JWAM8		0.050	7	0.000	50.0	25.0	1	0.10	0.10
H7E070000	427	B	GNLO	INTRA-LAB BLANK	JWFFK		0.050			50.0	25.0	1	0.10	0.10
H7E070000	427	C	GNLO	INTRA-LAB CHECK	JWFFK		0.050			50.0	25.0	1	0.10	0.10

			Expiration Date
Hg LCS/LCSD Spike:	2.5 mL of	I-CAL-3425-10-4	5/10/2007
Hg MS/MSD Spike:	0.5 mL of	I-CAL-3425-10-4	5/10/2007

Comments: _____

* = Sample chosen for PDS.
** = Sample chosen for PDS/PDSD.

Pre-prep KMnO4 Lot #: N/A

QuantIMS Upload Dilution Factor *and* QuantIMS Multiplier = (Total Sample Volume (L) + Volume NH_2OH Added (L)) x Final Hg Digestate Volume (ml) / Volume Sample Used (ml) x Hg Bench Dilution Factor

STL Knoxville
Mercury Air Prep Spiking Form

Analyst: DKW Date: 050907 Batch: 7127427

Bath A Temp: 93°C
Bath B Temp: 93°C
(Acceptance range 90°–95°C)

☐ Hg in PM10 filters: KNOX-IP-0003, Rev. 4
☐ MMT train: KNOX-MT-0006, Rev. 10
☑ Ontario Hydro: KNOX-IP-0006, Rev. 3

Standard Type	Standard ID	Intermediate Std.		Volume Used (ml)	Final Volume (ml)	Final Concentration (ug/L)
		Source	Conc.(ug/L)			
Calibration Std 1	N/A		N/A	N/A	50	Blank
Calibration Std 2	I-CAL-3425-10-4	SPEX	100	0.05	50	0.1
Calibration Std 3	I-CAL-		100	0.1	50	0.2
Calibration Std 4	I-CAL-		100	0.25	50	0.5
Calibration Std 5	I-CAL-		100	0.5	50	1.0
Calibration Std 6	I-CAL-		100	2.5	50	5.0
Calibration Std 7	I-CAL-		100	5.0	50	10.0

Standard Type	Standard ID	Intermediate Std.		Amount Used (ml)	Final Volume (ml)	Final Conc. (ug/L)
		Source	Conc.(ug/L)			
ICV	I-VER-3426-11-3	ULTRA	100	1.25	50	2.5
CCV	I-CAL-3425-10-4	SPEX	100	2.5	50	5.0
CRA	I-CAL-		100	0.1	50	0.2

Standard Type	Standard ID	Intermediate Std.		Amount Used @ ICP prep/final volume	ICP Sample Volume used @ Hg prep (ml)	Final Conc. @ Hg prep (ug/L)	Final Amount (ug)
		Source	Conc.(ug/L)				
Air (PM10) LCS	I-CAL-		10,000	0.250 ml/50ml	5.0	5.0	11.25
Air (PM10) MS	I-CAL-		10,000	0.050 ml/50ml	5.0	1.0	2.25

REAGENTS			
Conc. H_2SO_4 Lot #:	C15045	5% $KMnO_4$ ID #:	B-3122-13-D
Conc. HNO_3 Lot #:	B44032	5% $K_2S_2O_8$ ID #:	D-2638-18-E
Conc. HCL Lot #:	C42A22	$SnCl_2$ Solution ID #:	A-3382-26-D
12% $NaCl{\cdot}NH_2OH{\cdot}HCL$ ID #:	C-3267-4-C		

STL Knoxville
Ontario-Hydro Air Train - SOP KNOX-IP-0006rev2
Back Half Mercury Sample Preparation Worksheet

Batch Number: 7127421
Prep Date: 05/09/2007 0800
Comp Date: 05/10/2007 1500

Pre-prep Performed by: KND — Date: 5/8/2007
1st Level Review/Relinquished by: DKW — Date: 5/10/2007
2nd Level Review/Received by: KND — Date: 5/11/07

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	PDS	Total Sample Volume (L)	Sample pH	Volume NH_2OH Added (L)	Final Hg Digestate Volume (ml)	Volume Sample Used (ml)	Hg Bench Dilution Factor	QuantIMS Upload Dilution Factor	QuantIMS Upload Multiplier
H7E040218	5		DYLO	HARDIN STACK RUN 1 HNO3/H2O2	JWAFW		0.140	<2		50.0	10.0	1	0.70	0.70
H7E040218	5	D	DYLO	HARDIN STACK RUN 1 HNO3/H2O2	JWAFW		0.140	<2		50.0	10.0	1	0.70	0.70
H7E040218	5	S	DYLO	HARDIN STACK RUN 1 HNO3/H2O2	JWAFW		0.140	<2		50.0	10.0	1	0.70	0.70
H7E040218	11		DYLO	HARDIN STACK RUN 2 HNO3/H2O2	JWAGP		0.145	<2		50.0	10.0	1	0.73	0.73
H7E040218	17		DYLO	HARDIN STACK RUN 3 HNO3/H2O2	JWAHL		0.135	<2		50.0	10.0	1	0.68	0.68
H7E040218	24		DYLO	HARDIN SDA INLET DUCT RUN 1 HNO3/H2O2	JWAJH		0.135	<2		50.0	10.0	1	0.68	0.68
H7E040218	31		DYLO	HARDIN SDA INLET DUCT RUN 2 HNO3/H2O2	JWAKK		0.140	<2		50.0	10.0	1	0.70	0.70
H7E040218	38		DYLO	HARDIN SDA INLET DUCT RUN 3 HNO3/H2O2	JWAMK		0.145	<2		50.0	10.0	1	0.73	0.73
H7E040218	42		DYLO	HARDIN SDA INLET+STACK RB HNO3/H2O2	JWAND		0.050	<2		50.0	10.0	1	0.25	0.25
H7E070000	421	B	DYLO	INTRA-LAB BLANK	JWFFG		0.050			50.0	10.0	1	0.25	0.25
H7E070000	421	C	DYLO	INTRA-LAB CHECK	JWFFG		0.050			50.0	10.0	1	0.25	0.25

		Expiration Date
Hg LCS/LCSD Spike: 2.5 mL of	I-CAL-3425-10-3	5/9/2007
Hg MS/MSD Spike: 0.5 mL of	I-CAL-3425-10-3	5/9/2007

Comments:

Pre-prep KMnO4 Lot #: 056788

* = Sample chosen for PDS.
** = Sample chosen for PDS/PDSD.

QuantIMS Upload Dilution Factor *and* QuantIMS Multiplier = (Total Sample Volume (L) + Volume NH_2OH Added (L)) x Final Hg Digestate Volume (ml) / Volume Sample Used (ml) x Hg Bench Dilution Factor

STL Knoxville
Mercury Air Prep Spiking Form

Analyst: DKW Date: 050907 Batch: _____

Bath A Temp: 95°C
Bath B Temp: 95°C
(Acceptance range 90°–95°C)

☐ Hg in PM10 filters: KNOX-IP-0003, Rev. 4
☐ MMT train: KNOX-MT-0006, Rev. 10
☑ Ontario Hydro: KNOX-IP-0006, Rev. 3

Standard Type	Standard ID	Intermediate Std.		Volume Used (ml)	Final Volume (ml)	Final Concentration (ug/L)
		Source	Conc.(ug/L)			
Calibration Std 1	N/A		N/A	N/A	50	Blank
Calibration Std 2	I-CAL-3425-10-4	SPEX	100	0.05	50	0.1
Calibration Std 3	I-CAL-		100	0.1	50	0.2
Calibration Std 4	I-CAL-		100	0.25	50	0.5
Calibration Std 5	I-CAL-		100	0.5	50	1.0
Calibration Std 6	I-CAL-		100	2.5	50	5.0
Calibration Std 7	I-CAL-		100	5.0	50	10.0

Standard Type	Standard ID	Intermediate Std.		Amount Used (ml)	Final Volume (ml)	Final Conc. (ug/L)
		Source	Conc.(ug/L)			
ICV	I-VER-3426-11-3	ULTRA	100	1.25	50	2.5
CCV	I-CAL-3425-10-4	SPEX	100	2.5	50	5.0
CRA	I-CAL-		100	0.1	50	0.2

Standard Type	Standard ID	Intermediate Std.		Amount Used @ ICP prep/final volume	ICP Sample Volume used @ Hg prep (ml)	Final Conc. @ Hg prep (ug/L)	Final Amount (ug)
		Source	Conc.(ug/L)				
Air (PM10) LCS	I-CAL-		10,000	0.250 ml/50ml	5.0	5.0	11.25
Air (PM10) MS	I-CAL-		10,000	0.050 ml/50ml	5.0	1.0	2.25

REAGENTS			
Conc. H_2SO_4 Lot #:	C15045	5% $KMnO_4$ ID #:	B-3122-13-D
Conc. HNO_3 Lot #:	B44032	5% $K_2S_2O_8$ ID #:	D-2638-18-E
Conc. HCL Lot #:	C42A22	$SnCl_2$ Solution ID #:	A-3382-26-D
12% $NaCl{\cdot}NH_2OH{\cdot}HCL$ ID #:	C-3267-4-C		

STL Knoxville
Ontario-Hydro Air Train - SOP KNOX-IP-0006rev2
Front Half Mercury Sample Preparation Worksheet

Batch Number: 7134095
Prep Date: 05/14/2007 0900
Comp Date: 05/14/2007 1700

Microwave Prep Performed by: N/A Date:
1st Level Review/Relinquished by: KND Date: 5/15/2007
2nd Level Review/Received by: DKW Date: 5/17/2007

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	PDS	Total Volume Probe Rinse (L)	Probe Rinse pH	Final Microwave Digestate Volume (L)	Final Hg Digestate Volume (ml)	Volume Microwave Digestate Used (ml)	Hg Bench Dilution Factor	QuantIMS Upload Dilution Factor	QuantIMS Upload Multiplier
H7E040218	3		DXLO	HARDIN STACK RUN 1 FH	JWAFK		0.075	<2	0.100	50.0	50.0	1	0.10	0.10
H7E040218	9		DXLO	HARDIN STACK RUN 2 FH	JWAGK	*	0.080	<2	0.100	50.0	50.0	1	0.10	0.10
H7E040218	15		DXLO	HARDIN STACK RUN 3 FH	JWAHE		0.095	<2	0.100	50.0	50.0	1	0.10	0.10
H7E040218	22		DXLO	HARDIN SDA INLET DUCT RUN 1 FH	JWAH7		0.140	<2	0.100	50.0	50.0	5	0.50	0.50
H7E040218	29		DXLO	HARDIN SDA INLET DUCT RUN 2 FH	JWAKF		0.135	<2	0.100	50.0	50.0	5	0.50	0.50
H7E040218	36		DXLO	HARDIN SDA INLET DUCT RUN 3 FH	JWAL3		0.115	<2	0.100	50.0	50.0	5	0.50	0.50
H7E040218	40		DXLO	HARDIN SDA INLET+STACK RB 0.1N HNO3	JWAM2		0.065	<2	0.100	50.0	50.0	1	0.10	0.10
H7E040218	44		DXLO	HARDIN SDA INLET+STACK RB QUARTZ FILTER	JWAPF				0.100	50.0	50.0	1	0.10	0.10
H7E040218	45		DXLO	HARDIN SDA INLET+STACK RB THIMBLE 1	JWAPP				0.100	50.0	50.0	1	0.10	0.10
H7E140000	95	B	DXLO	INTRA-LAB BLANK	JWWQH				0.100	50.0	50.0	1	0.10	0.10
H7E140000	95	C	DXLO	INTRA-LAB CHECK	JWWQH				0.100	50.0	50.0	1	0.10	0.10
H7E140000	95	L	DXLO	INTRA-LAB CHECK	JWWQH				0.100	50.0	50.0	1	0.10	0.10

* = Sample chosen for PDS.
** = Sample chosen for PDS/PDSD.

Hg LCS/LCSD Spike: 50 uL of I-CAL-3425-10 — Expiration Date: 6/1/2007

HNO_3 Lot #: C49030
HCl Lot #: C42A22
HF Lot #:
H_3BO_3 Lot #

Comments: 0.1N HN03 - 2664:93

QuantIMS Upload Dilution Factor *and* QuantIMS Multiplier = Final Microwave Digestate Volume (L) x Final Hg Digestate Volume (ml) / Volume Microwave Digestate Used (ml) x Hg Bench Dilution Factor

STL Knoxville
Mercury Air Prep Spiking Form

Analyst: DKW Date: 051607 Batch: 7134095 Bath A Temp: 93°C
Bath B Temp: —
(Acceptance range 90°–95°C)

☐ Hg in PM10 filters: KNOX-IP-0003, Rev. 4 ☑ Ontario Hydro: KNOX-IP-0006, Rev. 3
☐ MMT train: KNOX-MT-0006, Rev. 10

Standard Type	Standard ID	Intermediate Std.		Volume Used (ml)	Final Volume (ml)	Final Concentration (ug/L)
		Source	Conc.(ug/L)			
Calibration Std 1	N/A		N/A	N/A	50	Blank
Calibration Std 2	I-CAL- 3425-10-7	SPEX	100	0.05	50	0.1
Calibration Std 3	I-CAL-		100	0.1	50	0.2
Calibration Std 4	I-CAL-		100	0.25	50	0.5
Calibration Std 5	I-CAL-		100	0.5	50	1.0
Calibration Std 6	I-CAL-		100	2.5	50	5.0
Calibration Std 7	I-CAL-		100	5.0	50	10.0

Standard Type	Standard ID	Intermediate Std.		Amount Used (ml)	Final Volume (ml)	Final Conc. (ug/L)
		Source	Conc.(ug/L)			
ICV	I-VER- 3426-11-6	ULTRA	100	1.25	50	2.5
CCV	I-CAL- 3425-10-7	SPEX	100	2.5	50	5.0
CRA	I-CAL-		100	0.1	50	0.2

Standard Type	Standard ID	Intermediate Std.		Amount Used @ ICP prep/final volume	ICP Sample Volume used @ Hg prep (ml)	Final Conc. @ Hg prep (ug/L)	Final Amount (ug)
		Source	Conc.(ug/L)				
Air (PM10) LCS	I-CAL-		10,000	0.250 ml/50ml	5.0	5.0	11.25
Air (PM10) MS	I-CAL-		10,000	0.050 ml/50ml	5.0	1.0	2.25

REAGENTS			
Conc. H_2SO_4 Lot #:	C15045	5% $KMnO_4$ ID #:	B-3122-13-E
Conc. HNO_3 Lot #:	B44032	5% $K_2S_2O_8$ ID #:	D-2638-19-A
Conc. HCL Lot #:	C42A22	$SnCl_2$ Solution ID #:	A-3282-27-B
12% $NaCl{\cdot}NH_2OH{\cdot}HCL$ ID #:	C-3267-4-D		

Wet Chemistry

Sample Summary

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 FILTER A176

General Chemistry

Lot-Sample #...: H7E040218-001 Work Order #...: JWAEW Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	386	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 1 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-002 Work Order #...: JWAFF Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	24.8	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 FILTER A177

General Chemistry

Lot-Sample #...: H7E040218-007 Work Order #...: JWAF5 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	400	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 2 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-008 Work Order #...: JWAGJ Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	13.6	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 FILTER A178

General Chemistry

Lot-Sample #...: H7E040218-013 Work Order #...: JWAG8 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	401	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN STACK RUN 3 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-014 Work Order #...: JWAHC Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	54.3	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 FILTER (THIMBLE 50)

General Chemistry

Lot-Sample #...: H7E040218-019 Work Order #...: JWAH3 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	11700	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 FILTER (A173)

General Chemistry

Lot-Sample #...: H7E040218-020 Work Order #...: JWAH5 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	417	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 1 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-021 Work Order #...: JWAH6 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	3790	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 FILTER (THIMBLE 52)

General Chemistry

Lot-Sample #...: H7E040218-026 Work Order #...: JWAJV Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	9860	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 FILTER (A174)

General Chemistry

Lot-Sample #...: H7E040218-027 Work Order #...: JWAJ5 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	726	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 2 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-028 **Work Order #...:** JWAJ9 **Matrix.....:** AIR
Date Sampled...: 04/26/07 **Date Received..:** 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	3030	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 FILTER (THIMBLE 51)

General Chemistry

Lot-Sample #...: H7E040218-033 Work Order #...: JWAK9 Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	12400	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 FILTER (A175)

General Chemistry

Lot-Sample #...: H7E040218-034 Work Order #...: JWALL Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	413	0.50	mg	CFR60A 5	05/10/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Air Sampling Associates, Inc.

Client Sample ID: HARDIN SDA INLET DUCT RUN 3 ACETONE

General Chemistry

Lot-Sample #...: H7E040218-035 Work Order #...: JWALV Matrix.....: AIR
Date Sampled...: 04/26/07 Date Received..: 05/01/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Particulates (total)	1540	0.50	mg	CFR60A 5	05/10-05/11/07	7130097

Dilution Factor: 1 MDL.....: 0.50

Raw Data

Total Particulates

STL Knoxville Particulate Matter Determination Data Review/Narrative Checklist
Method: SW-846 Method 0050 by SOP KNOX-WC-0006, Rev. 2
Page 1 of 1

Batch Number:	7130097
Lot Number(s):	H7E040218

Review Items A. Calibration	N/A	Y	N	If No, why is data reportable?	2nd √
1. Was the balance calibration checked with 5, 50 & 100 gram weights prior to use?		✓			✓
2. Was the balance checked with 100 gram weight after every 10 samples?		✓			✓
3. Was the balance tared before each weighing?		✓			✓
4. Was the balance ID documented?		✓			✓
B. Client Sample and QC Sample Results					
1. Were all special project requirements met? **(Were PM Checklists, Lot Summary, and any applicable QAS reviewed?)**		✓			✓
2. Were sample IDs verified?		✓			✓
3. Were all transcriptions checked?		✓			✓
4. Calculations checked for error?		✓			✓
5. Final report acceptable? (Results correct, units correct, **deviations noted in narrative**, and analysis dates correct.)		✓			✓
C. Preparation/Matrix QC					
1. Were all sample weighings performed in duplicate (at least)?		✓			✓
2. Was the average of the last two weighings used?		✓			✓
D. Other					
1. Are all nonconformances documented appropriately?	✓			NCM No.:	NA

Analyst: Lauren Walker	Date: 5/14/07	2nd Level Reviewer:	Date: 5/15/07
Comments:		Comments:	

STL Knoxville
SOP KNOX-WC-0006
Particulate Data Worksheet

Batch Number: 7130097
Prep Date: 05/10/2007 0000
Comp Date: 05/11/2007 0000

Analyst: JMH/LDW

Reviewed by: [signature]

Date: 5/15/2007

Lot Number	Lot Sample Number	Suffix	Method Code	Client ID	WO #	1	2	3	*Tare Weight Average (g)*	1	2	3	*Final Weight Average (g)*	*Particulate Weight (mg)*
H7E040218	1		88AG	HARDIN STACK RUN 1 FILTER A176	JWAEW1AA	0.0000			*0.00001*	0.3856	0.3856		*0.38560*	385.6
H7E040218	2		88AG	HARDIN STACK RUN 1 ACETONE	JWAFF1AA	67.6005			*67.60050*	67.6265	67.6241		*67.62530*	24.8
H7E040218	7		88AG	HARDIN STACK RUN 2 FILTER A177	JWAF51AA	0.0000			*0.00000*	0.4001	0.4001		*0.40010*	400.1
H7E040218	8		88AG	HARDIN STACK RUN 2 ACETONE	JWAGJ1AA	68.1287			*68.12870*	68.1432	68.1414		*68.14230*	13.6
H7E040218	13		88AG	HARDIN STACK RUN 3 FILTER A178	JWAG81AA	0.0000			*0.00000*	0.4010	0.4008		*0.40090*	400.9
H7E040218	14		88AG	HARDIN STACK RUN 3 ACETONE	JWAHC1AA	64.9120			*64.91200*	64.9670	64.9656		*64.96630*	54.3
H7E040218	19		88AG	HARDIN SDA INLET DUCT RUN 1 FI	JWAH31AA	0.0000			*0.00000*	11.7296	11.7206		*11.72510*	11725.1
H7E040218	20		88AG	HARDIN SDA INLET DUCT RUN 1 FI	JWAH51AA	0.0000			*0.00000*	0.4173	0.4173		*0.41730*	417.3
H7E040218	21		88AG	HARDIN SDA INLET DUCT RUN 1 A(	JWAH61AA	64.7960			*64.79600*	68.5799	68.5839		*68.58190*	3785.9
H7E040218	26		88AG	HARDIN SDA INLET DUCT RUN 2 FI	JWAJV1AA	0.0000			*0.00000*	9.8646	9.8548		*9.85970*	9859.7
H7E040218	27		88AG	HARDIN SDA INLET DUCT RUN 2 FI	JWAJ51AA	0.0000			*0.00000*	0.7265	0.7261		*0.72630*	726.3
H7E040218	28		88AG	HARDIN SDA INLET DUCT RUN 2 A(	JWAJ91AA	66.3031			*66.30310*	69.3333	69.3355		*69.33440*	3031.3
H7E040218	33		88AG	HARDIN SDA INLET DUCT RUN 3 FI	JWAK91AA	0.0000			*0.00000*	12.3816	12.3798		*12.38070*	12380.7
H7E040218	34		88AG	HARDIN SDA INLET DUCT RUN 3 FI	JWALL1AA	0.0000			*0.00000*	0.4133	0.4134		*0.41335*	413.3
H7E040218	35		88AG	HARDIN SDA INLET DUCT RUN 3 A(	JWALV1AA	65.0895			*65.08950*	66.6300	66.6313		*66.63065*	1541.2

Comments: These samples were extremely hydroscopic. We used the first two weights for samples #002, 008, 014, 021, 028, + 035 to get a more representative answer.
Gross wt. only for #001, 007, 013, 019, 020, 026, 027, 033 + 034.

STL Knoxville
Sample Data Log
Particulate Matter by KNOX-WC-0006

Batch Number: 7130097

	Sample Number	Work Order Number	Matrix	Filter or Beaker No.	Probe Rinse Volume (mL)	Tare Weight (g)	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials	
1	H7E040218-001	JWAEW -1AA	F	A176	–	–	1	H-47372	99.9998	✓	0.3856	5-10-07	1455	JMH	
							2	↓	↓	✓	0.3856	↓	1718	LDW	
							3								
							4				LDW				
2	-002	JWAFF -1AA	P N R	1	195	✓ 67.6005	1	H-47372	100.0000	✓	67.6265	5-11-07	1132	LDW	used First Two Bad 5/10/07
							2	↓	↓	✓	67.6241	↓	1343	↓	
							3			✓	67.6258		1558		
							4				LDW				
3	-007	JWAF5 -1AA	F	A177	–	–	1	H-47372	99.9998	✓	0.4001	5-10-07	1456	JMH	
							2	↓	↓	✓	0.4001	↓	1719	LDW	
							3								
							4				LDW				
4	-008	JWAGJ -1AA	P N R	2	142	✓ 68.1287	1	H-47372	100.0000	✓	68.1432	5-11-07	1133	LDW	used First Two Bad 5/10/07
							2	↓	↓	✓	68.1414	↓	1344	↓	
							3			✓	68.1430		1559		
							4				LDW				
5	-013	JWAG8 -1AA	F	A178	–	–	1	H-47372	99.9998	✓	0.4010	5-10-07	1457	JMH	
							2	↓	↓	✓	0.4008	↓	1720	LDW	
							3								
							4				LDW				

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

STL Knoxville
Sample Data Log
Particulate Matter by KNOX-WC-0006

Batch Number: 7130097

	Sample Number	Work Order Number	Matrix	Filter or Beaker No.	Probe Rinse Volume (mL)	Tare Weight (g)	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials
1	H7E040218-014	JWAHC -1AA	P N R	3	192	✓ 64.9120	1	H-47372	100.0000	✓	64.9670	5-11-07	11:25	LDW
							2	↓	↓	✓	64.9656	↓	1345	↓
							3			✓	64.9689		1600	
							4				LDW			
2	-019	JWAH3 -1AA	F	50	–	–	1	H-47372	99.9998	✓	11.7422	5-10-07	1508	JMH
							2	↓	↓	✓	11.7381	↓	1800	LDW
							3		100.0000	✓	11.7296	5-11-07	1129	LDW
							4			✓	11.7206		1507	↓
3	-020	JWAH5 -1AA	F	A173	–	–	1	H-47372	99.9998	✓	0.4173	5-10-07	1459	JMH
							2	↓	↓	✓	0.4173	↓	1721	↓
							3							
							4				LDW			
4	-021	JWAH6 -1AA	P N R	4	405	✓ 64.7960	1	H-47372	100.0000	✓	68.5799	5-11-07	11:26	LDW
							2	↓	↓	✓	68.5839	↓	1346	↓
							3			✓	68.5888		1601	
							4				LDW			
5	-026	JWAJV -1AA	F	52	–	–	1	H-47372	99.9998	✓	9.8747	5-10-07	1509	JMH
							2	↓	↓	✓	9.8717	↓	1801	LDW
							3		100.0000	✓	9.8646	5-11-07	1130	LDW
							4			✓	9.8548		1508	↓

used first two tare 5/15/2007

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

STL Knoxville
Sample Data Log
Particulate Matter by KNOX-WC-0006

Batch Number: 7130097

	Sample Number	Work Order Number	Matrix	Filter or Beaker No.	Probe Rinse Volume (mL)	Tare Weight (g)	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials
1	H7E040218-027	JWAJ5 -1AA	F	A174	-	-	1	H-47372	99.9998	✓	0.7262	5-10-07	1502	JMH
							2	↓	↓	✓	0.7261	↓	1725	LDW
							3							
							4				LDW			
2	-028	JWAJ9 -1AA	PNR	5	380	✓ 66.3031	1	H-47372	100.0000	✓	69.3333	5-11-07	1127	LDW
							2	↓	↓	✓	69.3355	↓	1347	↓
							3	↓	↓	✓	69.3392	↓	1602	↓
							4				LDW			
3	-033	JWAK9 -1AA	F	A51	-	-	1	H-47372	99.9998	✓	12.3908	5-10-07		JMH
							2	↓	↓	✓	12.3887	↓	1803	LDW
							3	↓	100.0000	✓	12.3816	5-11-07	1131	LDW
							4	↓	↓	✓	12.3798	↓	1509	↓
4	-034	JWALL -1AA	F	A175	-	-	1	H-47372	99.9998	✓	0.4133	5-10-07	1503	JMH
							2	↓	↓	✓	0.4134	↓	1726	LDW
							3							
							4				LDW			
5	-035	JWALV -1AA	PNR	6	362	✓ 65.0895	1	H-47372	100.0000	✓	66.6300	5-11-07	1128	LDW
							2	↓	↓	✓	66.6313	↓	1348	↓
							3	↓	↓	✓	66.6344	↓	1603	↓
							4				LDW			

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

STL Knoxville

Tare Weight Log
Particulate Matter by KNOX-WC-0006

	Filter or Beaker No.	Matrix	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials	Tare Weight (g)
1	I-1260	F	1	H-47372	99.9999	✓	79.8122	5-8-07	12:20	LDW	79.8130
			2	↓	↓	✓	79.8129	↓	14:45	↓	
			3			✓	79.8131		17:00		
			4								
2	I-1261	F	1	H-47372	99.9999	✓	33.7370	5-8-07	12:21	LDW	33.7371[5]
			2	↓	↓	✓	33.7373	↓	14:46	↓	
			3				LDW				
			4				5-8-07				
3	I-1262	F	1	H-47372	99.9999	✓	34.1264	5-8-07	12:22	LDW	34.1264[5]
			2	↓	↓	✓	34.1265	↓	14:47	↓	
			3				LDW				
			4				5-8-07				
4	I-1263	F	1	H-47372	99.9999	✓	31.0245	5-8-07	12:23	LDW	31.0247
			2	↓	↓	✓	31.0249	↓	14:48	↓	
			3				LDW				
			4				5-8-07				
5	I-1264	F	1	H-47372	99.9999	✓	34.7858	5-8-07	12:24	LDW	34.7860
			2	↓	↓	✓	34.7862	↓	14:49	↓	
			3				LDW				
			4				5-8-07				
6	I-1265	F	1	H-47372	99.9999	✓	32.1083	5-8-07	12:25	LDW	32.1088[5]
			2	↓	↓	✓	32.1088	↓	14:50	↓	
			3			✓	32.1089		17:01		
			4								
7	I-1266	F	1	H-47372	99.9999	✓	35.9456	5-8-07	12:26	LDW	35.9457[5]
			2	↓	↓	✓	35.9459	↓	14:51	↓	
			3				LDW				
			4				5-8-07				
8	1	P_{N_R}	1	H-47372	100.0001	✓	67.6005	5-10-07	0717	JMH	67.6005
			2								
			3					JMH			
			4					5-10-07			
9	2	P_{N_R}	1	H-47372	100.0001	✓	68.1287	5-10-07	0718	JMH	68.1287
			2								
			3					JMH			
			4					5-10-07			
10	3	P_{N_R}	1	H-47372	100.0001	✓	64.9120	5-10-07	0719	JMH	64.9120
			2								
			3					JMH			
			4					5-10-07			

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

STL Knoxville

Tare Weight Log
Particulate Matter by KNOX-WC-0006

	Filter or Beaker No.	Matrix	Replicate No.	Balance ID	Cal Check[1]	Tare?[2]	Individual Weight (g)	Date	Time	Analyst Initials	Tare Weight (g)
1	4	PNR	1	H-47372	100.0001	✓	64.7960	5-10-07	0720	JMH	64.7960
			2								
			3					JMH			
			4					5-10-07			
2	5	PNR	1	H-47372	100.0001	✓	66.3031	5-10-07	0721	JMH	66.3031
			2								
			3					JMH			
			4					5-10-07			
3	6	PNR	1	H-47372	100.0001	✓	65.0895	5-10-07	0722	JMH	65.0895
			2								
			3					JMH			
			4					5-10-07			
4	7	PNR	1	H-47372	100.0001	✓	66.1942	5-10-07	0723	JMH	66.1942
			2								
			3					JMH			
			4					5-10-07			
5	8	PNR	1	H-47372	100.0001	✓	84.3151	5-10-07	0724	JMH	84.3151
			2								
			3					JMH			
			4					5-10-07			
6	9	PNR	1	H-47372	100.0001	✓	66.4565	5-10-07	0725	JMH	66.4565
			2								
			3					JMH			
			4					5-10-07			
7	10	PNR	1	H-47372	100.0001	✓	67.4339	5-10-07	0726	JMH	67.4339
			2								
			3					JMH			
			4					5-10-07			
8	11	PNR	1	H-47372	100.0001	✓	65.1229	5-10-07	0728	JMH	65.1229
			2								
			3					JMH			
			4					5-10-07			
9	A	PNR	1	62278	100.0001	✓	64.8821	5-10-07	17:00	LDW	64.8821
			2								
			3					LDW			
			4								
10	B	PNR	1	62278	100.0001	✓	67.1833	5-10-07	17:01	LDW	67.1833
			2								
			3					LDW			
			4								

[1] Record the measured weight of the 100 gram weight. Was the measured weight 100 ± 0.0005 grams? (At start, and after every ten containers)

[2] Was the balance tared before the current weighing?

Sample Receipt Documentation

AIR SAMPLING ASSOCIATES, INC.

HTE 040218

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 1 of 7	
Address:	Unit No.: Stack	Lab: STL Knoxville	
City: Hardin, State: MT, Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 1	Test Method: ASTM D6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg
Container 1	4/26/07	1405	—	1	Filter # A176	X	X		
Container 2	4/26/07	1604	—	1	0.1 N HNO_3 Front Wash		X		
Container 2a	4/26/07	1601	—	1	ACE Front Wash	X	X		
Container 3	4/26/07	1350	1 N KCl	1	Imps 1,2,3 Contents + Rinses			X	
Container 4	4/26/07	1332	5% HNO_3 - 10% H_2O_2	1	Imp 4 Contents + Rinse				X
Container 5	4/26/07	1343	4% $KMnO_4$ - 10% H_2SO_4	1	Imps 5,6,7 Contents + Rinse				X
			Rec'd temp. Ambient						
			7 Boxes Rec'd Fedex # 7929		7774 7919, 7986 6347 3017				
			MFH 5-2-07		7775 5240, 7916 7901 5901 7774 2023.				
					7775 1587				
					7996 3143 2360				

Special Instructions: No Custody Seals.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	4/26/07	1604	1. Relinquished By: Bill Mullins	4-26-07	2230
2. Received By: Billy J. Mullins, Jr.	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr.	4/30/07	0815
3. Received By: Scott Jack	4/30/07	0830	3. Relinquished By: Scott Jack	4/30/07	0830

Comments: SHIP VIA FEDEX TO STL K 4/30/07

Rec'd ~~Tau~~ By: Matthew Hickman 5-1-07 ~~5-2-07~~ 10:45

MFH 5-2-07 MFH 5-2-07

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AIR SAMPLING ASSOCIATES, INC.

17JE040218

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 2 of 7	
Address:	Unit No.: Stack	Lab: STL Knoxville	
City: Hardin, State: MT, Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: ASTM D6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg
Container 1	4/26/07	1949	—	1	Filter # A177	X	X		
Container 2	4/26/07	1959	—	1	0.1 N HNO_3 Front Wash		X		
Container 2a	4/26/07	1957	—	1	ACE Front Wash	X	X		
Container 3	4/26/07	1951	1 N KCl	1	Imps 1,2,3 Contents + Rinses			X	
Container 4	4/26/07	1723	5% HNO_3 — 10% H_2O_2	1	Imp 4 Contents + Rinses				X
Container 5	4/26/07	1732	4% $KMnO_4$ — 10% H_2SO_4	1	Imps 5,6,7 contents + Rinse				X

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hafley	4/26/07	1959	1. Relinquished By: Bill Hafley	4-26-07	2230
2. Received By: Billy J. Mullins, Jr	4/27/07	2230	2. Relinquished By: Billy J. Mullins, Jr	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEX TO STLK 4/30/07

Rec'd By: [illegible] 5-1-07 10:45

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AIR SAMPLING ASSOCIATES, INC.

H7E040218

Chain of Custody Record

Client: ADA-ES			Project No.: 07-024			Page 3 of 7	Analysis			
Address:			Unit No.: Stack			Lab: STL Knoxville				
City: Hardin	State: MT	Zip Code:	Project Manager: Bill Mullins			Lab Contact: Terry Wasmund				
Run No.: 3			Test Method: ASTM D6784 (Ontario Hydro)			Lab Phone No.:				
Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Container 1	4-26-07	2211	—	1	Filter # A178	X	X			
Container 2	4/26/07	2212	—	1	0.1 N HNO_3 Front Wash		X			
Container 2a	4/26/07	2213	—	1	ACE Front Wash	X	X			
Container 3	4/26/07	2213	1N KCl	1	Imps 1,2,3 contents + Rinses			X		
Container 4	4/26/07	2151	5% HNO_3 - 10% H_2O_2	1	Imp 4 contents + Rinses				X	
Container 5	4/26/07	2159	4% $KMnO_4$ 10% H_2SO_4	1	Imps 5,6,7 contents + Rinses				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mylly	4/26/07	2213	1. Relinquished By: Bill Mylly	4-26-07	2230
2. Received By: Billy J. Mullins, Jr	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEX TO STLK 4/30/07

Rec'd By: [illegible] 5-1-07 10:45

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17E040218

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 4 of 7	
Address:	Unit No.: SDA Inlet	Lab: STL Knoxville	
City: Hardin / State: MT / Zip Code:	Project Manager: Bill Mulling	Lab Contact: Terry Wasmund	
Run No.: 1	Test Method: ASTM D 6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Container 1	4/26/07	1525	—	1	Thimble filter # 50	X	X			
Container 1a	4/26/07	1524	—	1	Back-up filter # A173	X	X			
Container 2	4/26/07	1554	—	1	0.1N HNO_3 Front Wash		X			
Container 2a	4/26/07	1552	—	1	ACE Front Wash	X	X			
Container 3	4/26/07	1448	1 N KCl	1	Imps. 1,2,3 contents + Rinses			X		
Container 4	4/26/07	1432	5% HNO_3 – 10% H_2O_2	1	Imp 4 contents + Rinse				X	
Container 5	4/26/07	1441	4% $KMnO_4$ – 10% H_2SO_4	1	Imps 5,6,7 Contents + Rinses				X	

Special Instructions:

Turn Around Time Required: [X] Normal [ ] Rush

Sample Disposal: [ ] Return to ASAI [X] Disposal By Lab [X] Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mulling	4/26/07	1554	1. Relinquished By: Bill Mulling	4-26-07	2230
2. Received By: Billy J. Mullins, Jr	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEX TO STLK 4/30/07

Rec'd By: [illegible] 5-1-07 10:45

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HJE040218

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 5 of 7	Analysis
Address:	Unit No.: SDA Inlet	Lab: STL Knoxville	
City: Hardin; State: MT; Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 2	Test Method: ASTM D6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part Bound Hg	Oxidized Hg	Elemental Hg
Container 1	4/26/07	1936	—	1	Thimble Filter #	X	X		
Container 1a	4/26/07	1918	—	1	Back-up Filter #	X	X		
Container 2	4/26/07	1946	—	1	0.1N HNO_3 Front Wash		X		
Container 2a	4/26/07	1944	—	1	ACE Front Wash	X	X		
Container 3	4/26/07	1908	1N KCl	1	Imps 1,2,3 Contents + Rinse			X	
Container 4	4/26/07	1843	5% HNO_3 - 10% H_2O_2	1	Imp 4 contents + Rinse				X
Container 5	4/26/07	1829	4% $KMnO_4$ - 10% H_2SO_4	1	Imps 5,6,7 contents + Rinse				X

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	4/26/07	1946	1. Relinquished By: Bill Mullins	4-26-07	2230
2. Received By: Billy J. Mullins, Jr.	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr.	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FED EX TO STLK 4/30/07 [illegible]

[illegible] 5-1-07 10:45

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AIR SAMPLING ASSOCIATES, INC.

H7E040218

Chain of Custody Record

Client: ADA-ES			Project No.: 07-024			Page 6 of 7	Analysis			
Address:			Unit No.: SDA Inlet			Lab: STL Knoxville				
City: Hardin	State: MT	Zip Code:	Project Manager: Bill Mullins			Lab Contact: Terry Wasmund				
Run No.: 3			Test Method: ASTM D6784 (Ontario Hydro)			Lab Phone No.:				
Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments		Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg
Container 1	4/26/07	2133	—	1	Thimble filter # 51		X	X		
Container 1a	4/26/07	2129	—	1	Back-up filter # A175		X	X		
Container 2	4/26/07	2150	—	1	0.1 N HNO_3 Front Wash			X		
Container 2a	4/26/07	2147	—	1	ACE Front Wash		X	X		
Container 3	4/26/07	2122	1 N KCl	1	Imps 1, 2, 3 contents + Rinses				X	
Container 4	4/26/07	2106	5% HNO_3 - 10% H_2O_2	1	Imp 4 Contents + Rinses					X
Container 5	4/26/07	2111	4% $KMnO_4$ - 10% H_2SO_4	1	Imps 5, 6, 7 Contents + Rinses					X

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	4-26-07	2150	1. Relinquished By: Bill Mullins	4-26-07	2230
2. Received By: Billy J. Mullins, Jr	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEX TO STLK 4/30/07

Rec'd BY: Matthew J. Howard 5-1-07 10:45

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H7E-DH02|8

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page 7 of 7	Analysis
Address:	Unit No.: SDA Inlet & Stack	Lab: STL Knoxville	
City: Hardin; State: MT; Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: Reagent Blanks	Test Method: ASTM D6784	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part. Bound Hg	Oxidized Hg	Elemental Hg	
Container 7	4-26-07	2217	—	1	0.1 N HNO_3 Blank			X	X	
Container 8	4-26-07	1743	—	1	1 N KCl Blank - 50 ml			X		
Container 9	4-26-07	1746	—	1	5% HNO_3 - 10% H_2O_2 (50 ml)				X	
Container 10	4-26-07	1748	—	1	4% $KMnO_4$ - 10% H_2SO_4 (50 ml)				X	
Container 11	4-26-07	2218	—	1	Hydroxylamine Sulfate Blank			X	X	
Container 12	4-26-07	2016	—	4	Filter Blanks		X			

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyde	4-26-07	2218	1. Relinquished By: Bill Hyde	4-26-07	2230
2. Received By: Billy J. Mullins, Jr.	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr.	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEX TO STL K 4/30/07 [illegible]

Rec'd By: Matthew F. Hamel 5-1-07 10:45

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STL KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: _____ **Project:** _____ **Lot Number:** H7E040218

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)		✓		☐ 1a Do not match COC ☑ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	1b. Containers 7, 8, 9, 10, + 12 ~~do~~ For the Reagent Blanks did not have Reagent Blank listed on the Sample Label. NFS 5-2-07 4a
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?	✓			☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For SOG water samples (1613B, 1668A, 8290, LR PAHs), do samples have visible solids present?			✓	If yes & appears to be >1%, was SOG notified? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: 75154 PM Instructions: _____

Sample Receiving Associate: [signature] Date: 5-2-07

QA026R18.doc, 1/30/06

AIR SAMPLING ASSOCIATES, INC.

Appendix G:

Chain of Custodies

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-024	Page: 1 of 7	
Address:	Unit No.: Stack	Lab: STL Knoxville	
City: Hardin; State: MT; Zip Code:	Project Manager: Bill Mullins	Lab Contact: Tony Wisnewski	
Run No.: 1	Test Method: ASTM D6784 (Ontario Hydro)	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Ant. Bound Hg	Oxidized Hg	Elemental Hg	
Container 1	4/26/07	1605	—	1	Filter # A176	X	X			
Container 2	4/26/07	1604	—	1	0.1 N HNO_3 Front Wash		X			
Container 2a	4/26/07	1601	—	1	ACE Front Wash	X	X			
Container 3	4/26/07	1350	1 N KCl	1	Imp 1,2,3 Contents + Rinses			X		
Container 4	4/26/07	1332	5% HNO_3 - 10% H_2O_2	1	Imp 4 Contents + Rinse				X	
Container 5	4/26/07	1343	4% $KMnO_4$ - 10% H_2SO_4	1	Imp 5,6,7 Contents + Rinse				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Kirk Hyly	4/26/07	1604	1. Relinquished By: Kirk Hyly	4/26/07	2230
2. Received By: Bill J. Mullins, J	4/26/07	2230	2. Relinquished By: Bill J. Mullins, J	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: SHIP VIA FEDEx TO STL K 4/30/07

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES			Project No.: 07-024		Page 2 of 7	Analysis				
Address			Unit No.: Stack		Lab: STL Knoxville					
City: Hardin	State: MT	Zip Code	Project Manager: Bill Mullins		Lab Contact: Terry Wasmund					
Run No.: 2			Test Method: ASTM D6784 (Ontario Hydro)		Lab Phone No.					
Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Soluble Bound Hg	Oxidized Hg	Elemental Hg	
Container 1	4/26/07	1949	—	1	Filter # A177	X	X			
Container 2	4/26/07	1959	—	1	0.1 N HNO_3 Front Wash		X			
Container 2a	4/26/07	1957	—	1	ACE Front Wash	X	X			
Container 3	4/26/07	1951	1 N KCl	1	Imps 1,2,3 Contents + Rinses			X		
Container 4	4/26/07	1723	5% HNO_3 — 10% H_2O_2	1	Imp 4 Contents + Rinses				X	
Container 5	4/26/07	1732	4% KMnO4 — 10% H_2SO_4	1	Imps 5,6,7 contents + Rinse				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☐ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyley	4/26/07	1959	1. Relinquished By: Bill Hyley	4-26-07	2230
2. Received By: Billy J. Mullins Jr.	4/27/07	2230	2. Relinquished By: Billy J. Mullins Jr	4/30/07	0815
3. Received By: Jon Nach	4/30/07	0830	3. Relinquished By: Jon Nach	4/30/07	0830

Comments: SHIP VIA FEDEX TO STL K 4/30/07

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	Project No.	Page of	Analysis
ADA ES	07-024	3 of 7	
Address	Unit No.	Lab	
	Stark	STL Knoxville	
City / State / Zip Code	Project Manager	Lab Contact	
Hardin / MT	Bill Mullins	Terry Wakenwood	
Run No.	Test Method	Lab Phone No.	
3	ASTM D6784 (Ontario Hydra)		

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Wet Based Hg	Oxidized Hg	Elemental Hg	
Container 1	4-26-07	2211	—	1	Filter # A178	X	X			
Container 2	4/26/07	2212	—	1	0.1 N HNO3 Front wash		X			
Container 2a	4/26/07	2213	—	1	ACE Front wash	X	X			
Container 3	4/26/07	2213	1N KCl	1	Tips 1,2,3 contents + Rinses			X		
Container 4	4/26/07	2151	5% HNO3 - 10% H2O2	1	Tip 4 contents + Rinses				X	
Container 5	4/26/07	2159	4% KMnO4	1	Tips 5,6,7 contents + Rinses				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☐ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Kell Hyley	4/26/07	2213	1. Relinquished By: Kell Hyley	4-26-07	2230
2. Received By: Billy J. Mullins Jr.	4/26/07	2230	2. Relinquished By: Billy J. Mullins Jr.	4/30/07	0815
3. Received By: Ark Hach	4/30/07	0830	3. Relinquished By: Ark Hach	4/30/07	0830

Comments: SHIP VIA FEDEX TO STLK 4/30/07

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	Project No.	Page 4 of 7
ADA-ES	07-024	
Address	Unit No. SDA Inlet	Lab STL Knoxville
City: Hardin; State: MT; Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund
Run No. 1	Test Method: ASTM D 6784 (Ontario Hydro)	Lab Phone No.

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate Hg	Part Bound Hg	Oxidized Hg	Elemental Hg	
Container 1	4/26/07	1525	—	1	Thimble filt. # 50	X	X			
Container 1a	4/26/07	1524	—	1	Back-up filt. # 4173	X	X			
Container 2	4/26/07	1554	—	1	0.1N HNO_3 Front Wash		X			
Container 2a	4/26/07	1552	—	1	ACE Front Wash	X	X			
Container 3	4/26/07	1448	1 N KCl	1	Imps. 1, 2, 3 contents + Rinses			X		
Container 4	4/26/07	1432	5% HNO_3 – 10% H_2O_2	1	Imp 4 contents + Rinse				X	
Container 5	4/26/07	1441	4% $KMnO_4$ – 10% H_2SO_4	1	Imps 5, 6, 7 contents + Rinses				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyty	4/26/07	1554	1. Relinquished By: Bill Hyty	4-26-07	2230
2. Received By: Billy J. Mullins, J.	4/26/07	2230	2. Relinquished By: Billy J. Mullins, J.	4/30/07	0815
3. Received By: Don Tach	4/30/07	0830	3. Relinquished By: Don Tach	4/30/07	0850

Comments: SHIP VIA FEDEX TO STLK 4/30/07

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	Project No.	Page of	Analysis
ADA-ES	07-024	5 of 7	
Address	Unit No.	Lab	
	SDA Inlet	STL Knoxville	
City / State / Zip Code	Project Manager	Lab Contact	
Hardin / MT	Bill Mullins	Terry Wasmund	
Run No.	Test Method	Lab Phone No.	
2	ASTM D6784 (Ontario Hydro)		

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Part Bound Hg	Ox. Hg	Elemental Hg	
Container 1	4/26/07	1936	—	1	Thimble Filter #	X	X			
Container 1a	4/26/07	1918	—	1	Back-up Filter #	X	X			
Container 2	4/26/07	1946	—	1	0.1N HNO_3 Front Wash		X			
Container 2a	4/26/07	1944	—	1	ACE Front Wash	X	X			
Container 3	4/26/07	1908	1N KCl	1	Imps 1,2,3 contents + Rinse			X		
Container 4	4/26/07	1843	5% HNO_3 - 10% H_2O_2	1	Imp 4 contents + Rinse				X	
Container 5	4/26/07	1829	4% $KMnO_4$ - 10% H_2SO_4	1	Imps 5,6,7 contents + Rinses				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	4/26/07	1946	1. Relinquished By: Bill Mullins	4/26/07	2230
2. Received By: Billy J. Mullins, Jr.	4/26/07	2230	2. Relinquished By: Billy J. Mullins, Jr.	4/30/07	0815
3. Received By: [illegible]	4/30/07	0830	3. Relinquished By: [illegible]	4/30/07	0830

Comments: Ship via FedEx to SILK 4/30/07

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	Project No.	Page of	Analysis
ADA-ES	07-024	6 of 7	
Address	Unit No.	Lab	
	SDA Inlet	STL Knoxville	
City / State / Zip Code	Project Manager	Lab Contact	
Hardin / MT	Bill Mullins	Terry Wasmund	
Run No.	Test Method	Lab Phone No.	
3	ASTM D6784 (Ontario Hydro)		

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Acid Bound Hg	Oxidized Hg	Elemental Hg	
Container 1	4/26/07	2133	—	1	Thimble filter # 51	X	X			
Container 1a	4/26/07	2129	—	1	Back up filter # A175	X	X			
Container 2	4/26/07	2150	—	1	0.1 N HNO3 Front Wash		X			
Container 2a	4/26/07	2147	—	1	ACE Front Wash	X	X			
Container 3	4/26/07	2122	1 N KCl	1	Imp 1, 2, 3 contents + Rinses			X		
Container 4	4/26/07	2106	5% HNO3 10% H2O2	1	Imp 4 Contents + Rinses				X	
Container 5	4/26/07	2111	4% KMnO4 10% H2SO4	1	Imp 5, 6, 7 Contents + Rinses				X	

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Kyle Hyby	4-26-07	2150	1. Relinquished By: Kyle Hyby	4-26-07	2230
2. Received By: Bill J. Mullins, J.	4/26/07	2230	2. Relinquished By: Bill J. Mullins, J.	4/30/07	0815
3. Received By: Scott Tack	4/30/07	0830	3. Relinquished By: Scott Tack	4/30/07	0830

Comments: SHIP VIA FEDEX TO STLK 4/30/07

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	Project No.	Page 7 of 7	Analysis
ADA-ES	07-024		
Address	Unit No. SDA Inlet & Stack	Lab STL Knoxville	
City: Hardin; State: MT; Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: Reagent Blanks	Test Method: ASTM D6784	Lab Phone No.	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Oxalic Acid	Dark Blue / HF	Oxidized HF	Hydroxylamine HF	
Container 7	4-26-07	2217	—	1	0.1 N HNO3 Blank			X	X	
Container 8	4-26-07	1743	—	1	1 N HCl Blank - 50 ml			X		
Container 9	4-26-07	1746	—	1	5% HNO3 - 10% H2O2 (50 ml)				X	
Container 10	4-26-07	1748	—	1	4% KMnO4 10% H2SO4 (50 ml)				X	
Container 11	4-26-07	2218	—	1	Hydroxylamine Sulfate Blank			X	X	
Container 12	4-26-07	2016	—	4	Filter Blanks		X			

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyly	4-26-07	2218	1. Relinquished By: Bill Hyly	4-26-07	2230
2. Received By: Billy J. Mullins, J.	4/26/07	2230	2. Relinquished By: Billy J. Mullins, J.	4/30/07	0815
3. Received By: Ron Mach	4/30/07	0830	3. Relinquished By: Ron Mach	4/30/07	1850

Comments: SHIP VIA FEDEX TO STL K 4/30/07

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Chain of Custody Record

Client: ADA-ES		Project No.: 07-024		Page: 1 of 1	Analysis
Address:		Unit No.: Stack		Lab: Severn Trent Labs.	
City: Hardin	State: MT	Zip Code:	Project Manager: Bill Mullins	Lab Contact: Terry Wasmund	
Run No.: 1, 2, 3 and Blanks			Test Method: EPA Method 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Hydrogen Halides	Halogens			
Run1, Container 3	4/27/07	1155	0.1N H_2SO_4	1		X				
Run1, Container 4	4/27/07	1200	0.1N NaOH	1			X			
Run2, Container 3	4/27/07	1355	0.1N H_2SO_4	1		X				
Run2, Container 4	4/27/07	1400	0.1N NaOH	1			X			
Run3, Container 3	4/27/07	1640	0.1N H_2SO_4	1		X				
Run3, Container 4	4/27/07	1645	0.1N NaOH	1			X			
Container 6	4/27/07	1450	0.1N H_2SO_4	1		X				
Container 7	4/27/07	1400	0.1N NaOH	1			X			
Container 8	4/27/07	1455	DI Water	1		X	X			

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 6 Months

1. Recovered By: Billy J. Mullins, J.	Date: 4/27/07	Time: 1730	1. Relinquished By: Billy J Mullins, J	Date: 4/27/07	Time: 0815
2. Received By: [illegible]	Date: 4/30/07	Time: 0900	2. Relinquished By: [illegible]	Date: 4/30/07	Time: 0900
3. Received By:	Date:	Time:	3. Relinquished By:	Date:	Time:

Comments: SHIP VIA FEDEX TO STLK 4/30/07

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	Project No.	Page	of	Analysis
ADA-ES	07-024	1	1	
Address	Unit No.	Lab		
	Stack	Air Sampling Assoc.		
City / State / Zip Code	Project Manager	Lab Contact		
Hardin / MT /	Bill Mullis	Bill Hetley		
Run No.	Test Method	Lab Phone No.		
1, 2, & 3	EPA Method 26A	972-492-1400		

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate				
Run 1, Container 1	4/27/07	1140	Filter	1	Filter	X				
Run 1, Container 2	4/27/07	1315	Acetone	1	Acetone Front Wash	X				
Run 2, Container 1	4/27/07	1255	Filter	1	Filter	X				
Run 2, Container 2	4/27/07	1310	Acetone	1	Acetone Front Wash	X				
Run 3, Container 1	4/27/07	1640	Filter	1	Filter	X				
Run 3, Container 2	4/27/07	1650	Acetone	1	Acetone Front Wash	X				
Container 9	4/27/07	1455	Acetone	1	Acetone Blank	X				

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☐ Archive For 6 Months

	Date	Time		Date	Time
1. Recovered By: Billy J. Mullins, Jr.	4/27/07	1730	1. Relinquished By: Billy J. Mullins, Jr.	4/30/07	0830
2. Received By: [illegible]	4/30/07	0830	2. Relinquished By:		
3. Received By:			3. Relinquished By:		

Comments:

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AIR SAMPLING ASSOCIATES, INC.

Appendix H:

Resumes of Test Personnel

BILLY J. MULLINS, JR.; President

Education	Post Graduate Study Environmental Engineering at Southern Methodist University; Dallas, Texas 1970. M.S. 1969, New York University; New York, New York, in Civil Engineering (Air Resources). B.S. 1968, Texas Tech University; Lubbock, Texas, in Civil Engineering (Water Resources). Studies in Engineering at the U.S. Naval Academy; Annapolis, Maryland, 1963-1964
Professional Training Courses	Attended Short Course on Air Pollution Engineering at the University of Texas at Austin, February 1970. Attended four-week management course presented by the American Management Association, 1976.
Certification	Registered Professional Engineer Certified Visible Emissions Evaluator Licensed Private Pilot (Multi-Engine-Land, Instrument) Diplomat in the American Academy of Environmental Engineers Inductee into the Stack Sampling Hall of Fame Certified as Qualified Environmental Professional (QEP)
Professional Memberships	**Air & Waste Management Association** – Past Chairman, Past Vice Chairman, and Past Board of Directors of North Texas Chapter and Southwest Section; Past Chairman, Consultants Committee; Past Chairman, Source Measurement Committee **Source Evaluations Society** – Past President, Past Board of Directors **American Management Association**

Publications

Authored "Real World Experience with USEPA's New Sampling and Analytical Methods for Conducting Risk Burn," May 1998.

Co-authored "Sulfur Compound Emissions of the Petroleum Production Industry," December 1974.

Co-authored "Field Procedure for Stabilizing Hydrogen Sulfide Samples to be Analyzed Using Modified Methylene Blue Technique," presented at the Conference on Ambient Air Quality Measurements, Austin, Texas, March 1975.

Co-authored "Atmospheric Emissions Survey of the Sour Gas Industry," October 1975.

Co-authored "Technique for Insuring the Validity of Samples for High Concentrations of Sulfur Dioxide Using the EPA Method 5 Sampling Train," presented at the Third National Conference on Energy and the Environment, College Corner, Ohio, September 1975.

Teaching Experience

Conducted training seminars on sampling methods periodically since 1974 to present.

Conducted a one-day seminar on Part 75 Testing over ten times in 1993 and 1994.

Served as a lecturer in the Environmental Protection Agency's (EPA) training course number 450, "Source Sampling for Particulate Pollutants," for two years from January 1974 to October 1975 and March, 1992.

Conducted a two-day training course entitled "technical Assistance in Source Sampling" at Iowa State University, Ames, Iowa, for the Environmental Protection Agency (EPA), October 1974.

Conducted Environmental Protection Agency's (EPA) training course number 450, "Source Sampling for Particulate Pollutants," at Research Triangle Park, North Carolina, September 1975.

Teaching Experience (Cont'd)

Conducted a two-day short course entitled "Performing and Observing Source Sampling," Dallas, Texas, July 1976, May 1977, October 1977, November 1987 and November 1988; Lake Charles, Louisiana, May 1977; Casper Wyoming, May 1977; Point Comfort, Texas, November 1992.

Served as a lecturer in the Environmental Protection Agency's two-day seminar entitled "Asphalt Industry Environmental Solutions," presented in Dallas, Texas, March 21-22, 1979.

Conducted a two-day short course entitled "Performing and Observing Source Sampling," Phoenix, Arizona, August, 1990, for the State of Arizona, Department of Environmental Quality; Lincoln, Nebraska, March 1980, for the State of Nebraska, Air Quality Control Division.

Technical Experience

Directed and performed stack sampling on over 2000 sources of which over 500 were sampled simultaneously using more than one sampling train at several points in the flue gas stream; 1972-present.

Directed and performed over 200 short-term ambient air studies using mobile sampling vans and various ambient air sampling equipment; 1972-present.

Designed, directed and operated over 20 permanent ambient air networks of various size and duration for a variety of parameters; 1972-present.

Designed surface and underground drainage systems for residential subdivisions, public works projects, and shopping centers; 1969-1972.

Designed several residential subdivisions including lot layout, street design, drainage design, and utility design; 1969-1972.

Research Projects

Supervised and conducted a study made by the Hawaiian Sugar Planters' Association to characterize the emissions for several bagasse-fired boilers, April-May 1976.

Supervised and conducted a study made by the Rio Grande Valley Sugar Growers, Inc. to determine the area affected by the burning of sugarcane fields prior to harvesting, November 1974-April 1975.

Supervised and conducted a study by a lightweight aggregate manufacturer to develop a material balance around the process through sampling and analysis of several parameters, November 1973.

Conducted a study in New York City to attempt to develop a correlation in the ambient air between carbon dioxide and sulfur dioxide to provide a tool for predicting air pollution predicting air pollution episodes, January-May 1969.

Related Projects

Served as Chairman of the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Destin, Florida, 2002, and Santa Barbara, California, 1985.

Served as Co-Chairman of the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Destin, Florida, 2001.

Served as Session Chairman at the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Hershey, Pennsylvania, 1984; San Diego, California, 1993; and in Palm Coast, Florida, 1994.

BILLY L. HEFLEY; Associate

Education	B.S. 1992, East Central University; Ada, Oklahoma, in Environmental Science with a concentration in Environmental Management.
Professional Training	Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, April 1993. Also attended an 8-hour refresher course January 1994, February 1995, January 1996, and May 2004. Attended 8-hour Safe Hazardous Materials Transportation Training Program (HM-126F and HM-181) Dallas, Texas, October 1994. Attended Bill Mullins' Performing and Observing Source Sampling Short Course; Dallas, Texas, January 1995.
Certification	Certified Visible Emissions Evaluator
Professional Memberships	**Air & Waste Management Association** **Source Evaluations Society**
Technical Experience	Participated in the sampling of over 750 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1992-present. Participated in an auditing program for a permanent eight-station sulfur dioxide ambient air network in East Texas, 1992-1993. Participated in a semi-monthly ambient air monitoring survey for organic compounds at a petrochemical facility located in South Texas, 1992-1993. Participated in EPA's Information Collection Request for Mercury conducting more than 46 simultaneous tests for Speciated Mercury using the "Standard Test Method for Elemental, Oxidized, Particle-Bound, and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)." September 1999-May 2000.

Experienced in the analysis of commercial calibration gas cylinders for NO_x, SO_2, CO_2, and O_2.

Experience with calibration techniques for all field testing equipment.

Thoroughly trained in the operation and routine maintenance of the following:

Anarad Model AR50-C Carbon Dioxide Analyzer
Anarad Model AR880 Oxides of Nitrogen Analyzer
Anarad Model AR23 Oxygen Analyzer
Anarad Model AR30C2 Sulfur Dioxide Analyzer
California Analytical Model 300-HFID Total Hydrocarbon Analyzer
Servomex Model 1440 Carbon Dioxide Analyzer
Servomex Model 1440 Oxygen Analyzer
Teledyne Model 326 Oxygen Analyzer
Thermo Environmental Model 10AR & 10S Oxides of Nitrogen Analyzer
Thermo Electron Model 46C Oxides of Nitrogen Analyzer
Thermo Electron Model 48C Oxides of Nitrogen Analyzer
Western Research Model 721A Sulfur Dioxide Analyzer

PATRICK SELAKOVICH; Associate

Education	B.S.B.A. 1992, University of Arkansas; Fayetteville, Arkansas, in General Business.
Professional Training	Attended 24-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, April 1997. Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) & 'Train the Trainer', Gettysburg, Pennsylvania, July 1998. Also attended an 8-hour refresher course January 2000, January 2001, and May 2004. Attended OSHA General Industry Safety and Health Training, May 1999.
Professional Memberships	**Society For Human Resource Management**
Technical Experience	Participated in the sampling of over 150 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1996-present. Participated in EPA's 3-D probe study. May – August 1997. Experience with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: California Analytical Model 300-HFID Total Hydrocarbon Analyzer Servomex Model 1440 Carbon Dioxide Analyzer Servomex Model 1440 Oxygen Analyzer Thermo Electron Model 46C Oxides of Nitrogen Analyzer Thermo Electron Model 48C Oxides of Nitrogen Analyzer Western Research Model 721A Sulfur Dioxide Analyzer

AIR SAMPLING ASSOCIATES, INC.

SCOT JACKSON; Associate

Education	B.S.B.A. May 1978, Mountain View Jr. College, in General Business.
Professional Training	Purchasing Supervisor for METCO Environmental, Inc. in charge of inventory and supplies. January 1995 – April 2005. Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120), Dallas, Texas, May 2000. Attended Fed-Ex Hazardous Goods Shipping Training, June 2004.
Certification	Certified Visible Emissions Evaluator
Technical Experience	Participated in the sampling of over 100 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1995-present. Experience with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: California Analytical Model 300-HFID Total Hydrocarbon Analyzer Servomex Model 1440 Carbon Dioxide Analyzer Servomex Model 1440 Oxygen Analyzer Thermo Electron Model 42C Oxides of Nitrogen Analyzer Thermo Electron Model 48C Oxides of Nitrogen Analyzer Western Research Model 721A Sulfur Dioxide Analyzer

PROFESSIONAL PROFILE

DANE ODDE

Environmental Specialist

Technical Expertise:

- Source Emission Testing
- Field Sampling
- Calibration and Maintenance of Sampling Equipment
- Monitoring and Equipment Repair
- VOC Sampling

Technical Experience:

Mr. Odde has 1-year experience in environmental testing. He has assisted in numerous source emissions testing throughout the Mountain West. Mr. Odde has experience in sample train preparation for EPA methods.

Education:

Mr. Odde has a Associates of Science Degree in Wildlife and Fisheries Biology and Bachelors of Science in Biology.

Certification:

MSHA Training
H_2S Safety Training

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407-2B Holford's Prairie Rd.• Lewisville, TX 75056

STACK SAMPLING REPORT
FOR
PM10/2.5 and SULFUR TRIOXIDE
TESTING
ON THE
ROCKY MOUNTAIN POWER
HARDIN POWER PLANT
STACK
HARDIN, MONTANA

PROJECT NO. 07-057

SEPTEMBER 2007

PREPARED FOR:
ADA-ES, INC.
8100 SOUTHPARK WAY
LITTLETON, CO 80120

PREPARED BY:
AIR SAMPLING ASSOCIATES, INC.
P.O. BOX 1175
LEWISVILLE, TEXAS 75067

(Total Number of pages: 182)

AIR SAMPLING ASSOCIATES, INC.

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Figure 2: EPA Methods 201A and 202 Sampling Train 12
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Figure 4: Location of Traverse Points A-3

EXECUTIVE SUMMARY

Air Sampling Associates, Inc. of Lewisville, Texas conducted stack testing at the Rocky Mountain Power, Hardin Power Plant, located in Hardin, Montana. The purpose of the stack testing was to determine the particulate matter and sulfur trioxide being emitted to the atmosphere via the stack. The testing was conducted on September 5 and 6, 2007.

The sampling team consisted of Mr. Bill Mullins, Mr. Patrick Selakovich, Mr. Scot Jackson, and Mr. John Stanley. Mr. Mullins was the test team leader.

The procedures set forth in Title 40 of the Code of Federal Regulations, Part 60 (40CFR60), Appendix A, Test Methods 1, 2, 3, 4, 5, 201A and 202; and the National Council for Air and Stream Improvement, Inc. (NCASI) Method 8A were followed during the testing.

The average emission rate of particulate matter > PM_{10} was 0.0030 grains per dry standard cubic foot (gr/dscf). The average emission rate of particulate matter > PM_{10} was 7.90 lbs/hr.

The average emission rate of particulate matter < PM_{10} > $PM_{2.5}$ was 0.0030 grains per dry standard cubic foot (gr/dscf). The average emission rate of particulate matter < PM_{10} > $PM_{2.5}$ was 7.90 lbs/hr.

The average emission rate of particulate matter $PM_{2.5}$ was 0.0023 grains per dry standard cubic foot (gr/dscf). The average emission rate of particulate matter $PM_{2.5}$ was 6.31 lbs/hr.

The average emission rate of particulate matter total catch was 0.0494 grains per dry standard cubic foot (gr/dscf). The average emission rate of particulate matter total catch was 131.10 lbs/hr.

The average SO_3 concentrations at the Stack were 1.10 ppm. The average moisture content measured at the Stack using NCASI 8A was 14.88%.

Billy J. Mullins, Jr. P.E., Q.E.P., D.E.E.

SUMMARY OF RESULTS

Table 1: Summary of Sampling Results

Parameter - Results	Average
Particulate Matter (> PM_{10}) - gr/dscf - lbs/hr	 0.0030 7.90
Particulate Matter (< PM_{10} > $PM_{2.5}$) - gr/dscf - lbs/hr	 0.0030 7.90
Particulate Matter ($PM_{2.5}$) - gr/dscf - lbs/hr	 0.0023 6.31
Particulate Matter (Total Catch) - gr/dscf - lbs/hr	 0.0494 131.10
Sulfur Trioxide - ppm	1.10

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 2: Summary of Particulate Matter Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	09/06/07	09/06/07	09/06/07	-----
Test Time	1021-1124	1310-1412	1537-1641	-----
*Flow Rate – DSCFM**	307,112	307,778	318,655	311,182
Stack Temp. - ˚F	227	217	217	220
O_2 - %Vol. (dry)	6.7	6.7	6.8	6.7
CO_2 - %Vol. (dry)	12.8	12.8	12.7	12.8
Percent Excess Air	45.8	45.8	46.8	46.1
Moisture Content - %	15.12	15.38	15.05	15.18
Percent Isokinetic	86.6	85.7	83.6	85.3
Particulate Matter (> PM_{10})				
- gr/dscf	0.0046	0.0013	0.0030	0.0030
- lbs/hr	12.06	3.38	8.27	7.90
Particulate Matter (< PM_{10} > $PM_{2.5}$)				
- gr/dscf	0.0037	0.0026	0.0026	0.0030
- lbs/hr	9.84	6.75	7.11	7.90
Particulate Matter ($PM_{2.5}$)				
- gr/dscf	0.0006	0.0006	0.0058	0.0023
- lbs/hr	1.67	1.50	15.77	6.31
Particulate Matter (Total Catch)				
- gr/dscf	0.0465	0.0737	0.0280	0.0494
- lbs/hr	122.30	194.47	76.52	131.10

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 3: Summary of Sulfur Trioxide Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	09/06/07	09/06/07	09/06/07	-----
Test Time	1038-1138	1359-1459	1529-1629	-----
O_2 - %Vol. (dry)	6.7	6.7	6.8	6.7
CO_2 - %Vol. (dry)	12.8	12.8	12.7	12.8
Percent Excess Air	45.8	45.8	46.8	46.1
Moisture Content - %	14.82	14.94	14.87	14.88
Sample Volume – DSCM	0.516	0.495	0.513	0.508
Sulfur Trioxide				
– µg	499	1,349	1,537	1,128
– ppm	0.49	1.32	1.49	1.10

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

DISCUSSION OF SAMPLING RESULTS

Particulate Matter

The three tests for particulate matter appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the sampling train and the pitot tubes indicated no leaks before or after each test. The indicative parameters calculated from the field data were in reasonable agreement. The measured moisture contents for the three runs were within 1.3% of the mean value. The measured flow rates (DSCFM) for the tests were within 2.4% of the mean value. The rates of sampling for the three tests were within the specified limits (80 to 120 percent isokinetic). The greatest deviation from 100% isokinetic was 16.4%. The particulate cut size was 9.17 microns, which was within the specified limits in EPA 201A of 9 to 11 microns.

The concentrations (gr/dscf) of particulate matter > PM_{10} for the three tests showed a range of -56.18 percent to +55.06 percent variation from the mean value of 0.0030 gr/dscf.

The concentrations (gr/dscf) of particulate matter < PM_{10} > $PM_{2.5}$ for the three tests showed a range of -12.36 percent to +24.72 percent variation from the mean value of 0.0030 gr/dscf.

The concentrations (gr/dscf) of particulate matter $PM_{2.5}$ for the three tests showed a range of -74.29 percent to +148.57 percent variation from the mean value of 0.0023 gr/dscf.

The concentrations (gr/dscf) of particulate matter total catch for the three tests showed a range of -43.32 percent to +49.19 percent variation from the mean value of 0.0494 gr/dscf.

Sulfur Trioxide

The three tests for sulfur trioxide appeared to be a valid representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train showed no leaks before or after testing. The measured moisture contents were within 0.4% of the mean value.

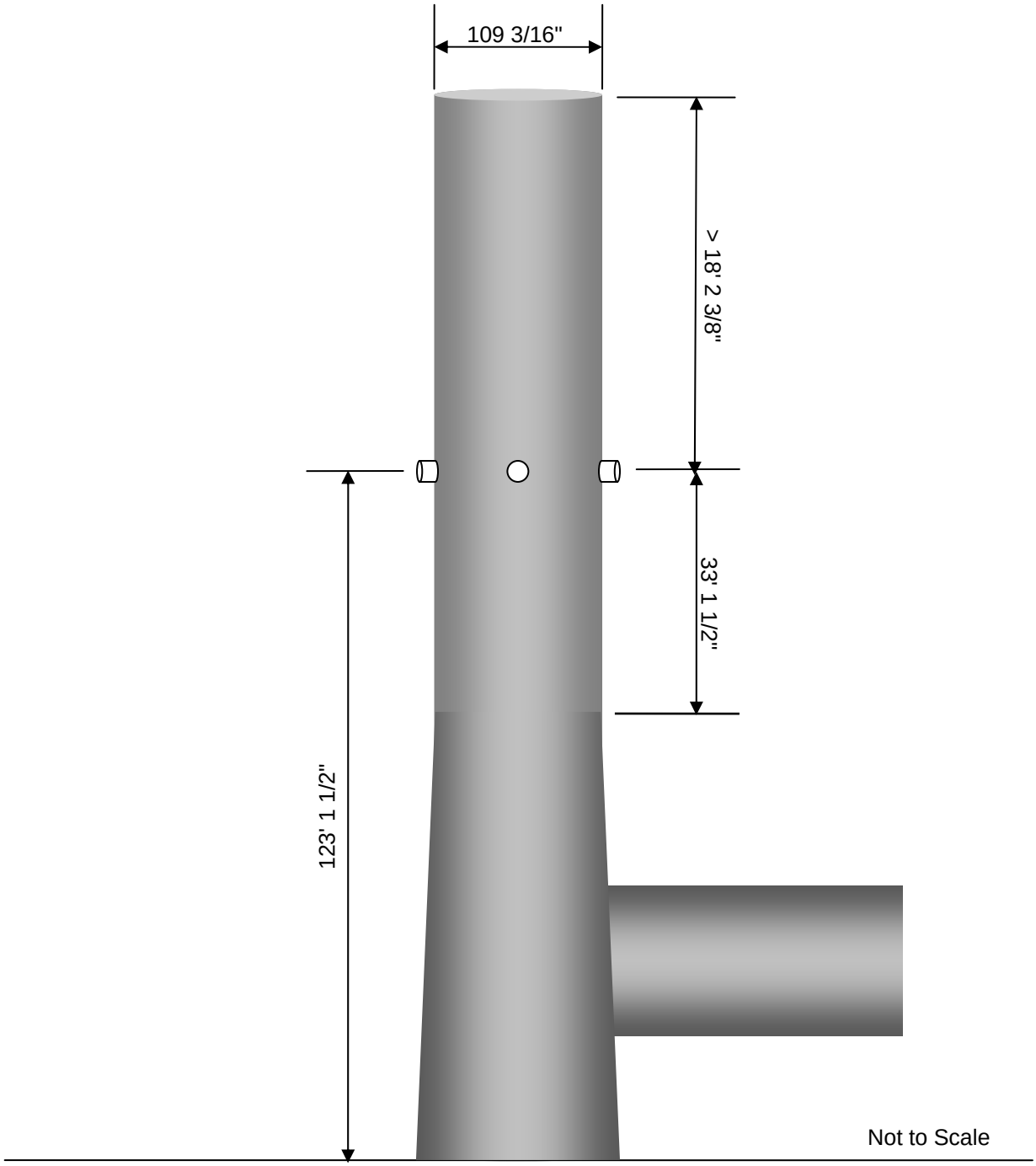
The concentrations (ppm) of sulfur trioxide for the three tests showed a range of -55.45 percent to +35.45 percent variation from the mean value of 1.10 ppm.

DESCRIPTION OF SAMPLING LOCATIONS

The sampling ports on the Stack are approximately 123 feet 1 1/2 inches above the ground. The sampling ports are located 33 feet 1 1/2 inches (3.64 stack diameters) downstream from a constriction in the stack and > 18 feet 2 3/8 inches (> 2.00 stack diameters) upstream from the outlet to the stack.

SAMPLING LOCATION

Figure 1: Stack



SAMPLING AND ANALYTICAL PROCEDURES

The procedures set forth in 40CFR60, Appendix A, Test Methods 1, 2, 3, 4, 5, 201A and 202; and NCASI Method 8A were followed during testing.

Particulate Matter

Six traverse points were sampled from each of the two ports on the stack for a total of twelve traverse points. All traverse points were previously checked for cyclonic flow and none was found to be present. For each run, samples of varying dwell time were taken at each of the twelve traverse points for a total sampling time of 60 minutes. The dwell time at each sampling point was proportional with the velocity at that point. Data was recorded at the beginning of each sample point.

The pitot tube lines were checked for leaks before and after each test under a vacuum and a pressure. The lines were also checked for clearance and the manometer was zeroed before each test.

The sampling train was leak checked at the end of the sampling probe at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The “front-half” of the sampling train contained the following components:

Stainless steel nozzle
PM_{10} Sampler
$PM_{2.5}$ Sampler
Heated glass lined probe@ 250°F ± 25°F
Heated Teflon sample line @ 250°F ± 25°F

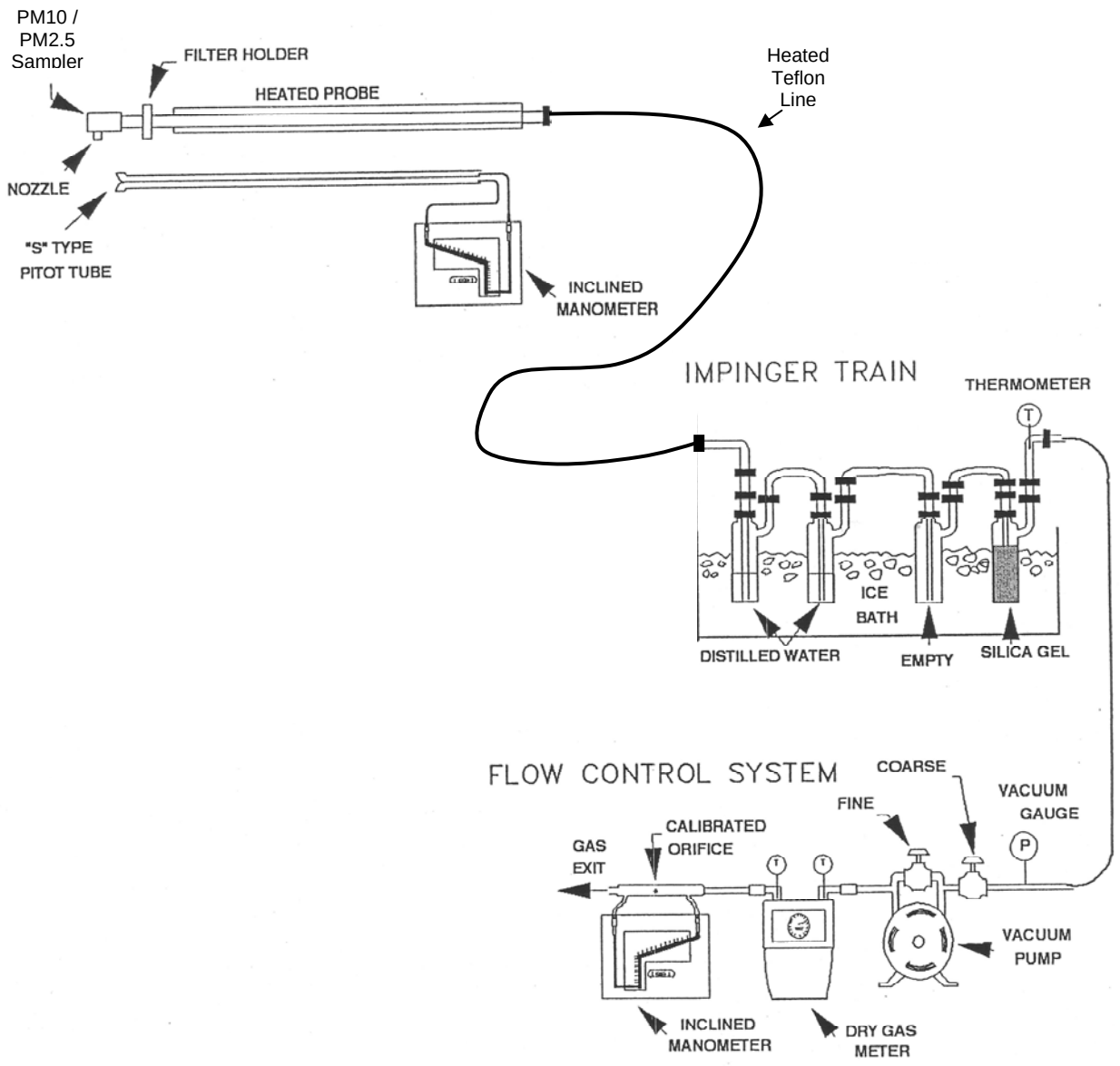
The “back-half” of the sampling train contained the following components:

Table 4: Reference Method 202 Sampling Train

Impinger No.	Impinger Type	Impinger Contents	Amount	Parameter Collected
1	Modified	H.P.L.C. H_2O	100 ml	H_2O
2	Greenburg-Smith	H.P.L.C. H_2O	100 ml	H_2O
3	Modified	Empty	-----	H_2O
4	Modified	Silica Gel	250 g	H_2O

At the completion of each run, the “back-half” of the sampling train was purged with nitrogen for 60 minutes at a rate of 20 liters per minute.

Figure 2: EPA Methods 201A and 202 Sampling Train



Sulfur Trioxide

All samples were taken at a single traverse point for a total sampling time of 60 minutes. Data was recorded at 5-minute intervals.

The sampling train was leak-checked at the end of the sampling probe at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The 'front-half' of the sampling train contained the following components:

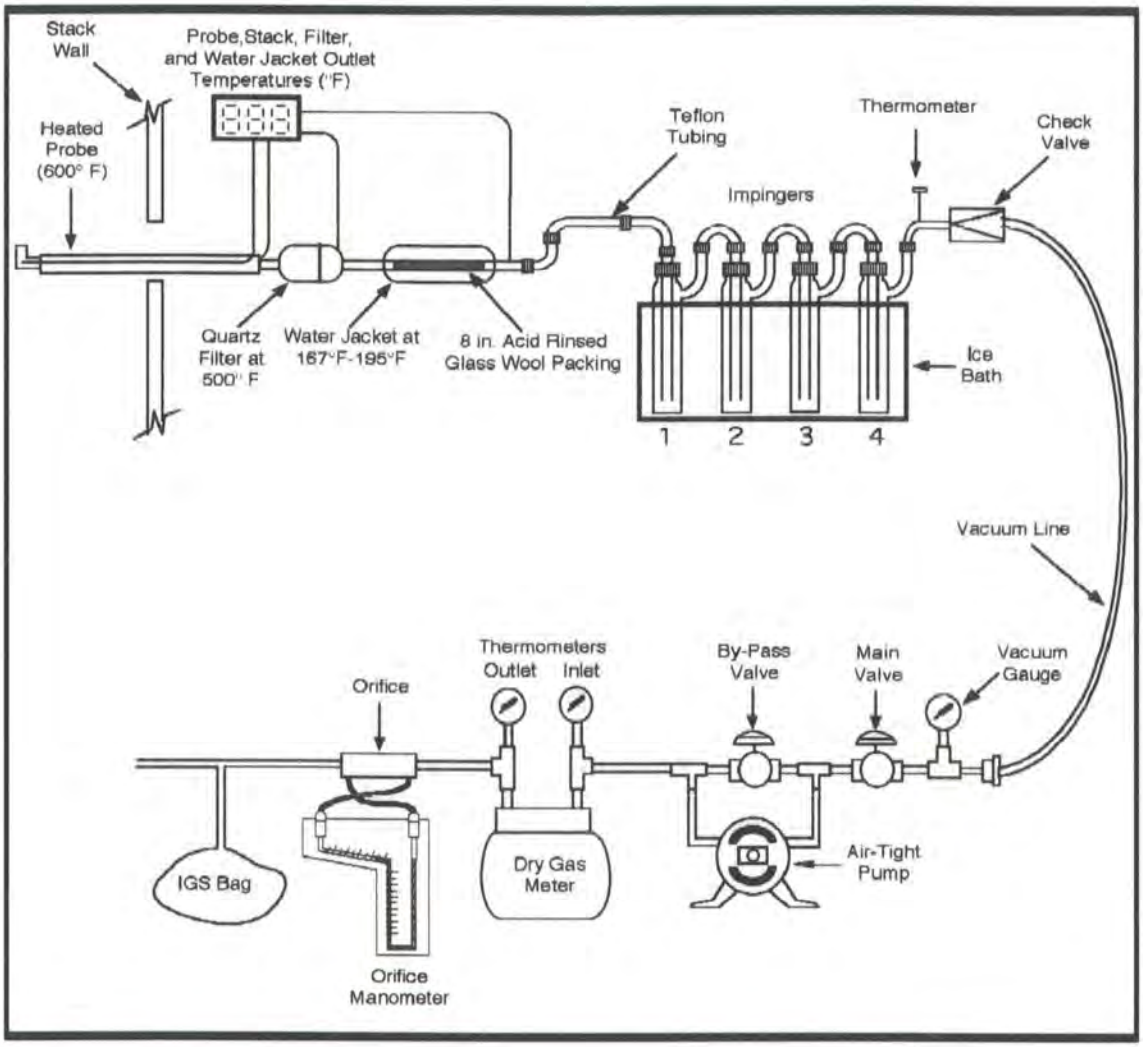
Glass Sample Probe heated to 500˚ F
Quartz Filter heated to 500˚ F
Glass Condenser cooled to 140˚ F
Teflon tubing connected to Impingers

The 'back-half' of the sampling train contained the following components:

Condenser/Absorbing System

Impinger No.	Impinger Type	Absorbing Solution
1	Modified	100 ml 3% H_2O_2
2	Greenburg-Smith	100 ml 3% H_2O_2
3	Modified	100 ml DI H_2O
4	Modified	~200 g silica gel

Figure 3: NCASI Method 8A Sampling Train



TEST NARRATIVE

Personnel from Air Sampling Associates, Inc arrived at the Rocky Mountain Power, Hardin Power Plant located in Hardin, Montana at 2:15 p.m. on Wednesday, September 5, 2007. Electrical power was established to the sampling trailer and the sampling equipment was moved onto the stack. Personnel departed the plant at 6:00 p.m.

On Thursday, September 6, 2007, personnel returned to the plant at 6:45 a.m. The sampling equipment was prepared for sampling and the first test for PM_{10} and $PM_{2.5}$ began at 10:21 a.m. The first test utilizing the controlled condensate sampling procedure began at 10:38 a.m. Sampling continued until the completion of the third test for PM_{10} and $PM_{2.5}$ at 4:41 p.m. and the completion of the third controlled condensate teat at 4:29 p.m.

The sampling equipment was moved off of the stack and loaded into the sampling trailer. The samples were recovered and taken to Air Sampling Associates, Inc.'s office in Lewisville, Texas for analysis and evaluation.

Operations at the Rocky Mountain Power, Harding Power Plant, located in Hardin, Montana, for ADA-ES, were completed at 6:30 p.m. on Thursday, September 6, 2007.

APPENDICES

Appendix A: **Location of Traverse Points**

Appendix B: **Nomenclature and Equations for Calculation of Source Emissions**

Appendix C: **Calibration Data**

Appendix D: **Field Data**

Appendix E: **EPA Test Methods 201A and 202 (Particulate Matter) Analytical Data**

Appendix F: **Controlled Condensate Test Method (Sulfate) Analytical Data**

Appendix G: **Chain of Custodies**

Appendix H: **Resumes of Test Personnel**

AIR SAMPLING ASSOCIATES, INC.

Appendix A:

Location of Traverse Points

Appendix A

Location of Traverse Points

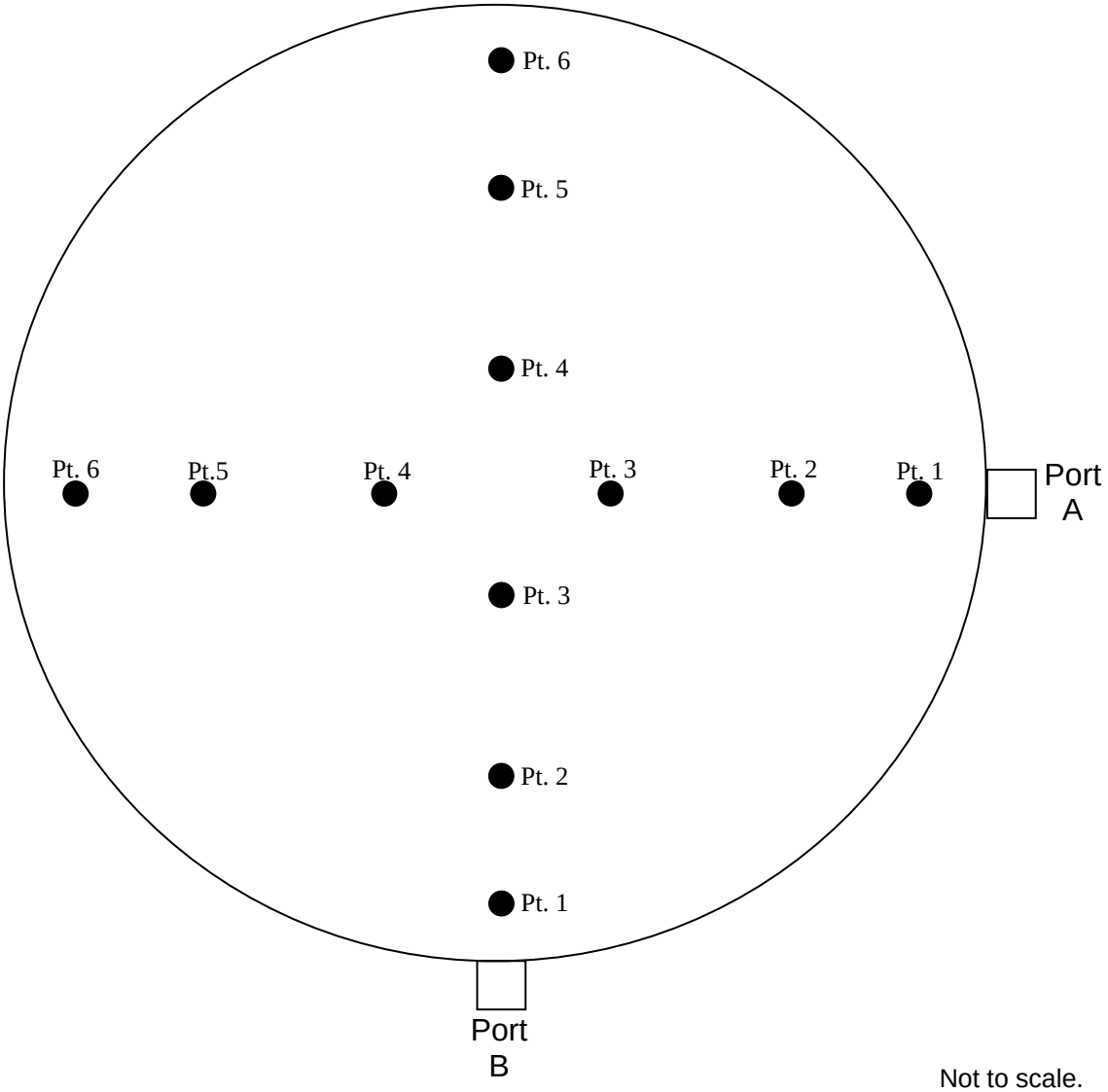
The sampling ports are located 33 feet 1 1/2 inches (3.64 stack diameters) downstream from a constriction in the stack and > 18 feet 2 3/8 inches (> 2.00 stack diameters) upstream from the outlet to the stack. The locations of the traverse points were calculated as follows:

Table 5: Location of Traverse Points

Port & Wall Thickness = 15 9/16 inches		
Inside Stack Diameter = 109 3/16 inches		
Point Number	**Percent of Stack Diameter**	**Distance from Wall**
1	4.4	4 13/16"
2	14.6	15 15/16"
3	29.6	32 5/16"
4	70.4	76 7/8"
5	85.4	93 1/4"
6	95.6	104 3/8"

Appendix A

Figure 4: Location of Traverse Points



Not to scale.

AIR SAMPLING ASSOCIATES, INC.

Appendix B:

Nomenclature and Equations for Calculation of Source Emissions

AIR SAMPLING ASSOCIATES, INC.

Nomenclature For Flow Rate and Moisture Calculations

Symbol	English Units	Metric Units	Description
A_s	in.^{2}	m^2	Stack Area
C_{an}	gr/dscf*	g/dscm*	Particulate – probe, cyclone, and filter
C_{ao}	gr/dscf*	g/dscm*	Particulate –total
C_{at}	gr/CF @ stack conditions	g/m3	Particulate – probe, cyclone, and filter
C_{au}	gr/CF @ stack conditions	g/m3	Particulate – total
C_{aw}	lbs/hr	kg/hr	Particulate – probe, cyclone, and filter
C_{ax}	lbs/hr	kg/hr	Particulate - total
C_p			Pitot Tube Calibration Factor
D_n	in.	m	Sampling Nozzle Diameter
%EA			Percent Excess Air at Sampling Point
g	32.2 ft/sec^2		Acceleration of gravity
%I			Percent Isokinetic
%M			Percent Moisture in the Stack Gas by Volume
M_d			Mole Fraction of Dry Gas
m_f	mg	mg	Particulate – probe, cyclone, and filter
mt	mg	mg	Particulate -total
M_{water}	18 lb/lb-mole		Molecular Weight of Water
MW	lb/lb-mole	g/g-mole	Molecular Weight of Stack Gas
MW_{air}	28.84 lb/lb-mole		Molecular Weight of Air
MW_d	lb/lb-mole	g/g-mole	Molecular Weight of Dry Stack Gas

Symbol	English Units	Metric Units	Description
P_b	"Hg Absolute	mm Hg	Barometric Pressure
P_m	"H_2O	mm H_2O	Orifice Pressure drop
Ps	"Hg Absolute	mm Hg	Stack Pressure
ΔP	"H_2O	mm H_2O	Velocity Head of Stack Gas
P_{std}	29.92" Hg	760 mm Hg	Standard Barometric Pressure
Q_a	ACFM	m^3/hr	Stack Gas Volume at Actual Stack Conditions
Q_s	DSCFM*	dscm/hr*	Stack Gas Volume at 29.92" Hg, 528° R, dry
R	21.83" Hg-ft^3/lb-mole °R		Universal Gas Constant
T_m	°F	°C	Average Gas Meter Temperature
T_t	min	min	Net Time of Test
T_s	°F	°C	Stack Temperature
T_{std}	528 °R	293 °K	Standard Temperature
V_m	ft^3	m^3	Volume of Dry Gas Sampled @ Meter Conditions
Vm_{std}	dscf*	dscm*	Volume of Dry Gas Sampled @ Standard Conditions
V_s	fpm	m/sec	Stack Velocity @ Stack Conditions
V_w	ml	ml	Total Water Collected in Impingers and Silica Gel
Vw_{gas}	scf*	scm*	Volume of Water Vapor Collected @ Standard Conditions

Symbol	English Units	Metric Units	Description
ρ_{air}	0.0748 lbs/ft^3		Density of Air
ρ_{water}	1 g/ml		Density of Water
ρ_{man}	62.32 lbs/ft^3		Density of Manometer Oil (Inches of Water)

Standard Conditions: 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

EXAMPLE CALCULATIONS

1. Volume of dry gas sampled at standard conditions. *

$$V_{m_{std}} = V_m \left(\frac{T_{std}}{T_m + 460} \right) \left[\frac{P_b + \frac{P_m}{13.6}}{P_{std}} \right]$$

$$V_{m_{std}} = 17.65\ V_m \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460} \right] = \text{dscf}$$

$$V_{m_{std}} = \text{dscf} \times 0.028317 = \text{dscm}$$

2. Volume of water vapor collected at standard conditions. *

$$V_{w_{gas}} = \frac{(V_w - gms\ SO_2 - gms\ H_2S)\ \rho_{water}\ RT_{std}}{P_{std}\ M_{water}\ 453.6}$$

$$V_{w_{gas}} = 0.0472\ (V_w - gms\ SO_2 - gms\ H_2S) = scf$$

$$V_{w_{gas}} = scf \times 0.028317 = scm$$

3. Percent moisture in stack gas.

$$\%M = \frac{V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} \times 100 = \%$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

4. Mole fraction of dry gas.

$$M_d = \frac{100 - \%M}{100}$$

5. Average molecular weight of dry stack gas.

$$MW_d = \left[\%CO_2 \times \frac{44}{100}\right] + \left[\%O_2 \times \frac{32}{100}\right] + \left[\%N_2 \times \frac{28}{100}\right] + \left[\%CO \times \frac{28}{100}\right] = lb/lb\text{-}mole$$

$$= g/g\text{-}mole$$

6. Molecular weight of stack gas.

$$MW = MW_d \times M_d + 18\,(1 - M_d) = \frac{lb}{lb\text{-}mole} = g/g\text{-}mole$$

7. Percent excess air at sampling point.

$$\%EA = \frac{100\,[\%O_2 - (0.5\,\%CO)]}{0.265\,(\%N_2) - [\%O_2 - (0.5\,\%CO)]}$$

8. Stack Pressure.

$$P_s = P_b + \frac{Stack\ Pressure\ "H_2O}{13.6} = "Hg\ Absolute$$

$$P_s = "Hg\ Abs. \times 25.4 = mm\ Hg$$

9. Stack velocity at stack conditions.

$$V_s = C_p\,60\left[\frac{2g \times \rho_{man} \times P_{std} \times MW_{air} \times (T_s + 460) \times \Delta P}{12 \times \rho_{air} \times P_s \times MW \times T_{std}}\right]^{1/2}$$

$$V_s = 5{,}123.8\,C_p\left[\frac{(T_s + 460)}{P_s \times MW}\right]^{1/2} \sqrt{\Delta P}\ \text{average} = \text{fpm}$$

$$V_s = \text{fpm} \times 0.00508 = \text{m/sec}$$

10. Dry stack gas volume at standard conditions. *

$$Q_s = \frac{1}{144} V_s \text{ x } A_s \text{ x } M_d \text{ x } \frac{T_{std}}{T_s + 460} \text{ x } \frac{P_s}{P_{std}}$$

$$Q_s = \frac{0.123\, V_s \text{ x } A_s \text{ x } M_d \text{ x } P_s}{T_s + 460} = DSCFM$$

$$Q_s = DSCFM \text{ x } 1.6990 = dscm/hr$$

11. Actual stack gas volume at stack conditions.

$$Q_a = \frac{V_s \text{ x } A_s}{144} = ACFM$$

$$Q_a = ACFM \text{ x } 1.6990 = m^3/hr$$

12. Percent Isokinetic

$$\%I = \frac{V_{mstd} \text{ x } (T_s + 460) \text{ x } P_{std} \text{ x } 100 \text{ x } 144\, in.^2/ft^2}{M_d \text{ x } T_{std} \text{ x } P_s \text{ x } T_t \text{ x } V_s \left(\frac{\Pi \text{ x } D_n^2}{4} \right)}$$

$$\%I = \frac{1039 \text{ x } V_{mstd} \text{ x } (T_s + 460)}{M_d \text{ x } P_s \text{ x } T_t \text{ x } V_s \text{ x } D_n^2}$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

13. Particulate – Probe, cyclone, and filter.

$$C_{an} = \frac{m_f}{V_{m_{std}}} x \frac{1\,gr}{64.8\,mg}$$

$$C_{an} = 0.0154 \text{ x } \frac{mf}{V_{m_{std}}} \text{ gr/dscf } *$$

$$C_{an} = \text{gr/dscf x } 2.290 = \text{g/dscm } *$$

14. Particulate total.

$$C_{ao} = 0.0154 \text{ x } \frac{m_t}{V_{m_{std}}} = gr\,/\,dscf\ *$$

$$C_{ao} = \text{gr/dscf x } 2.290 = \text{g/dscm } *$$

15. Particulate – probe, cyclone, and filter at stack conditions.

$$C_{at} = C_{an} \text{ x } \frac{P_s}{P_{std}} \text{ x } \frac{(T_{std})}{(T_s + 460)} \text{ x } M_d$$

$$C_{at} = \frac{17.65 \text{ x } C_{an} \text{ x } Ps \text{ x } Md}{Tx + 460} = \text{gr/CF}$$

$$C_{at} = \text{gr/CF x } 2.290 = \text{g/m}^3$$

16. Particulate – total, at stack conditions.

$$C_{au} = \frac{17.65 \text{ x } C_{ao} \text{ x } P_s \text{ x } M_d}{T_s + 460} = \text{gr/CF}$$

$$C_{au} = \text{gr/CF x } 2.290 = \text{g/m}^3$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

17. Particulate – probe, cyclone, and filter.

$$C_{aw} = C_{an} \text{ x } Q_s \text{ x } \frac{60 \text{ min.}}{1 \text{hr}} x \frac{1 \text{lb}}{7{,}000 \text{ gr}}$$

$$C_{aw} = 0.00857 \text{ x } C_{an} \text{ x } Q_s = \text{lbs/hr}$$

$$C_{aw} = \text{lbs/hr x } 0.4536 = \text{kg/hr}$$

18. Particulate – total.

$$C_{ax} = 0.00857 \text{ x } C_{ao} \text{ x } Q_s = \text{lbs/hr}$$

$$C_{ax} = \text{lbs/hr x } 0.4536 = \text{kg/hr}$$

*29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

SO_3 ppm Calculation

$$ppm = \frac{mgs}{V_{mstd}\ (dscm)}\ x\ \frac{24.04}{40}$$

Where: mgs = Concentration of ammonia collected in sample train, milligrams

24.04 = Conversion Constant

40 = Molecular Weight of SO_3, grams/gram-mole

SOURCE EMISSION SURVEY

JOB NUMBER: 07-057
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (PM 10/2.5)

SOURCE EMISSION CALCULATIONS

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
DATE			09/06/07	09/06/07	09/06/07
BEGIN TIME			1021	1310	1537
END TIME			1124	1412	1641
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	26.81	26.87	26.90
		(mm Hg)	(681.00)	(682.00)	(683.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	0.390	0.390	0.400
		(mm H2O)	(9.900)	(9.900)	(10.200)
	DGM CALIBRATION FACTOR		1.004	1.004	1.004
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	24.806	24.865	25.173
	@ METER CONDITIONS	(m^3)	(0.702)	(0.704)	(0.713)
	LEAK CHECK VOLUME	ft.^3	0.000	0.000	0.000
T(m)	AVERAGE GAS METER	DEG.F	78	85	87
	TEMPERATURE	(DEG.C)	(26)	(29)	(31)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	21.841	21.660	21.874
	@ STANDARD CONDITIONS*	(DSCM)	(0.618)	(0.613)	(0.619)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	82.4	83.4	82.1
V(w[gas])	VOLUME WATER VAPOR	SCF	3.889	3.936	3.875
	COLLECTED @ STANDARD	(SCM)	(0.110)	(0.111)	(0.110)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS BY VOLUME	%	15.12	15.38	15.05
Md	MOL FRACTION OF DRY GAS		0.8488	0.8462	0.8495
Tt	NET TIME OF TEST	MINUTES	60	60	60

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 07-057
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (PM 10/2.5)

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
CO2		%	12.8	12.8	12.7
O2		%	6.7	6.7	6.8
CO		%	0.0	0.0	0.0
N2		%	80.5	80.5	80.5
%EA	EXCESS AIR @ SAMPLING POINT	%	45.8	45.8	46.8
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.32 (30.32)	30.32 (30.32)	30.30 (30.30)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.45 (28.45)	28.42 (28.42)	28.45 (28.45)
Cp	PITOT TUBE CALIBRATION		0.827	0.827	0.827
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	4.033 (102.400)	4.000 (101.600)	4.250 (108.000)
DELTA P ^(1/2)		"H2O	2.008	1.999	2.061
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	227 (108)	217 (103)	217 (103)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg) "H20	26.65 (677.00) -2.20	26.75 (679.00) -1.70	26.79 (680.00) -1.50
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	8,099 (41)	7,993 (41)	8,231 (42)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	9,363 (6)	9,363 (6)	9,363 (6)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR)	307,112 (521,783)	307,778 (522,915)	318,655 (541,395)
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	526,626 (894,738)	519,737 (883,033)	535,174 (909,261)
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.128 (0.003)	0.128 (0.003)	0.128 (0.003)
%I	PERCENT ISOKINETIC	%	86.6	85.7	83.6

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 07-057
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (PM 10/2.5)

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
Mf	PARTICULATE - PROBE, CYCLONE AND FILTER	mg >PM10	6.5	1.8	4.3
Mt	PARTICULATE - TOTAL	mg	65.9	103.7	39.8
Can	PARTICULATE - PROBE, CYCLONE AND FILTER	gr/DSCF* (g/DSCM)	0.0046 (0.0105)	0.0013 (0.0029)	0.0030 (0.0069)
Cao	PARTICULATE - TOTAL	gr/DSCF* (g/DSCM)	0.0465 (0.1064)	0.0737 (0.1688)	0.0280 (0.0642)
Cat	PARTIC.-PROBE, CYCLONE AND FILTER @ STACK COND.	gr/CF (g/m3)	0.0027 (0.0062)	0.0008 (0.0018)	0.0018 (0.0041)
Cau	PARTICULATE - TOTAL @ STACK CONDITIONS	gr/CF (g/m3)	0.0270 (0.0618)	0.0435 (0.0996)	0.0166 (0.0380)
Caw	PARTICULATE - PROBE, CYCLONE AND FILTER	LBS/HR (Kg/HR)	12.06 (5.47)	3.38 (1.53)	8.27 (3.75)
Cax	PARTICULATE - TOTAL	LBS/HR (Kg/HR)	122.30 (55.47)	194.47 (88.21)	76.52 (34.71)

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 07-057
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (PM 10/2.5)

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
Mf	PARTICULATE - PROBE, CYCLONE AND FILTER	mg <PM10 >PM2.5	5.3	3.6	3.7
Mt	PARTICULATE - TOTAL	mg PM2.5	0.9	0.8	8.2
Can	PARTICULATE - PROBE, CYCLONE AND FILTER	gr/DSCF* (g/DSCM)	0.0037 (0.0086)	0.0026 (0.0059)	0.0026 (0.0060)
Cao	PARTICULATE - TOTAL	gr/DSCF* (g/DSCM)	0.0006 (0.0015)	0.0006 (0.0013)	0.0058 (0.0132)
Cat	PARTIC.-PROBE, CYCLONE AND FILTER @ STACK COND.	gr/CF (g/m3)	0.0022 (0.0050)	0.0015 (0.0034)	0.0015 (0.0034)
Cau	PARTICULATE - TOTAL @ STACK CONDITIONS	gr/CF (g/m3)	0.0004 (0.0009)	0.0003 (0.0007)	0.0034 (0.0078)
Caw	PARTICULATE - PROBE, CYCLONE AND FILTER	LBS/HR (Kg/HR)	9.84 (4.46)	6.75 (3.06)	7.11 (3.23)
Cax	PARTICULATE - TOTAL	LBS/HR (Kg/HR)	1.67 (0.76)	1.50 (0.68)	15.77 (7.15)

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION SURVEY

JOB NUMBER: 07-057
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (Controlled Condensate)

SOURCE EMISSION CALCULATIONS

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
DATE			09/06/07	09/06/07	09/06/07
BEGIN TIME			1138	1359	1529
END TIME			1238	1459	1629
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	26.81	26.87	26.90
		(mm Hg)	(681.00)	(682.00)	(683.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	0.300	0.300	0.300
		(mm H2O)	(7.600)	(7.600)	(7.600)
	DGM CALIBRATION FACTOR		0.998	0.998	0.998
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	20.610	20.025	20.789
	@ METER CONDITIONS	(m^3)	(0.584)	(0.567)	(0.589)
	LEAK CHECK VOLUME	ft.^3	0.000	0.000	0.000
T(m)	AVERAGE GAS METER	DEG.F	76	84	85
	TEMPERATURE	(DEG.C)	(24)	(29)	(29)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	18.210	17.472	18.126
	@ STANDARD CONDITIONS*	(DSCM)	(0.516)	(0.495)	(0.513)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	67.1	65.0	67.1
V(w[gas])	VOLUME WATER VAPOR	SCF	3.167	3.068	3.167
	COLLECTED @ STANDARD	(SCM)	(0.090)	(0.087)	(0.090)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS BY VOLUME	%	14.82	14.94	14.87
Md	MOL FRACTION OF DRY GAS		0.8518	0.8506	0.8513
Tt	NET TIME OF TEST	MINUTES	60	60	60

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 07-057
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (Controlled Condensate)

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
CO2		%	12.8	12.8	12.7
O2		%	6.7	6.7	6.8
CO		%	0.0	0.0	0.0
N2		%	80.5	80.5	80.5
%EA	EXCESS AIR @ SAMPLING POINT	%	45.8	45.8	46.8
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.32 (30.32)	30.32 (30.32)	30.30 (30.30)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.49 (28.49)	28.48 (28.48)	28.47 (28.47)
Cp	PITOT TUBE CALIBRATION		0.000	0.000	0.000
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	---- ----	---- ----	---- ----
DELTA P ^(1/2)		"H2O	----	----	----
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	---- ----	---- ----	---- ----
Ps	STACK PRESSURE	"Hg Abs. (mm Hg) "H20	26.65 (677.00) -2.20	26.75 (679.00) -1.70	26.79 (680.00) -1.50
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	---- ----	---- ----	---- ----
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	9,363 (6)	9,363 (6)	9,363 (6)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS* WET STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR) WSCFH	---- ---- ----	---- ---- ----	---- ---- ----
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	---- ----	---- ----	---- ----

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SO_3 ppm Calculations

$$ppm = \frac{mgs}{V_{mstd}\ (dscm)} \times \frac{24.04}{40}$$

Run No. 1 = $\frac{0.499\ mg}{0.618\ dscm} \times \frac{24.04}{40\ grams/gram\text{-}mole}$ = 0.49 ppm

Run No. 2 = $\frac{1.349\ mg}{0.613\ dscm} \times \frac{24.04}{40\ grams/gram\text{-}mole}$ = 1.32 ppm

Run No. 3 = $\frac{1.537\ mg}{0.619\ dscm} \times \frac{24.04}{40\ grams/gram\text{-}mole}$ = 1.49 ppm

PM 10 CALCULATION SPREADSHEET

This spreadsheet will calculate - 1) nozzle size
2) delta H for PM10 sampling
3) dwell time calculation number (magic #)
4) actual dwell time (if you dont have a calulator)
5) other cut sizes for different sample rates

INSTRUCTIONS:
1) Enter input data in --- INPUT DATA ---
2) based on your nozzle size selection - see if the the min & max delta P's nozzle size. Do not use "MISC CALCS" section. (That only uses the delta P at a single point as if it was going to be your average delta P)
3) Start test - set delta H at the designated value. Calculate dwell time by by multiplying the "MAGIC NUMBER" by square root of the sample point delta P to calculate sample point dwell time (seconds). (You can use the "input example point delta P" section if you forgot your calculator)
4) Copy column "C" over to the right if you want calc's for other data.

---- INPUT

	Run Number	RUN 1	RUN 2	RUN 3
Dn	Nozzle diameter	0.128	0.128	0.128
Pbar	Barometric Pressure	26.81	26.87	26.90
Ps	Stack Static	-2.20	-1.70	-1.50
Ts	Stack Temp (def F)	227.00	217.00	217.00
Tm	Meter Temp (deg F)	78.00	85.00	87.00
	Delta H @	1.80	1.80	1.80
	CO2 - dry	12.80	12.80	12.70
	O2 - dry	6.70	6.70	6.80
	N2 - by difference	80.50	80.50	80.50
Bws	Stack Moisture (not as a percent)	0.15	0.15	0.15
	Avg sqrt delta P	2.008	1.999	2.061
	Total No of Points	12.00	12.00	12.00
	Total sampling time (min)	60.00	60.00	60.00

--- CALCULATED VALUES ---

MW-d	Mol weight - dry	30.32	30.32	30.30
MW-w	molecular weight - wet	28.45	28.42	28.45
Ps	Stack Pressure	26.65	26.75	26.79
	Meter pressure	26.84	26.90	26.93
Ts	Stack Temp (deg R)	687.00	677.00	677.00
Tm	Meter Temp (deg R)	538.00	545.00	547.00

--- CALCS AT 10um CUT POINT - CSR ---

mu	Stack viscosity	200.88	198.18	198.47
Qs	Sample flow (at the PSD head)	0.55	0.54	0.54
	delta H	0.39	0.40	0.40
u	stack gas velocity based on sample rate	103.25	101.35	101.42

	minimum stack gas velocity	79.03	77.56	77.61
	maximum stack gas velocity	126.40	124.08	124.17
	minimum delta P (not square root)	1.33	1.31	1.31
	maximum delta P (not square root)	3.42	3.35	3.37

--- DWELL TIME CALCULATOR ---

	MAGIC NUMBER (multiply times sqrt delta P at the point in question to get dwell time in sec's)	149.402	150.08	145.56

--- INPUT EXAMPLE DELTA P ---

delta P	sample point delta P (input this value)	4.03	4.00	4.25
t	sample point dwell time (min)	5.001	5.003	5.001
	sample point dwell time(sec)	300.03	300.15	300.08

--- MISC CALCs USING 100% ISO SAMPE RATE FOR DELTA P IN (
vs PM10 BASED SAMPE RATE (Qs) ---
(DO NOT USE THIS PART OF THE SPDSHT FOR NORMAL PM10 CALCs)

You can estimate cut size for different delta H (sample rate other than designated value) based on 100% iso at "sample point delta P". You can input the average delta P in "sample point delta P" and your sample rate at the meter for 100% average iso's and the resulting cut size will be calculated. (meter cfm calc's do not include Pressure or Meter Y values - negligible)

	Nozzle area	0.000089	0.000089	0.000089
	sample point gas velocity	137.27	135.54	139.52
	100% iso sample rate (dacfm - meter conditions)	0.49	0.50	0.51
	PM10 sample rate, Qs (dacfm - meter conditions)	0.37	0.37	0.37
cf	estimated standard vol using PM10 rate(Qs*time)	22.73	22.73	22.78
cf	estimated standard volume using 100% iso rate	30.23	30.40	31.34
	predicted iso's using PM10 rate (Qs)	75.21	74.77	72.68
um	cut size based on 100% iso (stack flow,nozzle)	8.17	8.14	7.98

--- POST TEST CALC'S ---

|:

--- CALCULATION OF ACTUAL CUT SIZE ---

Results from the Method 5 spreadsheet can be entered as required below to calculate the actual cut size at the run conditions.

		RUN 1	RUN 2	RUN 3
Qs(std)	Average sample rate at standard conditions	0.364	0.361	0.365
t	Actual test time, min	60	60	60
Vw(std)	Volume of water vapor collected, scf	3.889	3.936	3.875
ISO	Isokinetic ratio, %	86.6	85.7	83.6

RESULTS:

Run Number	RUN 1	RUN 2	RUN 3
Qs, Sample rate at the cyclone, cfm	0.6267	0.6122	0.6154
D-50, Actual cut size, um	9.16	9.19	9.16
Isokinetic Rate, %	86.6	85.7	83.6

AIR SAMPLING ASSOCIATES, INC.

Appendix C:

Calibration Data

AIR SAMPLING ASSOCIATES, INC.

Appendix C

Table 6: Calibration Data

Pre-Test Calibrations:

Equipment	Calibration Factor	Calibration Date
Dry Gas Meter 1-1	0.998	04/03/07
Digital Temperature Indicator 1-1		04/03/07
Dry Gas Meter 1-1 Orifice		04/03/07
Dry Gas Meter 1-2	1.004	04/03/07
Digital Temperature Indicator 1-2		04/03/07
Dry Gas Meter 1-2 Orifice		04/03/07
Pitot Tube PM-10	0.827	08/31/07
Nozzle PM-10-1	0.128	09/06/07

Post-Test Calibrations:

Equipment	Calibration Factor	Calibration Date
Dry Gas Meter 1-1	0.998	09/11/07
Digital Temperature Indicator 1-1		09/11/07
Dry Gas Meter 1-1 Orifice		09/11/07
Dry Gas Meter 1-2	0.997	09/11/07
Digital Temperature Indicator 1-2		09/11/07
Dry Gas Meter 1-2 Orifice		09/13/07
Pitot Tube PM-10	0.825	09/10/07
Nozzle PM-10-1	0.128	09/06/07

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

ΔH Setting (" H_2O)	C_{DG}
0.50	1.002
1.00	1.000
1.50	1.002
2.00	1.000
3.00	0.992
4.00	0.991
Average	0.998

Variation +: 0.40%

Variation -: -0.70%

Certified by: Scot Jackson 04/03/07

Calibrator (Signature / Date)

Bill Hefley 04/03/07

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 0.5" ΔH

Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020

Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	11:11	5.367	cf	78	°F	-0.2	" H_2O		147.534	cf	79	°F	76	°F	0.50	" H_2O
Start	10:58	0.000	cf	78	°F	-0.2	" H_2O		142.100	cf	75	°F	74	°F	0.50	" H_2O
Average		5.367	cf	78	°F	-0.2	" H_2O		5.434	cf	77	°F	75	°F	0.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.315} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.305} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.002}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 1.0" ΔH Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	11:23	5.099	cf	79	°F	-0.3	" H_2O		153.187	cf	83	°F	78	°F	1.00	" H_2O
Start	11:14	0.000	cf	79	°F	-0.3	" H_2O		148.001	cf	79	°F	77	°F	1.00	" H_2O
Average		5.099	cf	79	°F	-0.3	" H_2O		5.186	cf	81	°F	78	°F	1.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.039} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.039} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.000}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 1.5" ΔH Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	11:41	10.248	cf	79	°F	-0.5	" H_2O	164.136	cf	87	°F	80	°F	1.50	" H_2O
Start	11:26	0.000	cf	79	°F	-0.5	" H_2O	153.704	cf	81	°F	78	°F	1.50	" H_2O
Average		10.248	cf	79	°F	-0.5	" H_2O	10.432	cf	84	°F	79	°F	1.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.123} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.106} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.002}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 2.0" ΔH Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	11:58	10.993	cf	80	°F	-0.7	" H_2O	175.623	cf	89	°F	82	°F	2.00	" H_2O
Start	11:44	0.000	cf	80	°F	-0.7	" H_2O	164.402	cf	84	°F	81	°F	2.00	" H_2O
Average		10.993	cf	80	°F	-0.7	" H_2O	11.221	cf	87	°F	82	°F	2.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.833} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.833} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.000}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 3.0" ΔH Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	13:24	10.681	cf	84	°F	-1.0	" H_2O	186.989	cf	87	°F	84	°F	3.00	" H_2O
Start	13:13	0.000	cf	84	°F	-1.0	" H_2O	176.100	cf	84	°F	84	°F	3.00	" H_2O
Average		10.681	cf	84	°F	-1.0	" H_2O	10.889	cf	86	°F	84	°F	3.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.440} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.524} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.992}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 04/03/07

Run 1 at 4.0" ΔH Pb = 29.61 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	13:39	11.105	cf	84	°F	-1.3	" H_2O	199.982	cf	91	°F	85	°F	4.00	" H_2O
Start	13:29	0.000	cf	84	°F	-1.3	" H_2O	188.648	cf	87	°F	84	°F	4.00	" H_2O
Average		11.105	cf	84	°F	-1.3	" H_2O	11.334	cf	89	°F	85	°F	4.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.847} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.941} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.991}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 1-1

Date Calibration Performed: 04/03/07

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	11:00	32° F	32° F
Ambient Air	11:01	68° F	68° F
Boiling Water	11:02	212° F	216° F
Oven	11:03	250° F	255° F
Oven	11:04	300° F	306° F
Oven	11:05	350° F	356° F
Oven	11:06	400° F	407° F

Meter Adjusted? Yes

ASTM Reference Thermometer: SN: 06000047 Range: -0.1°C to 1360.6°C

Range:

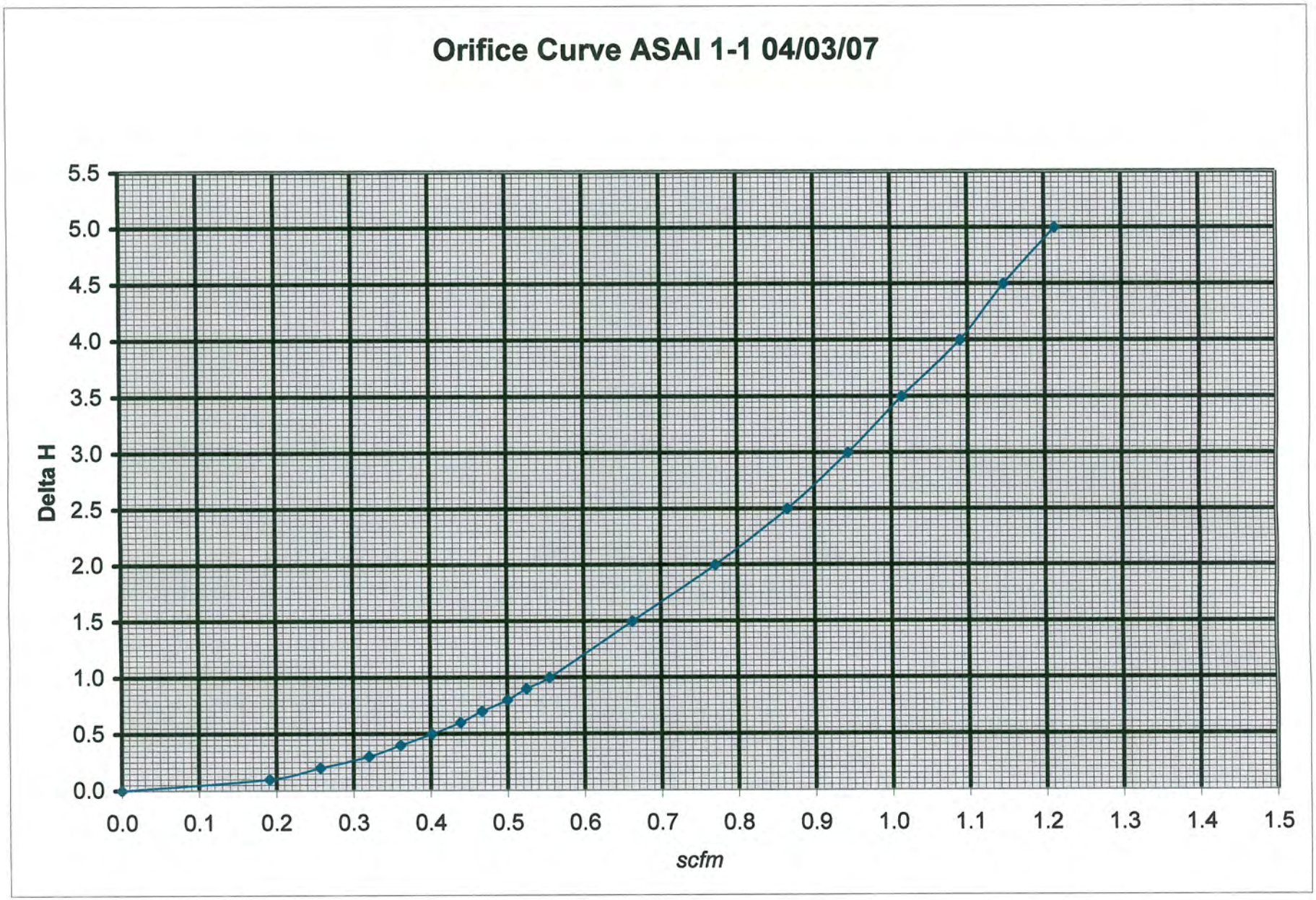
Range:

Certified by: Scot Jackson 04/03/07

Calibrator (Signature / Date)

Bill Hefley 04/03/07

QA Officer (Signature / Date)


Orifice Curve ASAI 1-1 04/03/07
Delta H
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
scfm

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

ΔH Setting (" H_2O)	C_{DG}
0.50	1.007
1.00	1.008
1.50	1.002
2.00	1.001
3.00	1.001
4.00	1.002
Average	1.004

Variation +: 0.40%

Variation -: -0.30%

Certified by: Scot Jackson 4/03/07

Calibrator (Signature / Date)

Bill Hefley 4/03/07

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 0.5" ΔH Pb = 29.56 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	9:02	5.005	cf	74	°F	-0.2	" H_2O	165.815	cf	81	°F	78	°F	0.50	" H_2O
Start	8:50	0.000	cf	74	°F	-0.2	" H_2O	160.702	cf	81	°F	78	°F	0.50	" H_2O
Average		5.005	cf	74	°F	-0.2	" H_2O	5.113	cf	81	°F	78	°F	0.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{4.985} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{4.951} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.007}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 1.0" ΔH Pb = 29.56 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	9:17	5.249	cf	74	°F	-0.4	" H_2O	171.643	cf	81	°F	78	°F	1.00	" H_2O
Start	9:08	0.000	cf	74	°F	-0.4	" H_2O	166.301	cf	79	°F	78	°F	1.00	" H_2O
Average		5.249	cf	74	°F	-0.4	" H_2O	5.342	cf	80	°F	78	°F	1.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.226} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.184} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{1.008}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 1.5" ΔH Pb = 29.57

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	9:40	10.523	cf	75	°F	-0.6	" H_2O	182.845	cf	83	°F	78	°F	1.50	" H_2O
Start	9:25	0.000	cf	75	°F	-0.6	" H_2O	172.100	cf	78	°F	78	°F	1.50	" H_2O
Average		10.523	cf	75	°F	-0.6	" H_2O	10.745	cf	81	°F	78	°F	1.50	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.455} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.438} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{1.002}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 2.0" ΔH Pb = 29.57 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	10:02	10.531	cf	75	°F	-0.7	" H_2O	193.955	cf	84	°F	78	°F	2.00	" H_2O
Start	9:49	0.000	cf	75	°F	-0.7	" H_2O	183.203	cf	79	°F	78	°F	2.00	" H_2O
Average		10.531	cf	75	°F	-0.7	" H_2O	10.752	cf	82	°F	78	°F	2.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.461} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.448} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{1.001}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 3.0" ΔH

Pb = 29.57 " Hg

Wet Test Meter C_f = 1.020

Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	10:18	10.922	cf	76	°F	-1.0	" H_2O		205.838	cf	87	°F	79	°F	3.00	" H_2O
Start	10:07	0.000	cf	76	°F	-1.0	" H_2O		194.706	cf	81	°F	79	°F	3.00	" H_2O
Average		10.922	cf	76	°F	-1.0	" H_2O		11.132	cf	84	°F	79	°F	3.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.821} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.809} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{1.001}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 04/03/07

Run 1 at 4.0" ΔH Pb = 29.58 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	10:30	10.229	cf	76	°F	-1.3	" H_2O	216.832	cf	89	°F	80	°F	4.00	" H_2O
Start	10:21	0.000	cf	76	°F	-1.3	" H_2O	206.408	cf	86	°F	79	°F	4.00	" H_2O
Average		10.229	cf	76	°F	-1.3	" H_2O	10.424	cf	88	°F	80	°F	4.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.130} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.113} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.002}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 1-2

Date Calibration Performed: 04/03/07

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	10:56	32° F	32° F
Ambient Air	10:57	68° F	68° F
Boiling Water	10:58	212° F	214° F
Oven	10:59	250° F	253° F
Oven	11:00	300° F	303° F
Oven	11:01	350° F	352° F
Oven	11:02	400° F	403° F

Meter Adjusted? No

ASTM Reference Thermometer: SN: 06000047 Range: -0.1°C to 1360.6°C

Range:

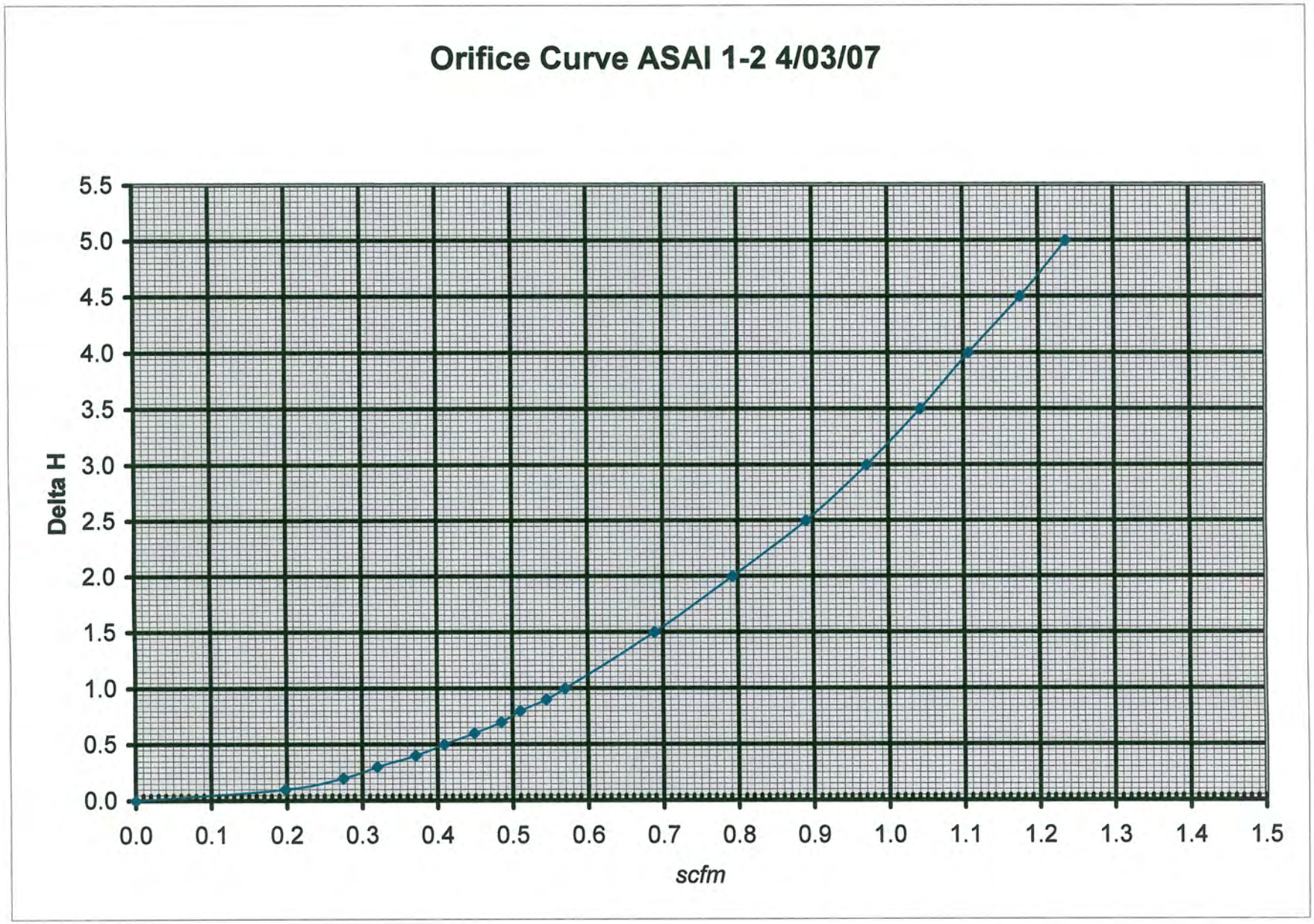
Range:

Certified by: Scot Jackson 4/03/07

Calibrator (Signature / Date)

Bill Hefley 4/03/07

QA Officer (Signature / Date)


Orifice Curve ASAI 1-2 4/03/07
Delta H
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
scfm

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 08/31/07 Time: 13:30
I.D. # PM-10 T_s: 94 °F
C_{pstd}: 0.990 Pb: 29.72 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.19	0.19	0.19	0.436	0.27	0.520	0.830	0.27	0.520	0.830
40	0.35	0.35	0.35	0.592	0.50	0.707	0.828	0.50	0.707	0.828
50	0.54	0.54	0.54	0.735	0.78	0.883	0.824	0.78	0.883	0.824
60	0.78	0.78	0.78	0.883	1.13	1.061	0.824	1.13	1.061	0.824
70	1.06	1.05	1.05	1.025	1.50	1.225	0.828	1.50	1.225	0.828
80	1.39	1.40	1.40	1.183	2.00	1.414	0.828	2.00	1.414	0.828
90	1.75	1.75	1,.75	1.323	2.50	1.581	0.828	2.50	1.581	0.828
50	0.54	0.54	0.54	0.735	0.78	0.883	0.824	0.78	0.883	0.824
50	0.54	0.54	0.54	0.735	0.78	0.883	0.824	0.78	0.883	0.824
Average							0.827			0.827

Summary of Results:

Normal high side calibraiton factor: 0.827
variation +: 0.36%
variation -: -0.36%
Normal low side calibration factor: 0.827
variation +: 0.36%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.827

Certified by: Scot Jackson 8/31/07 — Calibrator (Signature/Date)
Bill Hefley 8/31/07 — QA Officer (Signature/Date)

Calibration Data
Nozzle Calibration

Nozzle Set No. PM-10
Date Calibration Performed: 9/6/07

	-1	-2	-3	-4	-5	-6	-7
Measurement 1	.127						
Measurement 2	.129						
Measurement 3	.127						
Measurement 4	.127						
Measurement 5	.127						
Measurement 6	.128						
Measurement 7	.128						
Measurement 8	.128						
Measurement 9	.128						
Measurement 10	.127						
Average	.128						

Certified by: 9/6/07
Calibrator (Signature / Date)

Billy J. Mullins, Jr
QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Post-test Calibration Data

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/11/07

ΔH Setting (" H_2O)	C_{DG}
0.50	0.995
1.00	1.005
1.50	1.002
2.00	0.998
3.00	0.994
4.00	0.991
Average	0.998

Variation +: 0.70%

Variation -: -0.70%

Certified by: Scot Jackson 09/11/07

Calibrator (Signature / Date)

Bill Hefley 09/11/07

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/11/07

Run 1 at 0.5" ΔH Pb = 29.77 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	11:10	5.281	cf	77	°F	-0.2	" H_2O		694.214	cf	79	°F	76	°F	0.50	" H_2O
Start	10:57	0.000	cf	77	°F	-0.2	" H_2O		688.800	cf	79	°F	77	°F	0.50	" H_2O
Average		5.281	cf	77	°F	-0.2	" H_2O		5.414	cf	79	°F	77	°F	0.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.268} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.297} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.995}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/11/07

Run 1 at 1.0" ΔH Pb = 29.77 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	9:43	5.086	cf	77	°F	-0.3	" H_2O		642.773	cf	78	°F	75	°F	1.00	" H_2O
Start	9:34	0.000	cf	77	°F	-0.3	" H_2O		637.638	cf	76	°F	74	°F	1.00	" H_2O
Average		5.086	cf	77	°F	-0.3	" H_2O		5.135	cf	77	°F	75	°F	1.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.072} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.049} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.005}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/11/07

Run 1 at 1.5" ΔH Pb = 29.77 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	10:05	10.304	cf	77	°F	-0.5	" H_2O		653.935	cf	82	°F	76	°F	1.50	" H_2O
Start	9:50	0.000	cf	77	°F	-0.5	" H_2O		643.500	cf	75	°F	75	°F	1.50	" H_2O
Average		10.304	cf	77	°F	-0.5	" H_2O		10.435	cf	79	°F	76	°F	1.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.271} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.248} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.002}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/11/07

Run 1 at 2.0" ΔH Pb = 29.77 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	10:22	10.258	cf	77	°F	-0.7	" H_2O	664.844	cf	83	°F	76	°F	2.00	" H_2O
Start	10:09	0.000	cf	77	°F	-0.7	" H_2O	654.401	cf	78	°F	76	°F	2.00	" H_2O
Average		10.258	cf	77	°F	-0.7	" H_2O	10.443	cf	81	°F	76	°F	2.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.220} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.245} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{0.998}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/11/07

Run 1 at 3.0" ΔH Pb = 29.77 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	10:37	10.606	cf	77	°F	-1.0	" H_2O	676.222	cf	85	°F	77	°F	3.00	" H_2O
Start	10:26	0.000	cf	77	°F	-1.0	" H_2O	665.400	cf	78	°F	76	°F	3.00	" H_2O
Average		10.606	cf	77	°F	-1.0	" H_2O	10.822	cf	82	°F	77	°F	3.00	" H_2O

$$\text{Wet Test Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.559} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.628} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{msd}}{\text{Dry Gas Meter } V_{msd}} = \underline{0.994}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-1

Date Calibration Performed: 09/11/07

Run 1 at 4.0" ΔH Pb = 29.77 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	10:51	11.019	cf	77	°F	-1.3	" H_2O		687.951	cf	86	°F	77	°F	4.00	" H_2O
Start	10:41	0.000	cf	77	°F	-1.3	" H_2O		676.700	cf	79	°F	77	°F	4.00	" H_2O
Average		11.019	cf	77	°F	-1.3	" H_2O		11.251	cf	83	°F	77	°F	4.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.962} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{11.061} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.991}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 1-1

Date Calibration Performed: 09/11/07

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	8:00	32° F	30° F
Ambient Air	8:01	78° F	75° F
Boiling Water	8:02	212° F	211° F
Oven	8:03	250° F	250° F
Oven	8:04	300° F	299° F
Oven	8:05	350° F	349° F
Oven	8:06	400° F	399° F

Meter Adjusted? No

ASTM Reference Thermometer: SN: 06000047 Range: -0.1°C to 1360.6°C

Range:

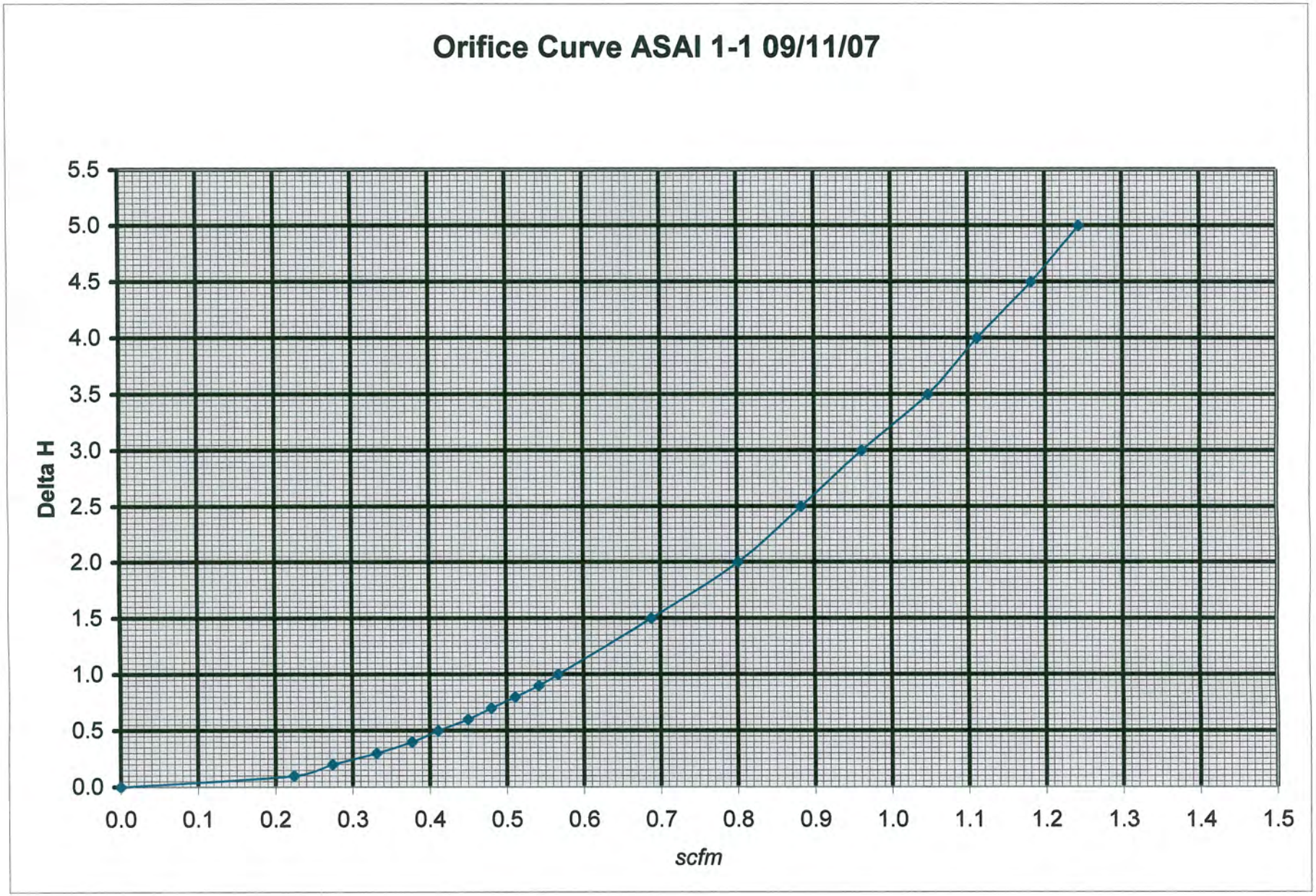
Range:

Certified by: Scot Jackson 09/11/07

Calibrator (Signature / Date)

Bill Hefley 09/11/07

QA Officer (Signature / Date)


Orifice Curve ASAI 1-1 09/11/07
Delta H
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
scfm

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 09/11/07

ΔH Setting (" H_2O)	C_{DG}
0.50	0.997
1.00	1.001
1.50	1.002
2.00	0.997
3.00	0.993
4.00	0.991
Average	0.997

Variation +: 0.50%

Variation -: -0.60%

Certified by: Scot Jackson 9/11/07

Calibrator (Signature / Date)

Bill Hefley 9/11/07

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 09/11/07

Run 1 at 0.5" ΔH

Pb = 29.80 " Hg

Wet Test Meter C_f = 1.020

Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							Dry Gas Meter							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	1:22	5.249	cf	79	°F	-0.3	" H_2O	79.645	cf	81	°F	79	°F	0.50	" H_2O
Start	1:10	0.000	cf	79	°F	-0.3	" H_2O	74.301	cf	75	°F	75	°F	0.50	" H_2O
Average		5.249	cf	79	°F	-0.3	" H_2O	5.344	cf	78	°F	77	°F	0.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.221} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.236} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.997}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 09/11/07

Run 1 at 1.0" ΔH Pb = 29.80 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*								
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	1:36	5.502	cf	80	°F	-0.4	" H_2O		85.708	cf	84	°F	81	°F	1.00	" H_2O
Start	1:27	0.000	cf	79	°F	-0.4	" H_2O		80.100	cf	82	°F	80	°F	1.00	" H_2O
Average		5.502	cf	80	°F	-0.4	" H_2O		5.608	cf	83	°F	81	°F	1.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.466} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.458} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.001}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 09/11/07

Run 1 at 1.5" ΔH Pb = 29.80

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	1:55	10.242	cf	81	°F	-0.6	" H_2O	96.822	cf	87	°F	82	°F	1.50	" H_2O
Start	1:41	0.000	cf	81	°F	-0.6	" H_2O	86.400	cf	84	°F	82	°F	1.50	" H_2O
Average		10.242	cf	81	°F	-0.6	" H_2O	10.422	cf	86	°F	82	°F	1.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.142} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.119} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{1.002}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 09/11/07

Run 1 at 2.0" ΔH Pb = 29.80 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	2:12	10.118	cf	81	°F	-0.7	" H_2O	107.779	cf	91	°F	83	°F	2.00	" H_2O
Start	2:00	0.000	cf	81	°F	-0.7	" H_2O	97.403	cf	88	°F	82	°F	2.00	" H_2O
Average		10.118	cf	81	°F	-0.7	" H_2O	10.376	cf	90	°F	83	°F	2.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.016} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.045} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.997}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 09/11/07

Run 1 at 3.0" ΔH

Pb = 29.80 " Hg

Wet Test Meter C_f = 1.020

Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	4:21	10.781	cf	83	°F	-1.1	" H_2O		185.741	cf	91	°F	85	°F	3.00	" H_2O
Start	4:10	0.000	cf	83	°F	-1.1	" H_2O		174.696	cf	87	84	85	°F	3.00	" H_2O
Average		10.781	cf	83	°F	-1.1	" H_2O		11.045	cf	89	°F	85	°F	3.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.623} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.699} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{0.993}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 1-2

Date Calibration Performed: 09/11/07

Run 1 at 4.0" ΔH Pb = 29.76 " Hg

Wet Test Meter C_f = 1.020 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	4:04	10.133	cf	83	°F	-1.4	" H_2O	174.078	cf	90	°F	85	°F	4.00	" H_2O
Start	3:55	0.000	cf	83	°F	-1.4	" H_2O	163.706	cf	89	°F	85	°F	4.00	" H_2O
Average		10.133	cf	83	°F	-1.4	" H_2O	10.372	cf	90	°F	85	°F	4.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{9.963} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.054} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.991}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 1-2

Date Calibration Performed: 09/11/07

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	13:00	32° F	32° F
Ambient Air	13:01	79° F	79° F
Boiling Water	13:02	212° F	214° F
Oven	13:03	250° F	253° F
Oven	13:04	300° F	303° F
Oven	13:05	350° F	352° F
Oven	13:06	400° F	403° F

Meter Adjusted? No

ASTM Reference Thermometer: SN: 06000047 Range: -0.1°C to 1360.6°C

Range:

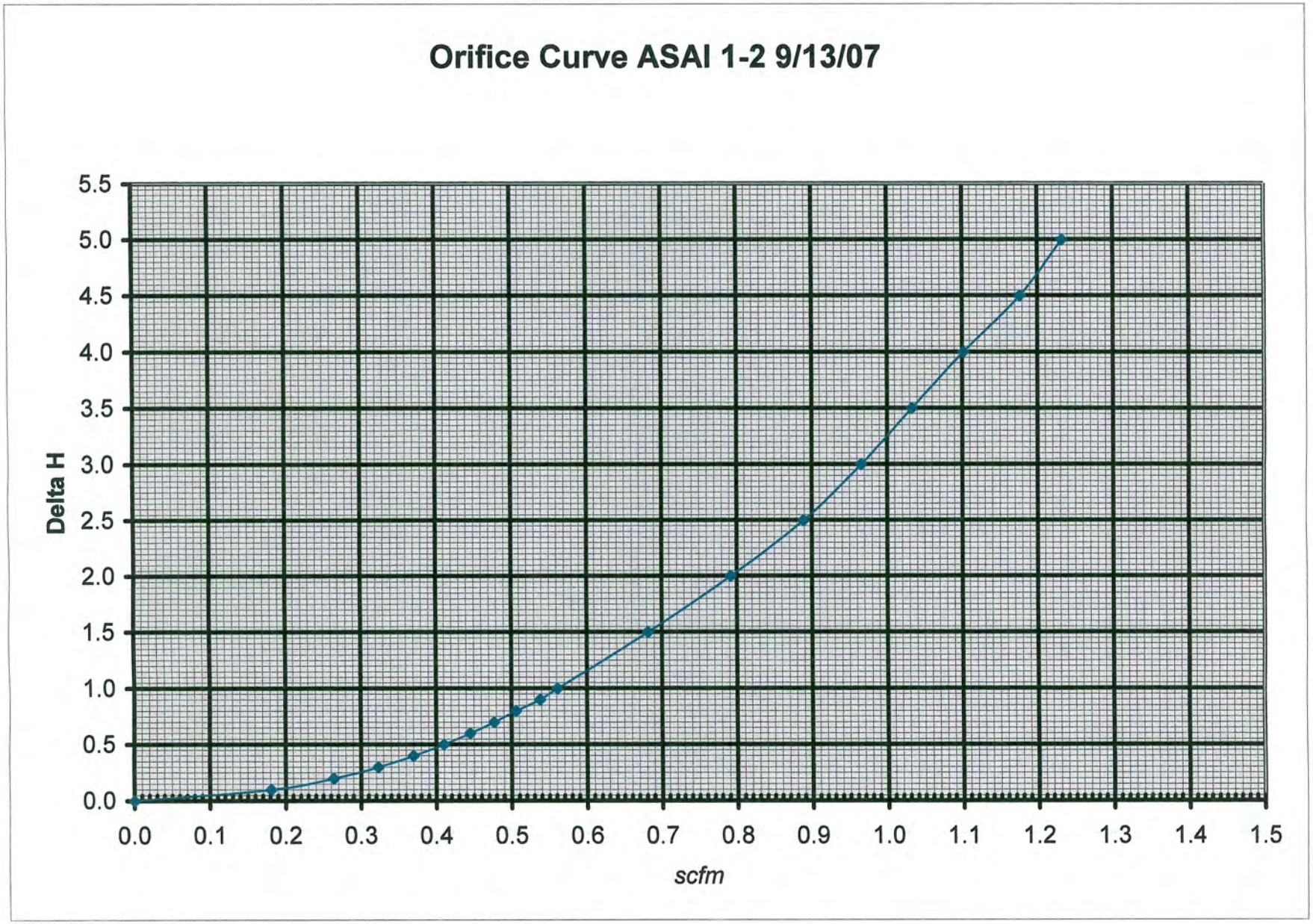
Range:

Certified by: Scot Jackson 9/11/07

Calibrator (Signature / Date)

Bill Hefley 9/11/07

QA Officer (Signature / Date)


Orifice Curve ASAI 1-2 9/13/07
Delta H
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
scfm

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. PM-10
Date Calibration Performed: 09/10/07

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.127							
Measurement 2	0.129							
Measurement 3	0.127							
Measurement 4	0.127							
Measurement 5	0.127							
Measurement 6	0.128							
Measurement 7	0.128							
Measurement 8	0.128							
Measurement 9	0.128							
Measurement 10	0.127							
Average	0.128	#####	#####	#####	#####	#####	#####	#####

Scot Jackson 9/06/07
Calibrator (Signature / Date)

Bill Hefley 9/06/07
QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 09/10/07
I.D. # PM-10
C_{pstd}: 0.990

Time: 9:00
T_s: 82 °F
Pb: 29.70 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	v Standard Average	High	v High	Cal. Factor	Low	v Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.35	0.35	0.35	0.592	0.50	0.707	0.828	0.50	0.707	0.828
50	0.55	0.55	0.55	0.742	0.79	0.889	0.826	0.79	0.889	0.826
60	0.80	0.80	0.80	0.894	1.15	1.072	0.826	1.15	1.072	0.826
70	1.08	1.10	1.10	1.049	1.58	1.257	0.826	1.58	1.257	0.826
80	1.42	1.40	1.45	1.194	2.05	1.432	0.825	2.05	1.432	0.825
90	1.79	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.55	0.55	0.55	0.742	0.79	0.889	0.826	0.79	0.889	0.826
50	0.55	0.55	0.55	0.742	0.79	0.889	0.826	0.79	0.889	0.826
Average							0.825			0.825

Summary of Results:

Normal high side calibraiton factor: 0.825
variation +: 0.36%
variation -: -0.36%
Normal low side calibration factor: 0.825
variation +: 0.36%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.825

Certified by: John Stanley 9/10/07
Calibrator (Signature/Date)

Bill Hefley 9/10/07
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

Appendix D:

Field Data

Job Number 07-057
Job Name AOA-ES Hardin, MT
Run Number 1
Unit Stack
Date 6 Sept 2007
Operator Mullins, Selakovich
Sample Box No. 1-1 Meter Box No. 1-2

PM10/2.5 Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: 1319 - 1419
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 72
Assumed Moisture % 15.2
Probe Length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.006 cfm
Final Leak @ 8.0 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	~~Heated Over-Line~~ Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
A-6	1021:0	980.100	3.80	0.39	0.39	5.5	226	251	241	67	73	72	
5	4:50	982.08	3.90	0.39	0.39	5.5	227	250	242	65	74	72	
4	9:51	984.10	3.80	0.39	0.39	5.5	227	252	239	63	75	73	
3	14:48	986.12	3.90	0.39	0.39	5.5	227	252	239	62	77	74	
2	19:30	988.05	4.00	0.39	0.39	5.5	227	252	239	62	79	74	
1	24:22	990.04	4.00	0.39	0.39	5.5	227	250	241	63	81	76	
End	29:12	992.007	—	—	—	—	—	—	—	—	—	—	
B-6	1053:0	992.007	4.20	0.39	0.39	5.5	225	253	240	67	81	77	
5	4:50	993.96	4.20	0.39	0.39	5.5	226	252	240	66	83	77	
4	10:12	996.16	4.10	0.39	0.39	6.0	226	251	240	66	84	79	
3	15:41	998.40	4.30	0.39	0.39	6.0	227	249	238	62	86	79	
2	20.53	1000.57	4.10	0.39	0.39	6.5	227	253	236	57	87	79	
1	25:59	1002.72	4.10	0.39	0.39	6.5	226	252	234	60	88	80	
End	30:49	1004.807	—	—	—	—	—	—	—	—	—	—	
All		1124											

Pitot Tube Calibration Factor C_p 0.827
Volume Collected V_m 24.806 ft^3
Water Collected V_w 82.4 ml
Time of Test T_t 60 min.
Stack Pressure P_s -2.20 "H_2O

Pitot Tube No. PM-10
Baro. Press. P_b 26.81 "Hg
Probe Tip Dia. D_n 0.128 in.
% CO_2 12.8 % CO 0.0
% O_2 6.7 % N_2 80.5
Area Stack A_s 9363 in^2

Barometer No. —
Probe Tip No. PM10-1
Total Volume of Leak Checks After Start: 0 ft^3
V_m X Dry Gas Meter Calibration Factor 1.004 X 24.707

[Dry Gas Meter Reading ___ ft^3 - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 1-1

			Water Weight Gain		
Impinger 1	Final Weight	793.9		Impinger 1	69.3
	Initial Weight	724.6			
	Increase	69.3		Impinger 2	7.5
Impinger 2	Final Weight	772.4		Impinger 3	0.9
	Initial Weight	764.9			
	Increase	7.5		Impinger 4	4.7
			V_w =		
Impinger 3	Final Weight	641.2	g SO_2 =	Impinger 5	
	Initial Weight	640.3	V_w =		
	Increase	0.9		Impinger 6	
			Filter No: 17		
Impinger 4	Final Weight	1002.7		Impinger 7	
	Initial Weight	998.0			
	Increase	4.7		Total	82.4 = V_w

Impinger 5	Final Weight		P_b =	26.81	$\%CO_2$ =	12.8
	Initial Weight		V_m =	24.806	$\%O_2$ =	6.7
	Increase		V_w =	82.4	%CO =	0.0
			P_m =	0.390	$\%N_2$ =	80.5
Impinger 6	Final Weight		Avg ΔP =	4.033	A_s =	9363
	Initial Weight				D_n =	0.128
	Increase		Avg$\sqrt{\Delta P}$ =	2.008	T_1 =	60
			C_p =	0.827		
Impinger 7	Final Weight		P_s =	-2.20 °H_2O	26.65	°Hg
	Initial Weight		T_m =	78 °F	538	°R
	Increase		T_s =	228 °F	687	°R

Moisture Content: %M = 15.12 M_d = 0.8488 MW_c = 30.316 MW = 28.45

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 24.806 \left[\frac{26.81 + \frac{0.390}{13.6}}{78 + 460}\right] = \frac{21.841}{0.364}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 82.4 = 3.889 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{3.889}{21.841 + 3.889}$ x 100 = 15.12 %

V_s = 5123.8 x 0.827 $\sqrt{\frac{687}{26.65 \times 28.45}}$ x 2.008 = 8099 fpm

ACFM: 526,626

%I = $\frac{1.039 \times 21.841 \times 687}{0.8488 \times 26.65 \times 8099 \times 60 \times (0.128)^2}$ = 86.6 %

(B) 9/13/07

SCFM: 307,112

%EA: 45.8

Job Number 07-057
Job Name ADA-ES Hardin, MT
Run Number 2
Unit Stack
Date 6 Sept 2007
Operator Mullins, Selakovich
Sample Box No. 1-2 Meter Box No. 1-2

PM10/2.5 Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: 1521-1621
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 72
Assumed Moisture % 15.2
Probe Length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.008 cfm
Final Leak @ 13.0 "Hg = 0.005 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	~~Heated Oven Temp~~ °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
B-6	1310-0	5.151	4.10	0.39	0.39	7.5	215	253	223	65	82	82	
5	4:50	7.14	4.40	0.39	0.39	7.5	219	250	218	57	82	82	
4	10:12	9.34	4.20	0.39	0.39	7.5	219	251	222	55	84	82	
3	15:41	11.59	4.30	0.39	0.39	7.5	220	250	225	59	85	82	
2	20:53	13.72	4.00	0.39	0.39	7.5	219	252	219	56	87	83	
1	25:59	15.83	3.80	0.39	0.39	7.5	218	254	220	55	88	83	
End	30:49	17.830	—	—	—	—	—	—	—	—	—	—	
A-6	1343-0	17.838	3.50	0.39	0.39	7.5	216	249	222	58	88	83	
5	4:50	19.80	4.00	0.39	0.39	7.5	217	249	223	55	89	84	
4	9:51	21.84	4.00	0.39	0.39	8.0	215	249	221	59	90	84	
3	14:48	23.86	3.90	0.39	0.39	8.0	216	247	222	55	91	85	
2	19:30	25.85	4.00	0.39	0.39	8.0	217	249	222	54	91	85	
1	24:22	27.83	3.80	0.39	0.39	8.0	215	251	224	55	92	85	
End	29:12	29.917	—	—	—	—	—	—	—	—	—	—	
All	1412												

Pitot Tube Calibration Factor C_p 0.827
Volume Collected V_m 24.865 ft^3
Water Collected V_w 83.4 ml
Time of Test T_t 60 min.
Stack Pressure P_s -1.70 "H_2O

Pitot Tube No. PM-10
Baro. Press. P_b 26.87 "Hg
Probe Tip Dia. D_n 0.128 in.
% CO_2 12.8 % CO 0.0
% O_2 6.7 % N_2 80.5
Area Stack A_s 9363 in^2

Barometer No. —
Probe Tip No. PM10-1
Total Volume of Leak Checks After Start: 0 ft^3
V_m X Dry Gas Meter Calibration Factor 1.004 X 24.766

[Dry Gas Meter Reading ___ ft^3 - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 1-2

			Water Weight Gain		
Impinger 1	Final Weight	820.2		Impinger 1	70.0
	Initial Weight	750.2			
	Increase	70.0		Impinger 2	5.5
Impinger 2	Final Weight	742.3		Impinger 3	0.6
	Initial Weight	736.8			
	Increase	5.5		Impinger 4	7.3
			V_w =		
Impinger 3	Final Weight	635.7	g SO_2 =	Impinger 5	
	Initial Weight	635.1	V_w =		
	Increase	0.6		Impinger 6	
			47mm		
Impinger 4	Final Weight	929.6	Filter No: 19	Impinger 7	
	Initial Weight	922.3			
	Increase	7.3		Total	83.4 = V_w

Impinger 5	Final Weight		P_b =	26.87	$\%CO_2$ =	12.8
	Initial Weight		V_m =	24.865	$\%O_2$ =	6.7
	Increase		V_w =	83.4	%CO =	0.0
			P_m =	0.390	$\%N_2$ =	80.5
Impinger 6	Final Weight		Avg ΔP =	4.000	A_s =	9363
	Initial Weight				D_n =	0.128
	Increase		Avg$\sqrt{\Delta P}$ =	1.999	T_1 =	60
			C_p =	0.827		
Impinger 7	Final Weight		P_s =	-1.70 "H_2O		26.75 "Hg
	Initial Weight		T_m =	85 °F		545 °R
	Increase		T_s =	217 °F		677 °R

Moisture Content: %M = 15.38 M_d = 0.8462 MW_c = 30.316 MW = 28.42

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 24.865 \left[\frac{26.87 + \frac{0.390}{13.6}}{85 + 460}\right] = 21.660\ sft^3 = 0.361\ scfm$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 83.4 = 3.936 sft^3

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{3.936}{21.660 + 3.936} \times 100 = 15.38\ \%$$

$$V_s = 5123.8 \times 0.827 \sqrt{\frac{677}{26.75 \times 28.42}} \times 1.999 = 7993\ fpm$$

PS 9/13/07

ACFM: 519,737

SCFM: 307,778

$$\%I = \frac{1.039 \times 21.660 \times 677}{0.8462 \times 26.75 \times 7993 \times 60 \times (0.128)^2} = 85.7\ \%$$

%EA: 45.8

Job Number 07-057
Job Name MDA-ES Hardin, MT
Run Number 3
Unit Stack
Date 6 Sept 2007
Operator Mullins, Salakowich
Sample Box No. 1-1 Meter Box No. 1-2

PM-10 / 2.5 Field Data

Read and record at the start of each test point.

Purge to: —
Purge time: 1704 - 1804
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 69
Assumed Moisture % 15.2
Probe Length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.014 cfm
Final Leak @ 10.5 "Hg = 0.003 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H_2O (ΔP_s)	Orifice ΔH "H_2O Desired	Orifice ΔH "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Heated Line Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet (T_m)	Dry Gas Temp. °F Outlet	Remarks
A-6	1537-0	31.050	4.40	0.40	0.40	6.5	217	252	252	61	84	84	
5	4:41	33.04	4.40	0.40	0.40	6.0	218	253	256	52	85	84	
4	9:41	35.11	4.30	0.40	0.40	6.0	218	255	253	49	86	84	
3	14:41	37.21	3.90	0.40	0.40	6.5	218	254	254	48	87	86	
2	19:37	39.25	4.30	0.40	0.40	6.5	217	256	256	49	89	84	
1	24:37	41.34	4.10	0.40	0.40	6.5	217	251	253	49	90	85	
End	29:30	43.432	—	—	—	—	—	—	—	—	—	—	
B-6	1611-0	43.432	4.40	0.40	0.40	6.5	217	252	254	54	90	85	
5	5:04	45.53	4.20	0.40	0.40	6.5	217	253	252	49	90	85	
4	10:19	47.71	4.20	0.40	0.40	6.5	217	255	256	51	91	86	
3	15:27	49.97	4.40	0.40	0.40	6.5	217	254	254	49	92	86	
2	20:38	51.97	4.60	0.40	0.40	7.0	218	253	254	49	93	87	
1	25:38	54.06	3.80	0.40	0.40	7.0	216	252	251	50	93	87	
End	30:31	56.123	—	—	—	—	—	—	—	—	—	—	
All	1641												

Pitot Tube Calibration Factor C_p 0.827
Volume Collected V_m 25.173 ft^3
Water Collected V_w 82.1 ml
Time of Test T_t 60 min.
Stack Pressure P_s -1.50 "H_2O

Pitot Tube No. PM-10
Baro. Press. P_b 26.90 "Hg
Probe Tip Dia. D_n 0.128 in.
% CO_2 12.7 % CO 0.0
% O_2 6.8 % N_2 80.5
Area Stack A_s 9363 in^2

Barometer No. —
Probe Tip No. PM10-1
Total Volume of Leak Checks After Start: 0 ft^3
V_m X Dry Gas Meter Calibration Factor 1.004 X 25.073

[Dry Gas Meter Reading ___ ft^3 - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 1-1

			Water Weight Gain		
Impinger 1	Final Weight	799.3		Impinger 1	70.0
	Initial Weight	729.3			
	Increase	70.0		Impinger 2	4.7
Impinger 2	Final Weight	771.1		Impinger 3	-1.4
	Initial Weight	766.4			
	Increase	4.7		Impinger 4	8.8
Impinger 3	Final Weight	643.0	V_w =	Impinger 5	
	Initial Weight	644.4	g SO_2 =		
	Increase	-1.4	V_w =	Impinger 6	
Impinger 4	Final Weight	1011.1	47mm	Impinger 7	
	Initial Weight	1002.3	Filter No: 20		
	Increase	8.8		Total	82.1 = V_w

Impinger 5	Final Weight		P_b =	26.90	%CO_2 =	12.7	
	Initial Weight		V_m =	25.173	%O_2 =	6.8	
	Increase		V_w =	82.1	%CO =	0.0	
			P_m =	0.400	%N_2 =	80.5	
Impinger 6	Final Weight		Avg ΔP =	4.250	A_s =	9363	
	Initial Weight				D_n =	0.128	
	Increase		Avg$\sqrt{\Delta P}$ =	2.061	T_1 =	60	
			C_p =	0.827			
Impinger 7	Final Weight		P_s =	-1.50	°H_2O	26.79	°Hg
	Initial Weight		T_m =	87	°F	547	°R
	Increase		T_s =	217	°F	677	°R

Moisture Content: %M = 15.05 M_d = 0.8495 MW_c = 30.304 MW = 28.45

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 25.173 \left[\frac{26.90 + \frac{0.400}{13.6}}{87 + 460}\right] = \frac{21.874}{0.365}\ \frac{sft^3}{scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 82.1 = 3.875 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{3.875}{21.874 + 3.875}$ x 100 = 15.05 %

V_s = 5123.8 x 0.827 $\sqrt{\frac{677}{26.79 \times 28.45}}$ x 2.061 = 8231 fpm

ACFM: 535,174

%I = $\frac{1.039 \times 21.874 \times 677}{0.8495 \times 26.79 \times 8231 \times 60 \times (0.128)^2}$ = 83.6 %

(15) 9/13/07

SCFM: 318,655

%EA: 46.8

Job Number 07-057 ✓ Controlled Condensate Field Data
Job Name ADA-ES Hardin, MT ✓
Run Number 1 ✓
Unit Stack ✓
Date 6 Sept 2007 ✓
Operator Jackson, Stanley ✓
Sample Box No. 3-1 Meter Box No. 1-1

Read and record at the start of each test point.

Purge lo: —
Purge time: —
Pitot Leak Check Initial — Final —

Ambient Temp. °F 72
Assumed Moisture % 15.2
Probe Length 9'
C Factor — to reference
Initial Leak @ 10.0 "Hg = 0.002 cfm
Final Leak @ 5.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet (T_m)	Condenser Exit °F	Remarks	Water Bath °F
Mid	1138 ✓	512.700	—	0.30	0.30	4.0	—	306	556	68	71	69	118		166
"	1143	514.395	—	0.30	0.30	3.5	—	325	555	66	71	70	140		166
"	1148	516.100	—	0.30	0.30	3.5	—	341	555	64	73	70	133		146
"	1153	517.785	—	0.30	0.30	4.0	—	352	554	64	74	71	135		163
"	1158	519.480	—	0.30	0.30	4.0	—	364	556	65	76	71	148		164
"	1203	521.210	—	0.30	0.30	4.5	—	367	555	65	77	72	150		169
"	1208	522.960	—	0.30	0.30	4.5	—	364	555	66	79	73	143		162
"	1213	524.600	—	0.30	0.30	4.5	—	357	555	65	81	75	139		166
"	1218	525.810	—	0.30	0.30	4.5	—	351	555	64	82	76	138		166
"	1223	528.105	—	0.30	0.30	4.5	—	352	553	64	83	77	139		165
"	1228	529.850	—	0.30	0.30	5.0	—	345	555	63	84	78	135		166
"	1233	531.600	—	0.30	0.30	5.0	—	342	556	65	85	79	135		166
"	1238 END ✓	533.351	—	—	—	—	—	—	—	—	—	—	—		—

Pitot Tube Calibration Factor C_p —
Volume Collected V_m 20.610 ft³
Water Collected V_w 67.1 ml
Time of Test T_t 60 min.
Stack Pressure P_s -2.20 "H₂O

Pitot Tube No. —
Baro. Press. P_b 26.81 "Hg
Probe Tip Dia. D_n — in.
% CO_2 12.8 % CO 0.0
% O_2 6.7 % N_2 80.5
Area Stack A_s 9363 in²

Barometer No. —
Probe Tip No. —
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.998 ✓ X 20.651

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 3-1

Impinger 1	Final Weight	917.7		Impinger 1	59.3
	Initial Weight	858.4			
	Increase	59.3		Impinger 2	0.8
Impinger 2	Final Weight	824.4		Impinger 3	1.2
	Initial Weight	823.6			
	Increase	0.8		Impinger 4	5.8
Impinger 3	Final Weight	628.8	V_w =	Impinger 5	
	Initial Weight	627.6	g SO_2 =		
	Increase	1.2	V_w =	Impinger 6	
Impinger 4	Final Weight	977.5	~~Filter No.:~~	Impinger 7	
	Initial Weight	971.7			
	Increase	5.8	Thimble No. 90	Total	67.1 = V_w

BSM 9/6/07 47mm

Impinger 5	Final Weight		P_b = 26.81	%CO_2 = 12.8	
	Initial Weight		V_m = 20.610	%O_2 = 6.7	
	Increase		V_w = 67.1	%CO = 0.0	
			P_m = 0.300	%N_2 = 80.5	
Impinger 6	Final Weight		Avg ΔP = –	A_s = 9363	
	Initial Weight			D_n = –	
	Increase		Avg$\sqrt{\Delta P}$ = –	T_1 = 60	
			C_p = –		
Impinger 7	Final Weight		P_s = -2.20 "H_2O	26.65 "Hg	
	Initial Weight		T_m = 76 °F	536 °R	
	Increase		T_s = – °F	– °R	

Moisture Content: %M = 14.82 M_d = 0.8518 MW_c = 30.316 MW = 28.49

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 20.610 \left[\frac{26.81 + \frac{0.300}{13.6}}{76 + 460}\right] = \frac{18.210\ sft^3}{0.304\ sctm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 67.1 = 3.167 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{3.167}{18.210 + 3.167}$ x 100 = 14.82 %

V_s = 5123.8 x ____ $\sqrt{\quad / \quad}$ x ____ = – fpm

ACFM: –

SCFM: –

%I = 1.039 x ____ / (x x x x( )^2) = – %

%EA: 45.8

9/13/07

Job Number 07-057
Job Name ADA-ES HARDIN, MT
Run Number 2
Unit STACK
Date 9/6/07
Operator JACKSON / STANLEY
Sample Box No. 3-2 Meter Box No. 1-1

Controlled Condensate Field Data

Read and record at the start of each test point.

Purge to: –
Purge time: –
Pitot Leak Check Initial – Final –

Ambient Temp. °F 75
Assumed Moisture % 15.2
Probe Length 9'
C Factor – to reference
Initial Leak @ 10 "Hg = 0.002 cfm
Final Leak @ 7 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O (ΔP_s)	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet (T_m)	CONDENSER EXIT °F Remarks	WATER BATH °F
MID	1359	533.544	–	0.30	0.30	5.0	–	276	557	64	84	81	110	164
"	1404	534.850	–	0.30	0.30	5.5	–	300	554	62	84	82	113	171
"	1409	536.550	–	0.30	0.30	5.5	–	325	553	61	83	83	120	170
"	1414	538.225	–	0.30	0.30	6.5	–	338	552	60	83	83	118	171
"	1419	539.930	–	0.30	0.30	6.5	–	346	555	57	84	83	114	170
"	1424	541.630	–	0.30	0.30	6.5	–	353	553	56	84	83	110	167
"	1429	543.330	–	0.30	0.30	6.5	–	355	554	56	84	83	111	165
"	1434	545.080	–	0.30	0.30	6.5	–	362	555	55	85	83	109	161
"	1439	546.790	–	0.30	0.30	6.5	–	369	554	55	85	83	112	166
"	1444	548.500	–	0.30	0.30	6.5	–	375	554	54	85	82	107	164
"	1449	550.210	–	0.30	0.30	6.5	–	383	553	54	86	83	110	165
"	1454	551.925	–	0.30	0.30	6.5	–	384	554	54	86	83	106	165
"	1459 END	553.609	–	–	–	–	–	–	–	–	–	–	–	–

Pitot Tube Calibration Factor C_p –
Volume Collected V_m 20.025 ft³
Water Collected V_w 65.0 ml
Time of Test T_t 60 min.
Stack Pressure P_s -1.70 "H₂O

Pitot Tube No. –
Baro. Press. P_b 26.87 "Hg
Probe Tip Dia. D_n – in.
% CO_2 12.8 % CO 0.0
% O_2 6.7 % N_2 80.5
Area Stack A_s 9363 in²

Barometer No. –
Probe Tip No. –
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.998 X 20.065

[Dry Gas Meter Reading ___ ft³ - (T_t ___ min. X Leak Rate ___ cfm)]

Impinger Box No. 3-2

Impinger 1	Final Weight	888.0		Water Weight Gain	
	Initial Weight	830.2		Impinger 1	57.8
	Increase	57.8		Impinger 2	1.0
Impinger 2	Final Weight	842.2		Impinger 3	0.6
	Initial Weight	841.2		Impinger 4	5.6
	Increase	1.0	V_w =		
Impinger 3	Final Weight	637.1	g SO_2 =	Impinger 5	
	Initial Weight	636.5	V_w =		
	Increase	0.6		Impinger 6	
Impinger 4	Final Weight	962.0		Impinger 7	
	Initial Weight	956.4			
	Increase	5.6		Total	65.0 = V_w
Impinger 5	Final Weight		P_b = 26.87	$\%CO_2$ = 12.8	
	Initial Weight		V_m = 20.025	$\%O_2$ = 6.7	
	Increase		V_w = 65.0	%CO = 0.0	
			P_m = 0.300	$\%N_2$ = 80.5	
Impinger 6	Final Weight		Avg ΔP = –	A_s = 9363	
	Initial Weight			D_n = –	
	Increase		Avg$\sqrt{\Delta P}$ = –	T_t = 60	
			C_p = –		
Impinger 7	Final Weight		P_s = -1.70 "H_2O	26.75 "Hg	
	Initial Weight		T_m = 84 °F	544 °R	
	Increase		T_s = – °F	– °R	

Moisture Content: %M = 14.94 M_d = 0.8506 MW_c = 30.316 MW = 28.48

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 20.025 \left[\frac{26.87 + \frac{0.300}{13.6}}{84 + 460}\right] = \frac{17.472\ sft^3}{0.291\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 65.0 = 3.068 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{3.068}{17.472 + 3.068}$ x 100 = 14.94 %

V_s = 5123.8 x ____ $\sqrt{\quad}$ x ____ = – fpm

%I = 1.039 x ____ x ____ / (x ____ x ____ x ( )^2) = – %

9/13/07

ACFM: –

SCFM: –

%EA: 45.8

Job Number 07-057
Job Name ADA-ES, HARDIN, MT
Run Number 3
Unit STACK
Date 9/6/07
Operator JACKSON / STANLEY
Sample Box No. 3-1 Meter Box No. 1-1

Controlled Condensate Field Data

Read and record at the start of each test point.

Purge to: –
Purge time: –
Pitot Leak Check Initial – Final –

Ambient Temp. °F 75
Assumed Moisture % 15.2
Probe Length 9
C Factor – to reference
Initial Leak @ 10 "Hg = 0.000 cfm
Final Leak @ 5 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" "H₂O	Orifice ΔH "H₂O Desired	Orifice ΔH "H₂O Actual	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp. °F Inlet	Dry Gas Temp. °F Outlet (T_m)	CONDENSER EXIT °F	Remarks	WATER BATH °F
MID	1529	553.904	–	0.30	0.30	4.5	–	353	555	62	82	82	108		166
"	1534	555.600	–	0.30	0.30	4.5	–	369	554	63	83	82	123		166
"	1539	557.345	–	0.30	0.30	4.5	–	385	554	62	84	81	140		163
"	1544	559.080	–	0.30	0.30	4.5	–	400	555	58	85	81	146		164
"	1549	560.800	–	0.30	0.30	4.5	–	405	555	57	85	82	141		164
"	1554	562.530	–	0.30	0.30	4.5	–	410	556	55	86	82	142		165
"	1559	564.280	–	0.30	0.30	5.0	–	414	556	54	87	83	141		165
"	1604	566.000	–	0.30	0.30	5.0	–	414	555	54	88	83	141		165
"	1609	567.755	–	0.30	0.30	5.0	–	411	556	55	88	84	138		164
"	1614	569.510	–	0.30	0.30	5.0	–	408	555	56	89	84	138		164
"	1619	571.255	–	0.30	0.30	5.0	–	408	556	55	89	85	140		165
"	1624	573.020	–	0.30	0.30	5.0	–	408	555	55	90	85	141		165
"	1629 END	574.735	–	–	–	–	–	–	–	–	–	–	–		–

Pitot Tube Calibration Factor C_p –
Volume Collected V_m 20.789 ft³
Water Collected V_w 67.1 ml
Time of Test T_t 60 min.
Stack Pressure P_s –1.50 "H₂O

Pitot Tube No. –
Baro. Press. P_b 26.90 "Hg
Probe Tip Dia. D_n – in.
% CO_2 12.7 % CO 0.0
% O_2 6.8 % N_2 80.5
Area Stack A_s 9363 in²

Barometer No. –
Probe Tip No. –
Total Volume of Leak Checks After Start: 0 ft³
V_m X Dry Gas Meter Calibration Factor 0.998 X 20.831

[Dry Gas Meter Reading ____ ft³ - (T_t ____ min. X Leak Rate ____ cfm)]

Impinger Box No. 3-1

			Water Weight Gain		
Impinger 1	Final Weight	922.5		Impinger 1	60.6
	Initial Weight	861.9			
	Increase	60.6		Impinger 2	1.7
Impinger 2	Final Weight	828.0		Impinger 3	0.4
	Initial Weight	826.3			
	Increase	1.7		Impinger 4	4.4
			V_w =		
Impinger 3	Final Weight	629.2	g SO_2 =	Impinger 5	
	Initial Weight	628.8	V_w =		
	Increase	0.4		Impinger 6	
Impinger 4	Final Weight	981.8		Impinger 7	
	Initial Weight	977.4			
	Increase	4.4		Total	67.1 = V_w

Impinger 5	Final Weight		P_b =	26.90	$\%CO_2$ =	12.7	
	Initial Weight		V_m =	20.789	$\%O_2$ =	6.8	
	Increase		V_w =	67.1	%CO =	0.0	
			P_m =	0.300	$\%N_2$ =	80.5	
Impinger 6	Final Weight		Avg ΔP =	—	A_n =	9363	
	Initial Weight				D_n =	—	
	Increase		Avg$\sqrt{\Delta P}$ =	—	T_1 =	60	
			C_p =	—			
Impinger 7	Final Weight		P_s =	-1.50	$^{\circ}H_2O$	26.79	$^{\circ}Hg$
	Initial Weight		T_m =	85	°F	545	°R
	Increase		T_s =	—	°F	—	°R

Moisture Content: %M = 14.857 M_d = 0.8513 MW_c = 30.304 MW = 28.47

$$Vm_{std} = 17.65\ Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 20.789 \left[\frac{26.90 + \frac{0.300}{13.6}}{85 + 460}\right] = \frac{18.126\ sft^3}{0.3021\ scfm}$$

Vw_{gas} = 0.0472 x Vw = 0.0472 x 67.1 = 3.167 sft^3

% Moisture = $\frac{Vw_{gas}}{Vm_{std} + Vw_{gas}}$ x 100 = $\frac{3.167}{18.126 + 3.167}$ x 100 = 14.87 %

V_s = 5123.8 x ____ $\sqrt{\quad}$ x ____ = — fpm

%I = 1.039 x ____ x ____ / ____ x ____ x ( )^2 = — %

PS 8/13/07

ACFM: —

SCFM: —

%EA: 46.8

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

Job Number 07-057
Job Name ADA-ES Hardin, MT
Sampling Location Stack
Date 6 Sept 2007 Time 0925-0940

Stack Height _____ ft.
Sampling Port Height Above Ground _____ ft.

	Port A	Port B	Port C	Port D	Average
Port & Inside Diameter (in.)					
Port & Wall Thickness (in.)					15 9/16"
Inside Stack Diameter (in.)					109 3/16"

Sampling Ports are 33 ft. 1 1/2 in. (3.64 stack diameters) downstream from disturbance (inlet, constriction, bend, expansion)

Sampling Ports are >18 ft. 2 3/8 in. (>2.00 stack diameters) upstream from disturbance (outlet, constriction, bend, expansion)

Point Number	Percent Diameter	Distance from Ref. Point (decimal in.)	Distance from Ref. Point (fractional in.)	Port A $\Delta P/T_s/\alpha$	Port B $\Delta P/T_s/\alpha$	Port C $\Delta P/T_s/\alpha$	Port D $\Delta P/T_s/\alpha$
1	4.4	4.804	4 13/16"	3.80 1225	3.80 1225	/ /	/ /
2	14.6	15.941	15 15/16"	3.85 1225	4.25 1226	/ /	/ /
3	29.6	32.320	32 5/16"	3.60 1225	4.40 1226	/ /	/ /
4	70.4	76.868	76 7/8"	4.00 1226	4.90 1226	/ /	/ /
5	85.4	93.246	93 1/4"	4.10 1225	4.70 1225	/ /	/ /
6	95.6	104.383	104 3/8"	3.80 1225	3.80 1225	/ /	/ /
7				/ /	/ /	/ /	/ /
8				/ /	/ /	/ /	/ /
9				/ /	/ /	/ /	/ /
10				/ /	/ /	/ /	/ /
11				/ /	/ /	/ /	/ /
12				/ /	/ /	/ /	/ /
13				/ /	/ /	/ /	/ /
14				/ /	/ /	/ /	/ /
15				/ /	/ /	/ /	/ /
16				/ /	/ /	/ /	/ /
17				/ /	/ /	/ /	/ /
18				/ /	/ /	/ /	/ /
19				/ /	/ /	/ /	/ /
20				/ /	/ /	/ /	/ /
21				/ /	/ /	/ /	/ /
22				/ /	/ /	/ /	/ /
23				/ /	/ /	/ /	/ /
24				/ /	/ /	/ /	/ /

Pitot Tube No. PM-10
C_p = 0.827
P_b = 26.81 "Hg
P_s = -2.20 "H_2O 26.65 "Hg
A_s = 9363 in.^{2}

Average ΔP 4.083
Average $\Delta P^{1/2}$ 2.019
Average T_s 225 °F
Average α _____ degrees

ORSAT ANALYSIS DATA FORM

Job #: 07-057
Job Name: ADA-ES
Location: Hardin, MT
Date: 6 Sept 2007
Operator: Mullins

Sample Location: Stack
Analytical Method: 3
Sample Type: Single Point / Multi Point Grab / Integrated
Leak Check: Time: 24hrs (≥ 4 minutes) Rate: 0.0
Ambient Air Check:

CO_2 - % Vol.	0.0
O_2 - % Vol.	20.9
N_2 - % Vol.	79.1

Run #: 1
Run Time: 1021-1124

CO_2 - % Vol.	12.8	12.8	12.8	12.8
O_2 - % Vol.	6.7	6.7	6.7	6.7
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

Run #: 2
Run Time: 1310-1412

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	12.8	12.9	12.8	12.8
O_2 - % Vol.	6.7	6.6	6.7	6.7
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

Run #: 3
Run Time: 1537-1641

	Analysis #1	Analysis #2	Analysis #3	Average - % Volume
CO_2 - % Vol.	12.7	12.7	12.7	12.7
O_2 - % Vol.	6.8	6.8	6.8	6.8
CO - % Vol.	0.0	0.0	0.0	0.0
N_2 - % Vol.	80.5	80.5	80.5	80.5

AIR SAMPLING ASSOCIATES, INC.

Appendix E:

EPA Test Methods 201A and 202 (Particulate Matter) Analytical Data

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 07-057

Date Analysis Completed: 9/21/07

Project Name: ADA-ES

Unit Tested: Stack

Project Location: Hardin, MT

Run Number:	1	2	3
Particulate Matter >PM10 (mgs):	6.5	1.8	4.3
Particulate Matter < PM10 >PM2.5 (mgs):	5.3	3.6	3.7
Particulate Matter PM2.5 Rinse (mgs):	0.1	0.0	7.6
Particulate Matter PM2.5 Filter (mgs):	0.8	0.8	0.6
Total Particulate Matter as PM2.5 (mgs):	0.9	0.8	8.2
Particulate Matter in "Back-Half" (mgs):	53.2	97.5	23.6
Total Particulate Matter in Sample – MT (mg):	65.9	103.7	39.8

Billy J. Mullins, Jr.
Analyst

Date:

Data Checked By

AIR SAMPLING ASSOCIATES, INC.

Page____of___

Particulate Analysis EPA Method PM10/2.5

Front Wash

Project No. 07-057 Location Hardin, MT
Project Name ADA-ES Unit Tested Stack

Desiccator Time In	9/16/07 0850	9/17/07 1310			
Desiccator Time Out	9/17/07 1305	9/18/07 0720			

Run No. 1-PM10		Volume (ml) 175		Sample I.D.	
Final Weight (g)	4.1898	4.1895 ✓			
Initial Weight (g)	4.1816	4.1816			
Particulate Weight (g)					

Particulate Average (mg) 7.9
Less Acetone Blank (mg) 1.4
Total Particulate (mg) 6.5

Run No. 1-PM10		Volume (ml) 190		Sample I.D.	
Final Weight (g)	4.6280	4.6279 ✓			
Initial Weight (g)	4.6211	4.6211			
Particulate Weight (g)					

Particulate Average (mg) 6.8
Less Acetone Blank (mg) 1.5
Total Particulate (mg) 5.3

Run No. 1-PM2.5		Volume (ml) 90		Sample I.D.	
Final Weight (g)	4.2862	4.2864 ✓			
Initial Weight (g)	4.2856	4.2856			
Particulate Weight (g)					

Particulate Average (mg) 0.8
Less Acetone Blank (mg) 0.7
Total Particulate (mg) 0.1

Acetone Blank		Volume (ml) 220		Sample I.D.	
Final Weight (g)	4.5534	4.5529 ✓			
Initial Weight (g)	4.5497	4.5497			
Particulate Weight (g)					

Average (mg) 3.2
* mg/l 14.5

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

Billy J. Mullins, Jr Date: 9/18/07
Analyst

Version No.2 10/22/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method PM10/2.5

Front Half Tare Weights

Project No. 07-057 Location Hardin, MT
Project Name ADA-ES Unit Tested Stack

Desiccator Time In	9/13/07 1050	9/14/07 1100			
Desiccator Time Out	9/14/07 1100	9/15/07 0925			

Run No. 1 -> PM10				Sample I.D.	
Weight (g)	4.1816	4.1816 ✓			

Run No. 1 - PM10				Sample I.D.	
Weight (g)	4.6216	4.6211 ✓			

Run No. 1 - PM2.5				Sample I.D.	
Weight (g)	4.2859	4.2856 ✓			

Acetone Blank				Sample I.D.	
Weight (g)	4.5496	4.5497 ✓			

Billy J. Mullins Jr
Analyst

AIR SAMPLING ASSOCIATES, INC.

Page____of___

Particulate Analysis EPA Method PM10/2.5

Front Wash

Project No. 07-057 Location Harding, MT
Project Name ADA-ES Unit Tested Stack

Desiccator Time In	09/16/07 0850	09/17/07 1320			
Desiccator Time Out	09/17/07 1315	09/18/07 0725			

Run No. Z->PM/10	Volume (ml) 160			Sample I.D.	
Final Weight (g)	4.3979	4.3978 ✓			
Initial Weight (g)	4.3947	4.3947			
Particulate Weight (g)					

Particulate Average (mg) 3.1
Less Acetone Blank (mg) 1.3
Total Particulate (mg) 1.8

Run No. Z-PM10	Volume (ml) 225			Sample I.D.	
Final Weight (g)	4.4164	4.4164 ✓			
Initial Weight (g)	4.4110	4.4110			
Particulate Weight (g)					

Particulate Average (mg) 5.4
Less Acetone Blank (mg) 1.8
Total Particulate (mg) 3.6

Run No. Z-PM2.5	Volume (ml) 80			Sample I.D.	
Final Weight (g)	4.0261	4.0258 ✓			
Initial Weight (g)	4.0255	4.0255			
Particulate Weight (g)					

Particulate Average (mg) 0.3
Less Acetone Blank (mg) 0.6
Total Particulate (mg) — 0.0

Acetone Blank		Volume (ml)		Sample I.D.	
Final Weight (g)					
Initial Weight (g)					
Particulate Weight (g)					

Average (mg) _____
* mg/l _____

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

Billy J. Mullins, Jr. Date: 9/13/07
Analyst

Version No.2 10/22/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method PM10/2.5

Front Half Tare Weights

Project No. 07-057 Location Hardin, MT
Project Name ADA Hardin Unit Tested Stack

Desiccator Time In	9/13/07 1050	9/14/07 1105			
Desiccator Time Out	9/14/07 1105	9/15/07 0930			

Run No. 2 - PM10				Sample I.D.	
Weight (g)	4.3944	4.3947 ✓			

Run No. 2 - PM10				Sample I.D.	
Weight (g)	4.4113	4.4110 ✓			

Run No. 2 - PM2.5				Sample I.D.	
Weight (g)	4.0258	4.0255 ✓			

Acetone Blank				Sample I.D.	
Weight (g)	~~4.5504~~ BM 9/14/07				

Billy J. Mullins Jr.
Analyst

AIR SAMPLING ASSOCIATES, INC.

Page____of___

Particulate Analysis EPA Method PM-10/2.5

Front Wash

Project No. 07-057 Location Hardin, MT
Project Name ADA-ES Unit Tested Stack

Desiccator Time In	9/18/07 0715	9/21/07 0830			
Desiccator Time Out	9/21/07 0830	9/21/07 1505			

Run No. 3-7PM/10	Volume (ml) 150		Sample I.D.		
Final Weight (g)	4.3988	4.3993 ✓			
Initial Weight (g)	4.3938	4.3938			
Particulate Weight (g)					

Particulate Average (mg) 5.5
Less Acetone Blank (mg) 1.2
Total Particulate (mg) 4.3

Run No. 3-PM10	Volume (ml) 200		Sample I.D.		
Final Weight (g)	4.6414	4.6418 ✓			
Initial Weight (g)	4.6365	4.6365			
Particulate Weight (g)					

Particulate Average (mg) 5.3
Less Acetone Blank (mg) 1.6
Total Particulate (mg) 3.7

Run No. 3-PM2.5	Volume (ml) 70		Sample I.D.		
Final Weight (g)	4.4007	4.4008 ✓			
Initial Weight (g)	4.3926	4.3926			
Particulate Weight (g)					

Particulate Average (mg) 8.2
Less Acetone Blank (mg) 0.6
Total Particulate (mg) 7.6

Acetone Blank		Volume (ml)		Sample I.D.	
Final Weight (g)					
Initial Weight (g)					
Particulate Weight (g)					

Average (mg) _____
* mg/l _____

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

Billy J. Mullins, Jr. Date: 9/21/07
Analyst

Version No.2 10/22/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method PM10/2.5

Front Half Tare Weights

Project No. 07-057 Location Hardin, MT
Project Name ADA-ES Unit Tested Stack

Desiccator Time In	9/13/07 1050	9/14/07 1115	9/15/07 0930	9/16/07 0845	
Desiccator Time Out	9/14/07 1115	9/15/07 0930	9/16/07 0845	9/17/07 1300	

Run No.	3 - >PM10			Sample I.D.	
Weight (g)	4.3940	4.3938 ✓			

Run No.	3 - PM10			Sample I.D.	
Weight (g)	4.6377	4.6372 ✓	4.6362	4.6365 ✓	

Run No.	3 - PM2.5			Sample I.D.	
Weight (g)	4.3942	4.3926	4.3929 ✓		

6 BJM 9/16/07

Acetone Blank				Sample I.D.	
Weight (g)					

Billy J. Mullins, Jr
Analyst

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method PM10/2.5

Stack Filters

Project No. 07-057
Project Name ADA-ES

Location Harding, MT
Unit Tested Stack

Desiccator Time In	9/16/07 0850	9/18/07 0735			
Desiccator Time Out	9/18/07 0730	9/18/07 1520			

Run No. 1		Filter No. 17		Sample I.D.	
Filter & Particulate (g)	0.1095	0.1096 ✓			

Filter & Particulate Average (g) 0.1096
Initial Filter Weight (g) 0.1088
Total Particulate (mg) 0.8

Run No. 2		Filter No. 19		Sample I.D.	
Filter & Particulate (g)	0.1083	0.1086 ✓	~~19~~ BJM 9/18/07		

Filter & Particulate Average (g) 0.1086
Initial Filter Weight (g) 0.1078
Total Particulate (mg) 0.8

Run No. 3		Filter No. 20		Sample I.D.	
Filter & Particulate (g)	0.1238	0.1238 ✓			

Filter & Particulate Average (g) 0.1238
Initial Filter Weight (g) 0.1232
Total Particulate (mg) 0.6

Billy J. Mullins Jr
Analyst

AIR SAMPLING ASSOCIATES, INC.

Filter Weight Log
47 mm

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
16	8/1/07 0800	0.1214 8/28/07 0910	0.1217 8/28/07 1520	✓			0.1217
17	8/1/07 0800	0.1084 8/28/07 0910	0.1088 8/28/07 1520	✓			0.1088 ✓
18	8/1/07 0800	0.1211 8/28/07 0910	0.1213 8/28/07 1520	✓			0.1213
19	8/1/07 0800	0.1075 8/28/07 0915	0.1078 8/28/07 1525	✓			0.1078 ✓
20	8/1/07 0800	0.1229 ~~8/28/07~~ 8/28/07 0915	0.1232 1525	✓			0.1232 ✓
21	8/1/07 0800	0.1212 8/28/07 0915	0.1214 8/28/07 1525	✓			0.1214
22	8/1/07 0800	0.1087 8/28/07 0920	0.1092 8/28/07 1530	✓			0.1092
23	8/1/07 0800	0.1067 8/28/07 0920	0.1067 8/28/07 1530	✓			0.1067
24	8/1/07 0800	0.1212 8/28/07 0920	0.1212 8/28/07 1530	✓			0.1212
25	8/1/07 0800	0.1188 8/28/07 0925	0.1189 8/28/07 1535	✓			0.1189
26	8/1/07 0800	0.1053 8/28/07 0925	0.1053 8/28/07 1535				0.1053
27	8/1/07 0800	0.1211 8/28/07 0925	0.1216 8/28/07 1535	✓			0.1216
28							
29							
30							

AIR SAMPLING ASSOCIATES, INC.

ADA-ES

Hardin, Montana

202 – Back Half Particulate Analyses

Run No.	MeCl	MeCl Blank Correction	DI Water	DI Water Blank Correction	Less Chlorides	Less Sulfates	Total
1	1.6	(0.5)	78.0	(4.3)	0.0	(21.6)	53.2
2	1.3	(0.4)	134.3	(3.9)	0.0	(33.8)	97.5
3	0.7	(0.5)	37.1	(4.0)	0.0	(9.7)	23.6
Blank	1.8		10.0				

Methylene Chloride Rinse

Job Number	**07-4087**	**Run Date**	9/6/2007
Client Name	**ASA- Hardin,MT**		
Unit Name	**Stack**	Method: 202	

RUN 1	**BEAKER**	A 680	**VOLUME**	ml	258	**AVERAGE**
Beaker + Particulate (g)		108.9793	108.9797			108.9795
Beaker Tare (g)		108.9779	108.9778			108.9779
Particulate Weight (g)		0.0014	0.0019			0.0016

RUN 2	**BEAKER**	A 682	**VOLUME**	ml	234	**AVERAGE**
Beaker + Particulate (g)		99.2249	99.2247			99.2248
Beaker Tare (g)		99.2235	99.2234			99.2235
Particulate Weight (g)		0.0014	0.0013			0.0013

RUN 3	**BEAKER**	A 684	**VOLUME**	ml	272	**AVERAGE**
Beaker + Particulate (g)		111.7504	111.7508			111.7506
Beaker Tare (g)		111.7499	111.7499			111.7499
Particulate Weight (g)		0.0005	0.0009			0.0007

Blank	**BEAKER**	A 686	**VOLUME**	ml	400	**AVERAGE**
Beaker + Particulate (g)		110.2706	110.2711			110.2709
Beaker Tare (g)		110.2703	110.2701			110.2702
Particulate Weight (g)		0.0003	0.0010			0.0007

Analyst	KP	Started	9/7/2007
		Completed	9/17/2007

FINAL REPORT

DI Water Analysis (Back)

Job Number	**07-4087**	**Run Date**	9/6/2007
Client Name	**ASA- Hardin, MT**		
Unit Name	**Stack**	Method: 202	

RUN 1	**BEAKER**	A 679	**VOLUME**	ml	425	**AVERAGE**
Glass Fragments Removed						
Beaker + Particulate (g)		107.4726	107.4722			107.4724
Beaker Tare (g)		107.3944	107.3944			107.3944
Particulate Weight (g)		0.0782	0.0778			0.0780

RUN 2	**BEAKER**	A 681	**VOLUME**	ml	390	**AVERAGE**
Glass Fragments Removed						
Beaker + Particulate (g)		109.2600	109.2599			109.2600
Beaker Tare (g)		109.1257	109.1256			109.1257
Particulate Weight (g)		0.1343	0.1343			0.1343

RUN 3	**BEAKER**	A 683	**VOLUME**	ml	400	**AVERAGE**
Glass Fragments Removed						
Beaker + Particulate (g)		100.7996	100.7996			100.7996
Beaker Tare (g)		100.7625	100.7624			100.7625
Particulate Weight (g)		0.0371	0.0372			0.0371

Blank	**BEAKER**	A 685	**VOLUME**	ml	260	**AVERAGE**
Beaker + Particulate (g)		100.9923	100.9924			100.9924
Beaker Tare (g)		100.9898	100.9897			100.9898
Particulate Weight (g)		0.0025	0.0027			0.0026

Analyst KP

FINAL REPORT

Started 9/7/2007
Completed 9/17/2007

Sulfate **07-4087 (07-057)**

Stack		Sample No.	Sample Volume, ml	Lab Volume, ml	Lab Results, ug/ml	Final Results, mg
	Run 1	4087-1	345	20	177	21.617
	Run 2	4087-2	310	20	308	33.800
	Run 3	4087-3	320	20	85.3	9.663

ENERGY LABORATORIES, INC. • 2393 Salt Creek Highway (82601) • P.O. Box 3258 • Casper, WY 82602
Toll Free 888.235.0515 • 307.235.0515 • Fax 307.234.1639 • casper@energylab.com • www.energylab.com

LABORATORY ANALYTICAL REPORT

Client: Western Environmental
Site Name: 07-4087
Report Date: 09/17/07

Lab ID: C07090271-001
Client Sample ID: 07-4087-1
Matrix: Aqueous
Collection Date: Not Provided
DateReceived: 09/07/07

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	177	mg/L	D	12		E300.0	09/12/07 17:27 / swc

Lab ID: C07090271-002
Client Sample ID: 07-4087-2
Matrix: Aqueous
Collection Date: Not Provided
DateReceived: 09/07/07

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	308	mg/L	D	12		E300.0	09/12/07 17:39 / swc

Lab ID: C07090271-003
Client Sample ID: 07-4087-3
Matrix: Aqueous
Collection Date: Not Provided
DateReceived: 09/07/07

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	85.3	mg/L		1.2		E300.0	09/12/07 18:29 / swc

Lab ID: C07090271-004
Client Sample ID: 07-4087-4
Matrix: Aqueous
Collection Date: Not Provided
DateReceived: 09/07/07

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	ND	mg/L		1.0		E300.0	09/12/07 15:17 / swc

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix interference.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

AIR SAMPLING ASSOCIATES, INC.

Appendix F:

Controlled Condensate Test Method (Sulfate) Analytical Data

Air Sampling Associates

407-2B Holford's Prairie Rd
Lewisville, TX 75056-9582

ADA-ES
Hardin, MT
Client 07-057

Analytical Report
(0907-56)

HPLC Analysis

Sulfate

Enthalpy Analytical, Inc.
Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
2202 Ellis Road Durham, NC 27703 - 5518

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)
- This analytical report was prepared in Portable Document Format (.PDF) and contains 53 pages.

Michael Steven Schapira

QA Review Performed by: Michael Steven Schapira

Summary of Results

Company	Air Sampling Associates
Analyst	KEH
Parameters	HPLC/IC Analysis
# Samples	3 Runs & 1 blank

Client #	07-057
Job #	0907-56
PO #	Verbal
Report Date	9/27/2007

Compound	Sample ID / Catch Weight (ug)		
	Run 1 - CC	***Run 2 - CC***	***Run 3 - CC***
Sulfate	499	1,349	1,537
	HPLC Blank		
Sulfate	2.92 ND		

Results

Company	Air Sampling Associates
Analyst	KEH
Parameters	HPLC/IC Analysis
# Samples	3 Runs & 1 blank

Client #	07-057
Job #	0907-56
PO #	Verbal
Report Date	9/27/2007

MDL 0.0622 (ug/mL)
LOQ 0.434 (ug/mL)
Compound Sulfate

Lower Curve Limit 0.434 (ug/mL)
Upper Curve Limit 13.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
Run 1 - CC	061-1001.D	061-1002.D	0907-60R.	10.08	10.08	0.0	7.67	7.70	0.2	7.68	1	65.0	499	
Run 2 - CC	062-1101.D	062-1102.D	0907-60R.	10.08	10.07	0.1	3.38	3.37	0.1	3.37	10	40.0	1,349	
Run 3 - CC	063-1201.D	063-1202.D	0907-60R.	10.09	10.07	0.1	2.54	2.50	0.6	2.52	10	61.0	1,537	
HPLC Blank	064-1301.D	064-1302.D	0907-60R.	NA	NA	NA	0.0622	0.0622	0.0	0.0622	1	47.0	2.92	ND
HPLC Lab Blank	064-1301.D	064-1302.D	0907-60R.	NA	NA	NA	0.0622	0.0622	0.0	0.0622	1	1.00	0.0622	ND
MS/Run 1 - CC	065-1401.D	065-1402.D	0907-60R.	10.07	10.08	0.1	9.74	9.70	0.2	9.72	1	0.525	5.10	

Spike Amount (ug)	1.25
Native Amount (ug)	3.84
Spike Recovery (%)	101%

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	Air Sampling Associates
Analyst	KEH
Parameters	HPLC/IC Analysis
# Samples	3 Runs & 1 blank

Client #	07-057
Job #	0907-56
PO #	Verbal
Report Date	September 27, 2007

Custody

Erin Ortiz of Enthalpy Analytical, Inc. received the samples on 9/13/2007 at 23.4 °C after being relinquished by Air Sampling Associates. The blank was also received by Erin Ortiz, at a temperature of 17.4 °C on 9/17/07, after being relinquished by Air Sampling Associates. The samples were received in good condition. Prior to and during analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for sulfate using an Agilent Model 1100, High Performance Liquid Chromatograph ("Curly"). The analyzer was equipped as follows:

Front: DIONEX ED40 Electrochemical Detector
Front: dionex Ion Pac AS14A, 4 x 250 mm (S/N 005275)

Calibration

The calibration curve(s) are located in the back of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method 0707-07.M is included in the Curve/QA Chromatograms section of this report.

Blanks

A blank sample (***HPLC blank***) was received and analyzed along with the samples. No blank corrections were made to any of the associated sample results.

QC Notes

A 0.500-mL aliquot of ***Run 1 - CC*** was spiked with 1.25 µg of sulfate (50 µL of a 50 µg/mL solution). The spiked sample was analyzed in the same manner as the samples and exhibited 101% recovery.

Reporting Notes

None

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. reports, unless specifically noted otherwise.

- The symbol ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot confim the presence of the analyte of interest reliably.
- The symbol ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The symbol ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The symbol ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The symbol ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point.
- The symbol ***DF*** represents a Dilution Factor. This number represents dilutions during the extraction and/or laboratory stages of sample treatment. The analytical result taken from a laboratory instrument is multiplied by the DF to get final results.
- The Sample ID ***MS*** represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix prohibits analysis for the analyte(s).
- The Sample ID ***MSD*** represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times. Most methods performed by Enthalpy do not require analysis of an MSD.
- The Sample ID ***BS*** represents a Blind Spike. A member of the Quality Assurance department has created BS samples for many of the analytes Enthalpy tests for, and only QA and the Enthalpy Analytical ownership have access to the actual values of these samples. The laboratory analyzes them without knowledge of the actual value, and the spreadsheets get completed for these samples solely by the QA group.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Whenever spikes are prepared for our clients more spikes are prepared than needed. The extras (randomly chosen) are kept in-house at the appropriate temperature conditions. When the spike samples come back from the client for analysis, the LCSs (usually two are saved) are analyzed to confirm that the analyte could be recovered from the media, separate from the spike samples which were used on the project and which may have had issues caused during collection and/or transport.
- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed (specifically values of 1,000 or greater), the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits reported, but no confidence should be placed on more than three significant digits.

Sample Custody

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	Project No.	Page 4 of 4
ADA-ES	07-057	
Address	Unit No. Stack	Lab ASAI
City Hardin, State MT, Zip Code	Project Manager Bill Mullins	Lab Contact Bill Hefley
Run No. Runs 1,2 & 3	Test Method Controlled Condensate	Lab Phone No.

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Sulfates	Analysis: SO2
Run 1, Condenser Rinse	9/6/07	1330	HPLC Water	1		X	
Run 1, Impingers	9/6/07	1340	HPLC Water	1			X*
Run 2, Condenser Rinse	9/6/07	1605	HPLC Water	1		X	
Run 2, Impingers	9/6/07	1610	HPLC Water	1			X*
Run 3, Condenser Rinse	9/6/07	1747	HPLC Water	1		X	
Run 3, Impingers	9/6/07	1745	HPLC Water	1			X*
Probe Rinse	9/6/07	1755	HPLC Water	1		X*	
Thimble	9/6/07	1750	Thimble	1	No. 90	X*	

Special Instructions: *DID NOT RECEIVE 9/10/07 BPM

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 6 Months

	Date	Time		Date	Time
1. Recovered By: Billy J. Mullins Jr.	9/6/07	1800	1. Relinquished By: Billy J. Mullins Jr.	9/6/07	1830
2. Received By: [signature]	9/6/07	1830	2. Relinquished By: [signature]	9/8/07	1430
3. Received By: [signature]	9/12/07	1300	3. Relinquished By: [signature]	9/12/07	1300

Comments: SHIP RUNS 1,2,3 CONDENSER RINSE TO ENTHALPY VIA UPS RED 9/12/07

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

Rec'd for Enthalpy: 9.13.07 945

T° = 23.4°C

CHAIN OF CUSTODY

Project #: 07-057 **Date:** 9/13/07

Client: ADA-ES

Location: HARDIN, MT.

Unit: STACK

	Number of Containers	Absorbing Solution	Analysis Required
Filter Container			
Front Wash			
Back Wash			
Impinger #1			
Impinger #2			
Impinger #3			
Impinger #4			
Impinger #5			
Impinger #6			
Impinger #7			
Blank #1	1	HPLC BLANK	SULFATES
Blank #2			
Other			

Special Instructions

Sample # 1 Recovered by [signature] Date 9/13/07 Time 1115 Location ASAI

Sample # Recovered by Date Time Location

Sample # Recovered by Date Time Location

Sample # Recovered by Date Time Location

Samples Received by [signature] *for transport* Date 9/13/07 Time 1130

Samples Released by [signature] * Date 9/13/07 Time 1130

Samples Received by [signature] *at lab* Date 9.17.07 Time 933

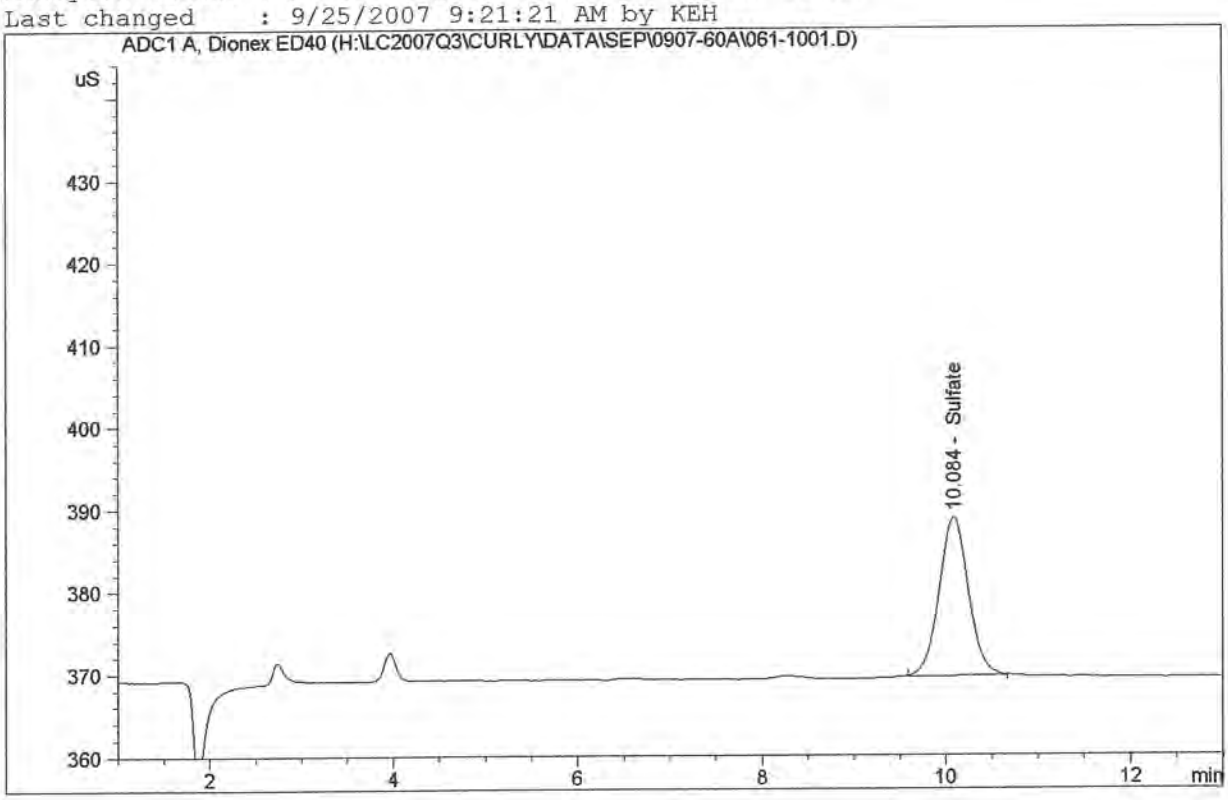
Samples Analyzed by T=17.4°C Date Time

* SHIP VIA UPS RED TO ENTHALPY 9/13/07

Sample Chromatograms

0907-56

Injection Date : 9/24/2007 8:19:23 PM Seq. Line : 10
Sample Name : Run 1 - CC Location : Vial 61
Acq. Operator : KEH Inj : 1
Acq. Instrument : Curly Inj Volume : 25 µl
Acq. Method : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed : 9/25/2007 9:21:21 AM by KEH



External Standard Report

Sorted By : Signal
Calib. Data Modified : Tuesday, September 25, 2007 9:21:18 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.084	BB	425.07446	1.80401e-2	7.66840		Sulfate

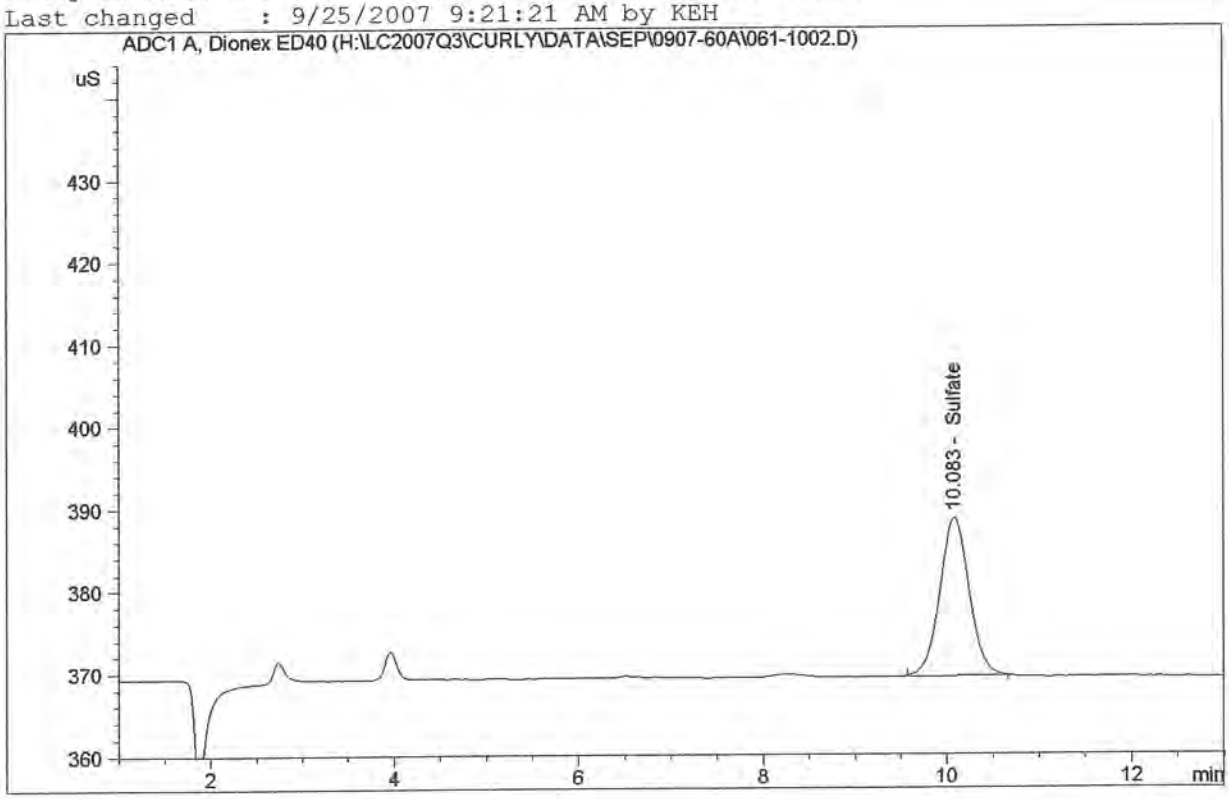
Totals : 7.66840

Results obtained with enhanced integrator!

*** End of Report ***

0907-56

```
==================================================================
Injection Date  : 9/24/2007 8:34:05 PM          Seq. Line :  10
Sample Name     : Run 1 - CC                     Location : Vial 61
Acq. Operator   : KEH                                Inj :   2
Acq. Instrument : Curly                        Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```

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==================================================================
                      External Standard Report
==================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

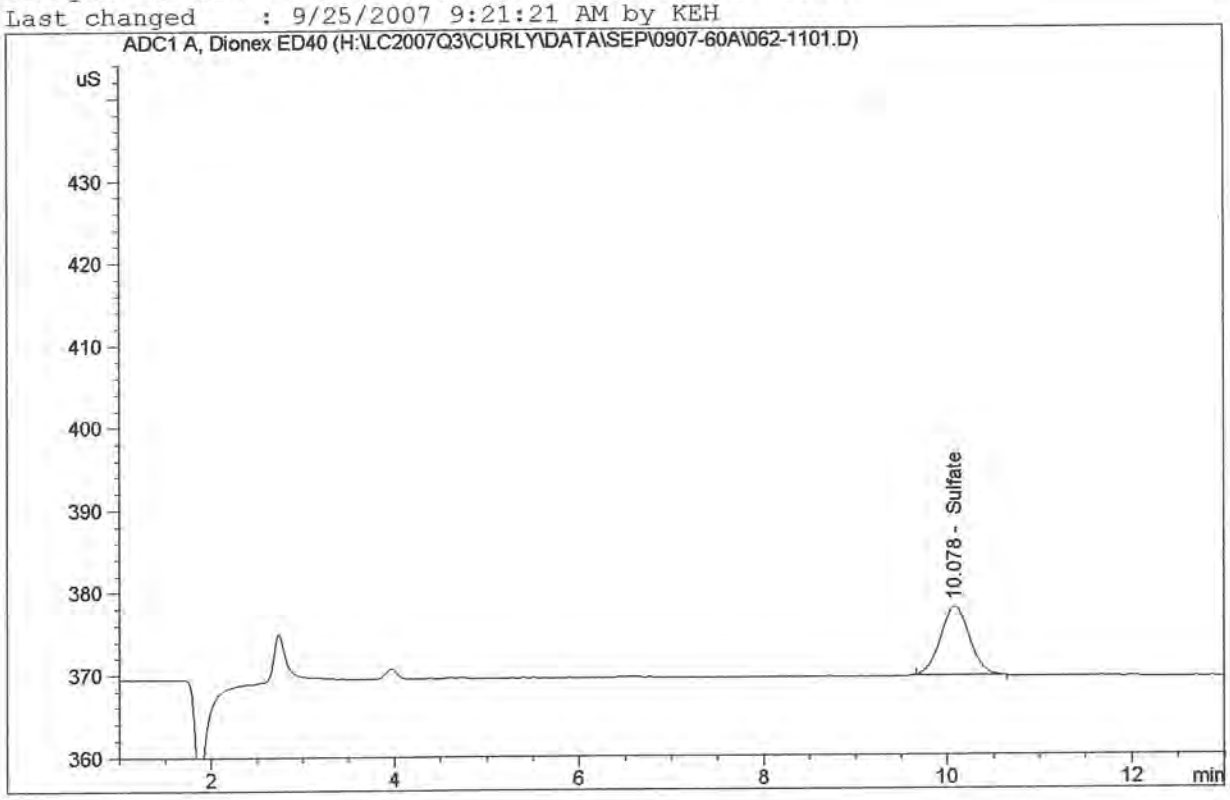
RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.083 BB      426.56271 1.80396e-2    7.69502     Sulfate

Totals :                                7.69502

 Results obtained with enhanced integrator!
==================================================================
                        *** End of Report ***
```

0907-56

Injection Date	: 9/24/2007 8:48:50 PM	Seq. Line :	11
Sample Name	: Run 2 - CC	Location :	Vial 62
Acq. Operator	: KEH	Inj :	1
Acq. Instrument	: Curly	Inj Volume :	25 µl
Acq. Method	: H:\LC2007Q3\CURLY\METHODS\0707-07.M		
Last changed	: 7/2/2007 5:15:05 PM by KEH		
Analysis Method	: H:\LC2007Q3\CURLY\METHODS\0907-60R.M		
Last changed	: 9/25/2007 9:21:21 AM by KEH		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Tuesday, September 25, 2007 9:21:18 AM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

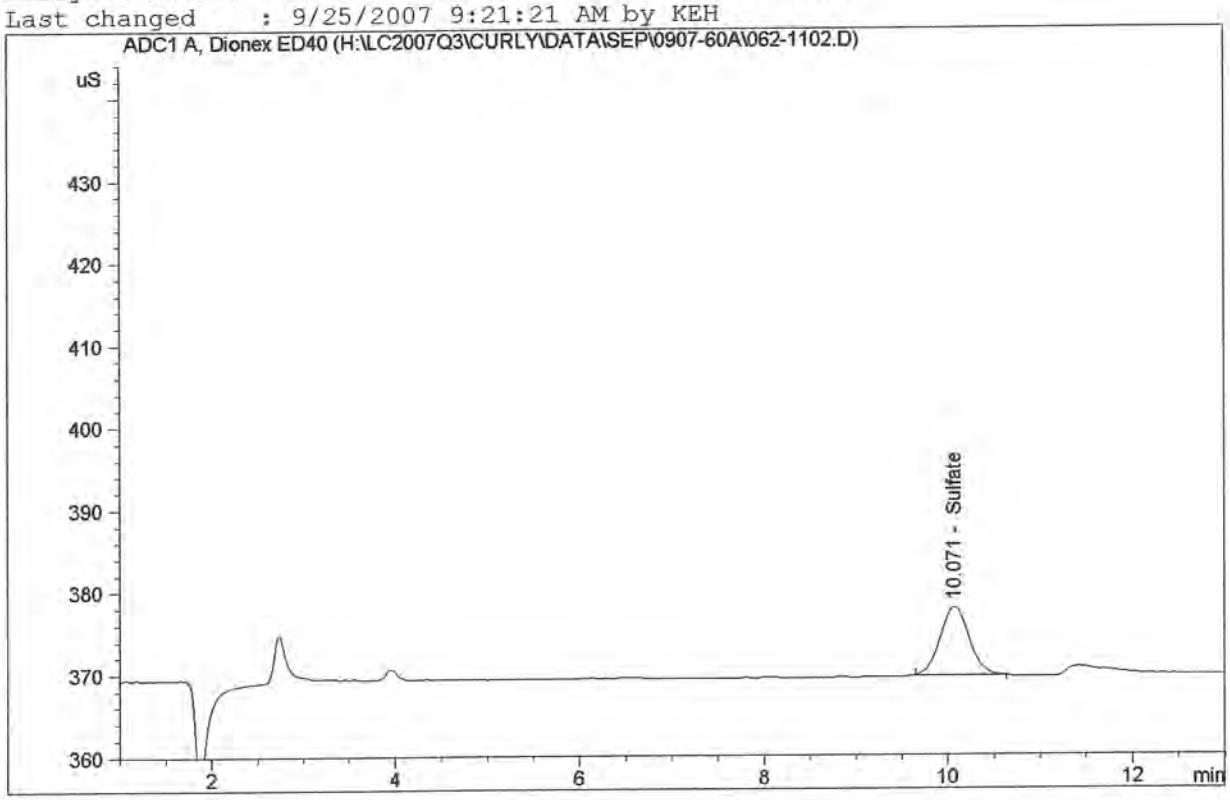
RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.078	BB	185.04147	1.82399e-2	3.37513		Sulfate
Totals :				3.37513		

Results obtained with enhanced integrator!

*** End of Report ***

0907-56

Injection Date : 9/24/2007 9:03:36 PM Seq. Line : 11
Sample Name : Run 2 - CC Location : Vial 62
Acq. Operator : KEH Inj : 2
Acq. Instrument : Curly Inj Volume : 25 µl
Acq. Method : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed : 9/25/2007 9:21:21 AM by KEH



External Standard Report

Sorted By : Signal
Calib. Data Modified : Tuesday, September 25, 2007 9:21:18 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.071	BB	184.67760	1.82406e-2	3.36862		Sulfate

Totals : 3.36862

Results obtained with enhanced integrator!

*** End of Report ***

0907-56

```
==========================================================================
Injection Date  : 9/24/2007 9:18:22 PM          Seq. Line :  12
Sample Name     : Run 3 - CC                     Location : Vial 63
Acq. Operator   : KEH                                Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
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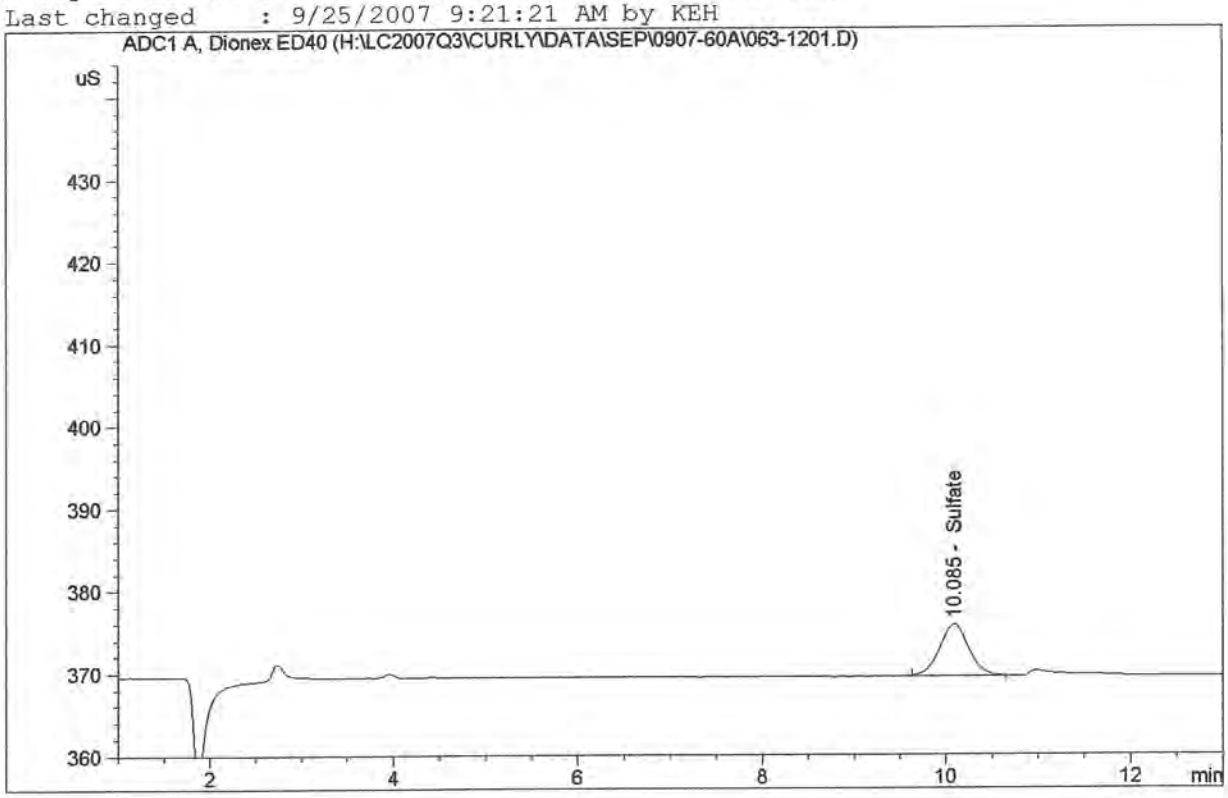


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==========================================================================
                        External Standard Report
==========================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

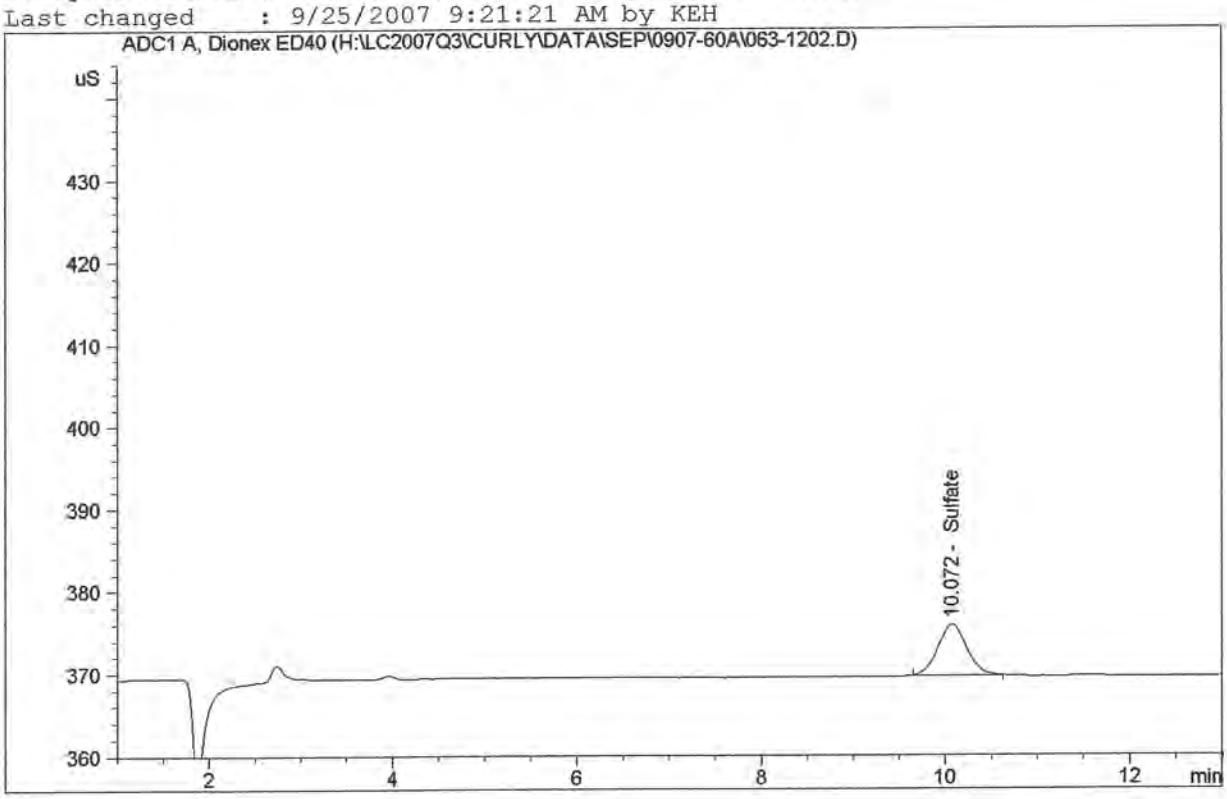
RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.085 BB      138.09756 1.83601e-2    2.53549    Sulfate

Totals :                                2.53549

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

0907-56

```
==========================================================================
Injection Date  : 9/24/2007 9:33:09 PM          Seq. Line :  12
Sample Name     : Run 3 - CC                     Location : Vial 63
Acq. Operator   : KEH                                Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```

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==========================================================================
                        External Standard Report
==========================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

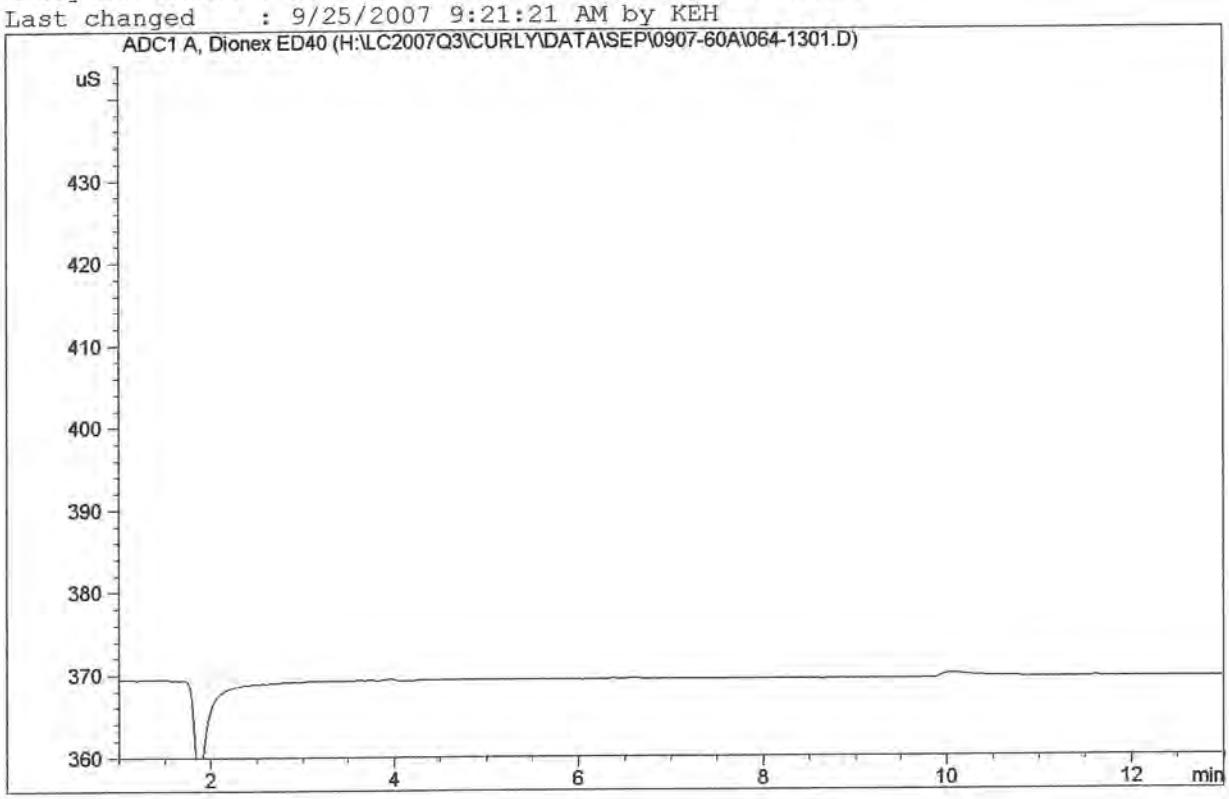
RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.072 BB      136.30301 1.83663e-2    2.50339     Sulfate

Totals :                                2.50339

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

0907-56 Sample Blank

```
==========================================================================
Injection Date  : 9/24/2007 9:47:52 PM          Seq. Line :  13
Sample Name     : HPLC Blank                     Location : Vial 64
Acq. Operator   : KEH                                Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```

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==========================================================================
                        External Standard Report
==========================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.090            -          -          -          Sulfate

Totals :                                 0.00000

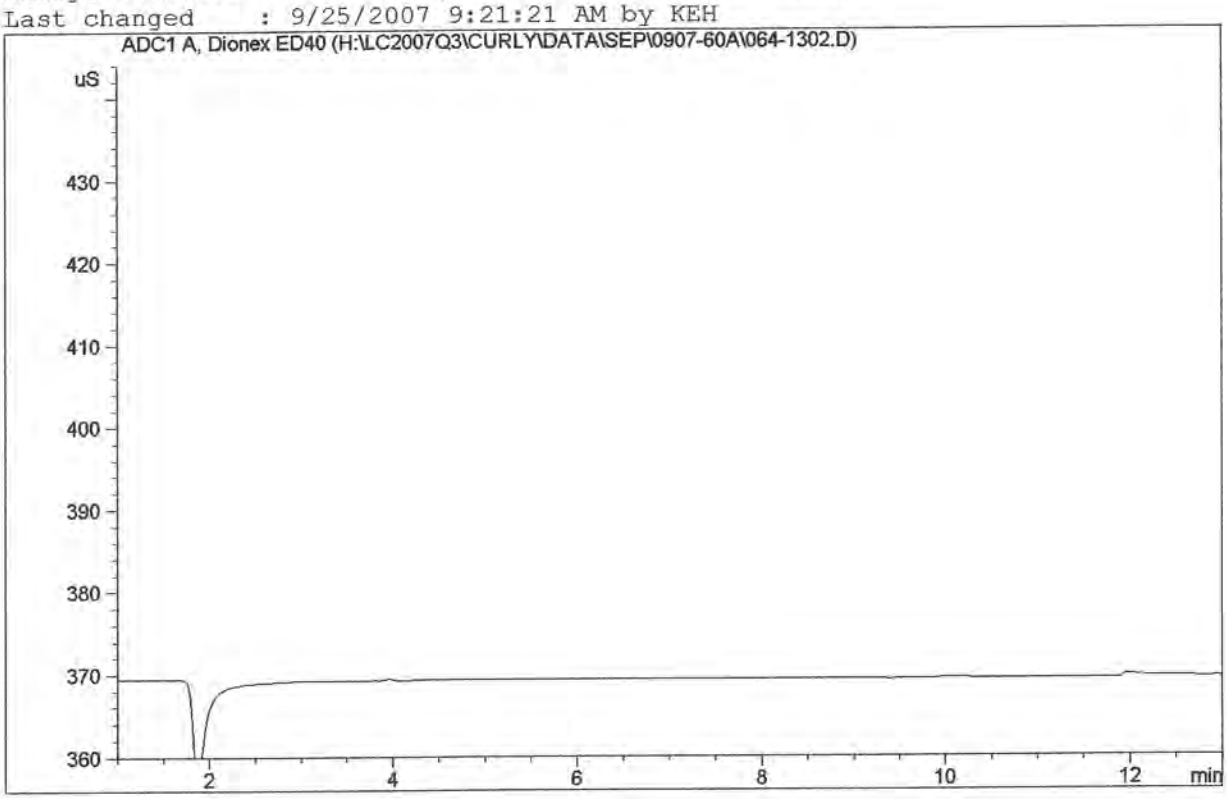
 Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========================================================================
```

0907-56 Sample Blank

```
==================================================================
Injection Date  : 9/24/2007 10:02:26 PM          Seq. Line :  13
Sample Name     : HPLC Blank                      Location : Vial 64
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```

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==================================================================
                      External Standard Report
==================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.090            -          -          -          Sulfate

Totals :                                 0.00000

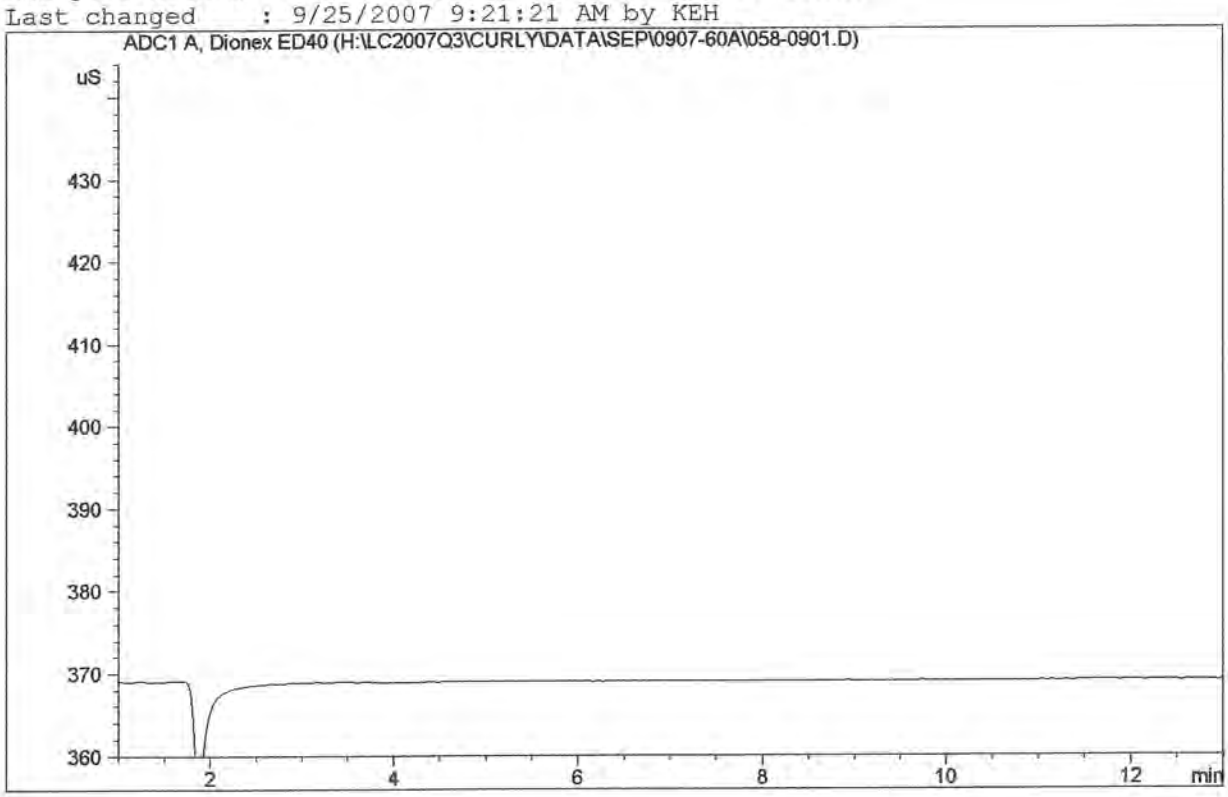
 Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==================================================================
```

Lab Blank DI H2O

```
==========================================================================
Injection Date  : 9/24/2007 7:49:53 PM          Seq. Line :   9
Sample Name     : DI H2O                         Location : Vial 58
Acq. Operator   : KEH                                Inj :   1
Acq. Instrument : Curly                        Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.090            -          -          -          Sulfate

Totals :                                 0.00000

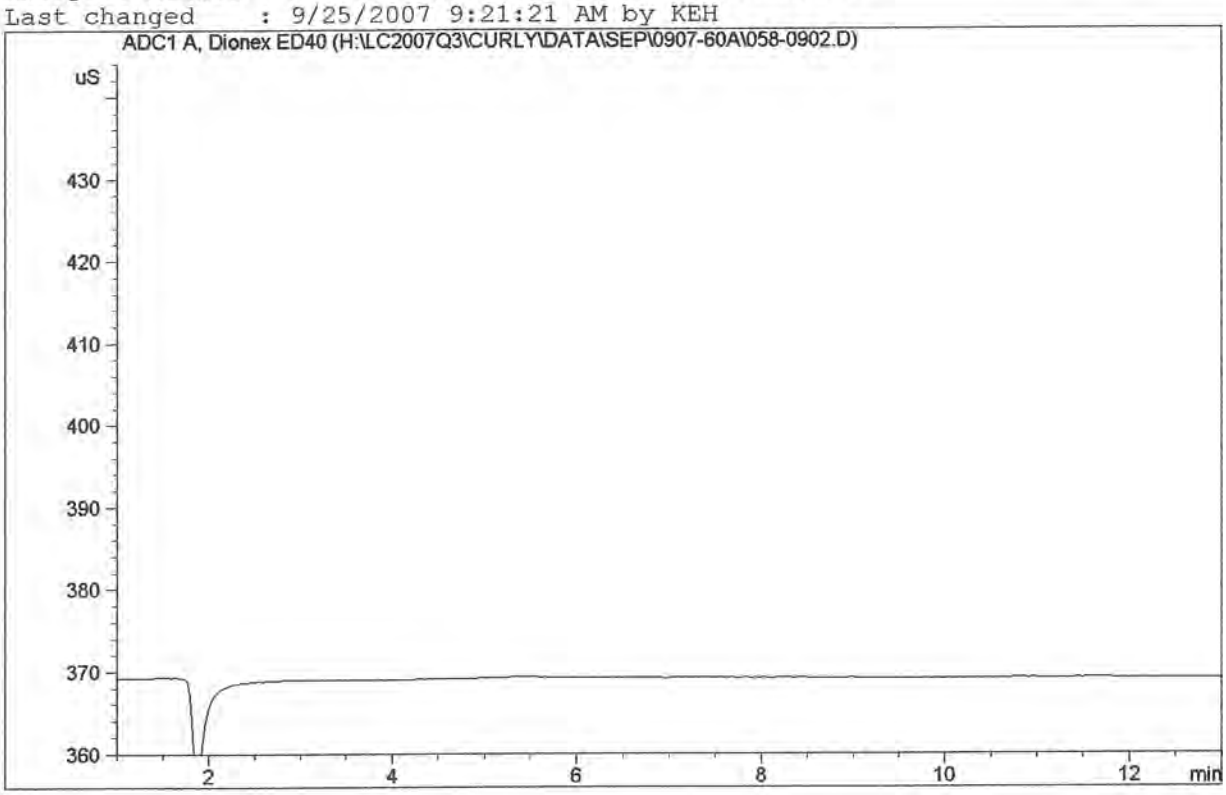
 Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========================================================================
```

Lab Blank DI H2O

```
==================================================================
Injection Date  : 9/24/2007 8:04:39 PM          Seq. Line :   9
Sample Name     : DI H2O                         Location : Vial 58
Acq. Operator   : KEH                                Inj :   2
Acq. Instrument : Curly                        Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==================================================================
                      External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.090            -          -          -          Sulfate

Totals :                                 0.00000

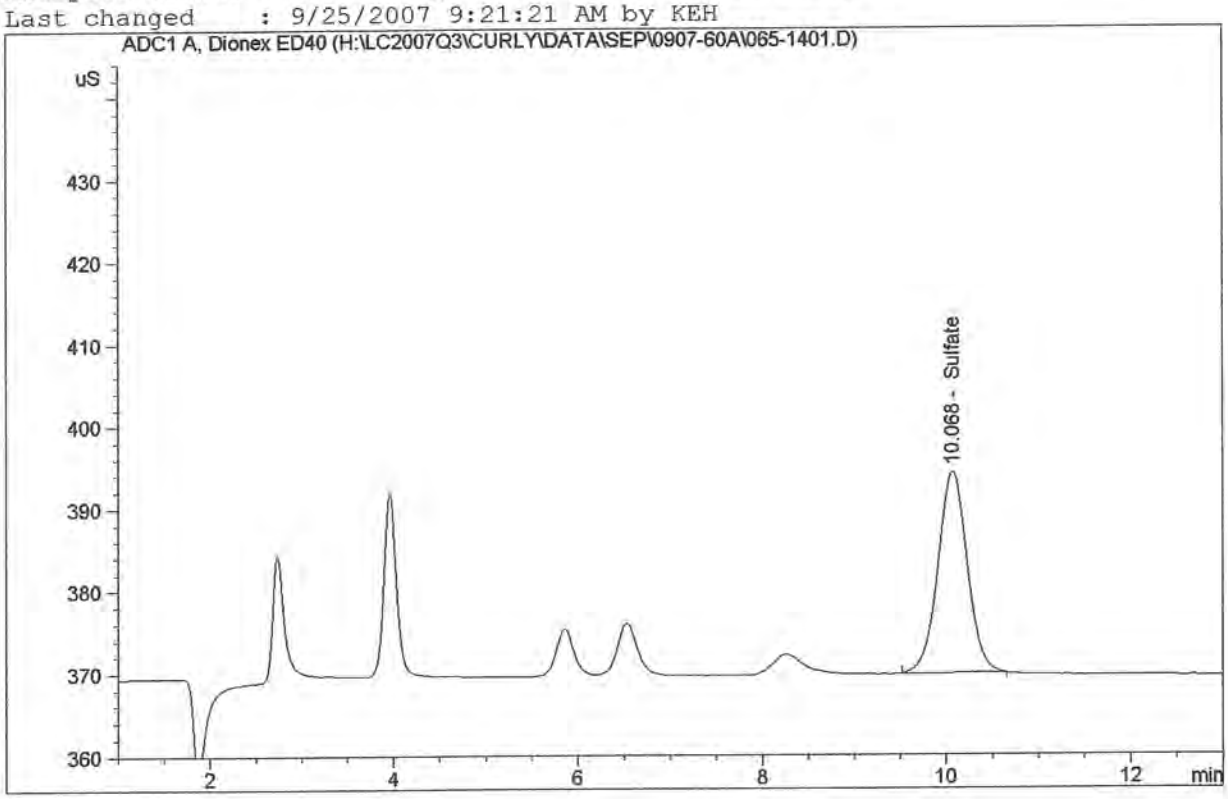
 Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==================================================================
```

0907-56 Matrix Spike

```
==========================================================================
Injection Date  : 9/24/2007 10:17:18 PM          Seq. Line :  14
Sample Name     : MS/Run 1 - CC                   Location : Vial 65
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

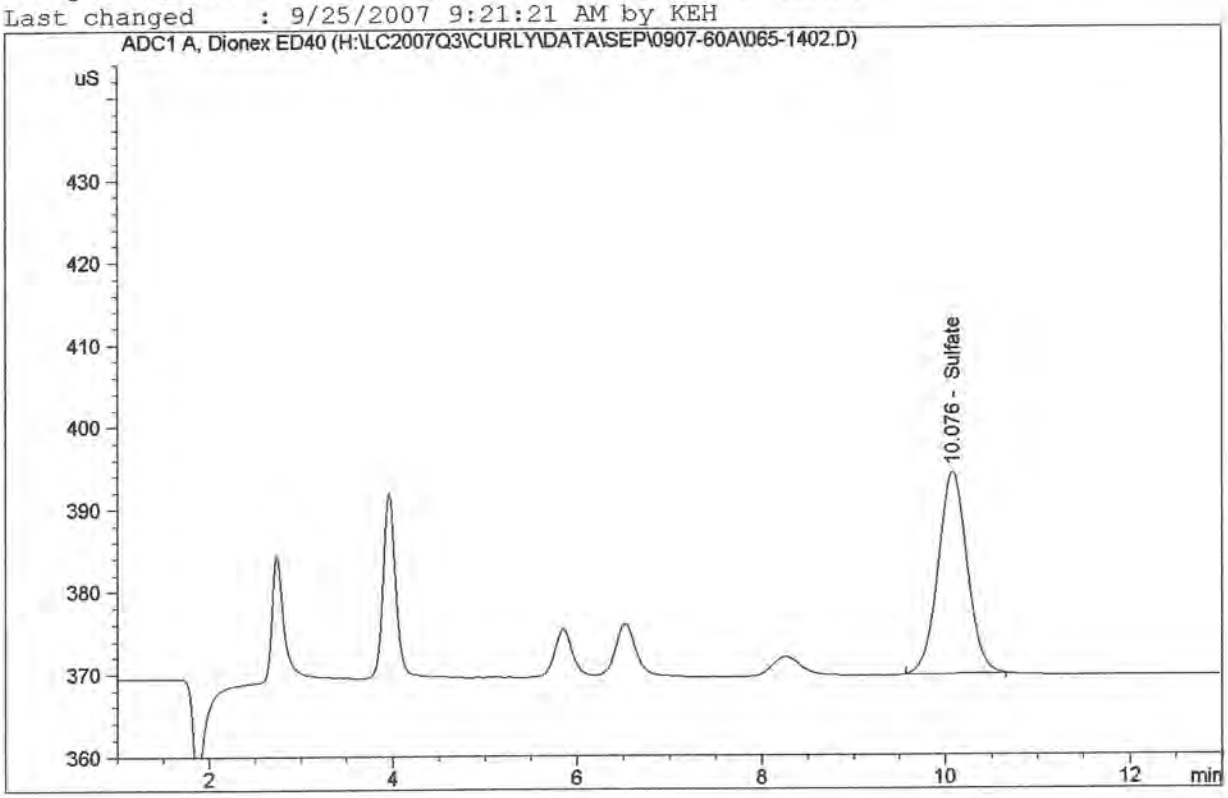
RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.068 BB      540.99268 1.80071e-2    9.74173     Sulfate

Totals :                                 9.74173

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

0907-56 Matrix Spike

```
==================================================================
Injection Date  : 9/24/2007 10:32:02 PM          Seq. Line :  14
Sample Name     : MS/Run 1 - CC                   Location : Vial 65
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==================================================================
                    External Standard Report
==================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.076 BB      538.86975 1.80076e-2    9.70376     Sulfate

Totals :                                 9.70376

 Results obtained with enhanced integrator!
==================================================================
                        *** End of Report ***
```

Curve(s)/QA Point(s) Chromatograms

Calibration Table

Calib. Data Modified : Tuesday, September 25, 2007 9:21:18 AM

Calculate : External Standard
Based on : Peak Area

Rel. Reference Window : 15.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 15.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : Yes, identified peaks are recalibrated
Correct All Ret. Times: No, only for identified peaks

Curve Type : Linear
Origin : Connected
Weight : Linear (Amnt)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

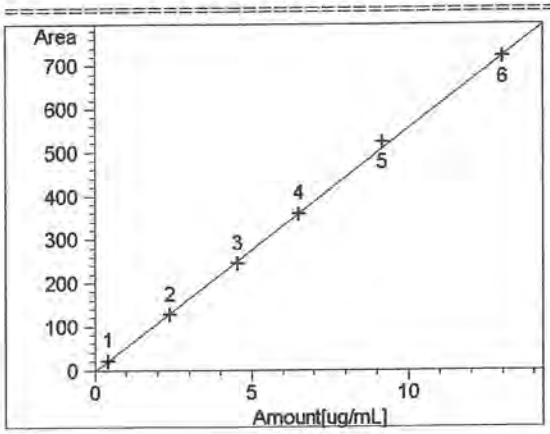
Signal 1: ADC1 A, Dionex ED40

RetTime [min]	Lvl Sig		Amount [ug/mL]	Area	Amt/Area	Ref	Grp	Name
10.090	1	1	4.34000e-1	21.32083	2.03557e-2			Sulfate
		2	2.38000	126.41281	1.88272e-2			
		3	4.55000	244.52789	1.86073e-2			
		4	6.52000	359.12700	1.81551e-2			
		5	9.18000	523.70706	1.75289e-2			
		6	13.00000	719.25635	1.80742e-2			

Peak Sum Table

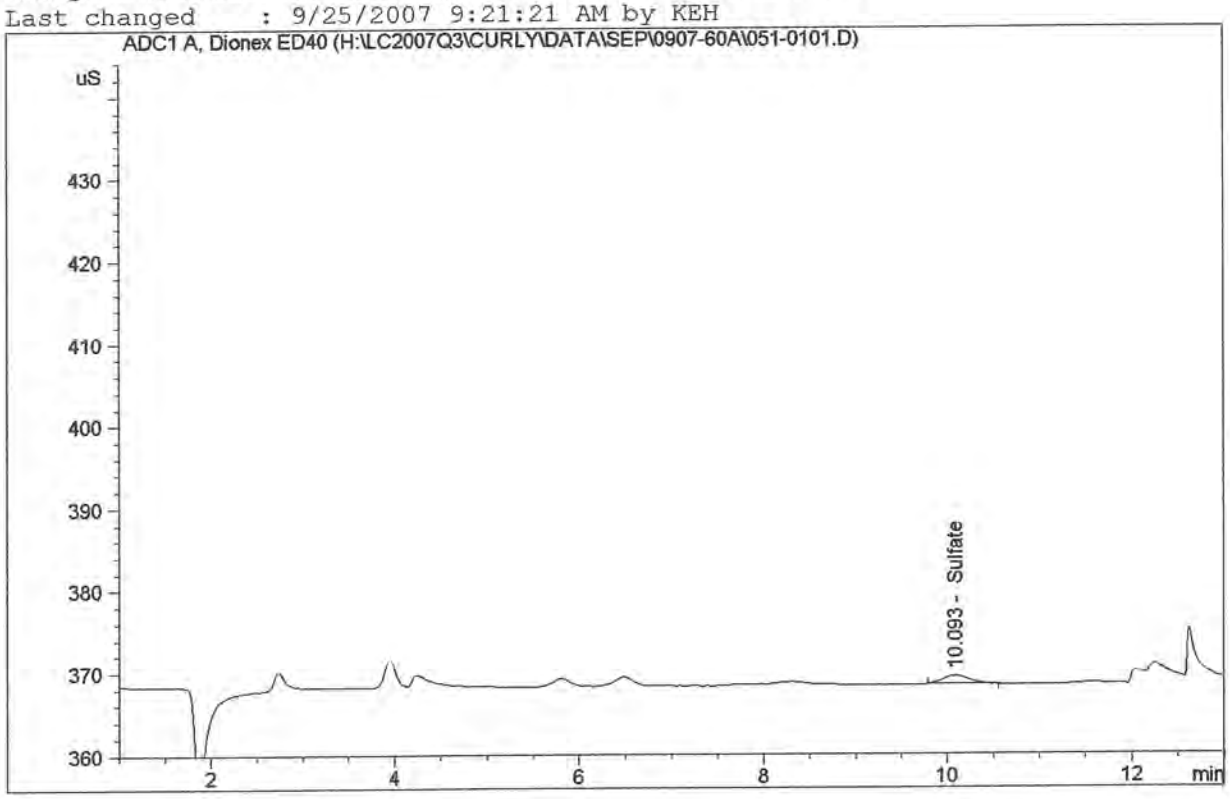
No Entries in table

Calibration Curves



Sulfate at exp. RT: 10.090
ADC1 A, Dionex ED40
Correlation: 0.99977
Residual Std. Dev.: 8.14782
Formula: y = mx + b
m: 55.90915
b: -3.65928
x: Amount[ug/mL]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.182353
Level 3 : 0.095385
Level 4 : 0.066564
Level 5 : 0.047277
Level 6 : 0.033385

```
==========================================================================
Injection Date  : 9/24/2007 3:54:03 PM          Seq. Line :   1
Sample Name     : Standard 1                     Location : Vial 51
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

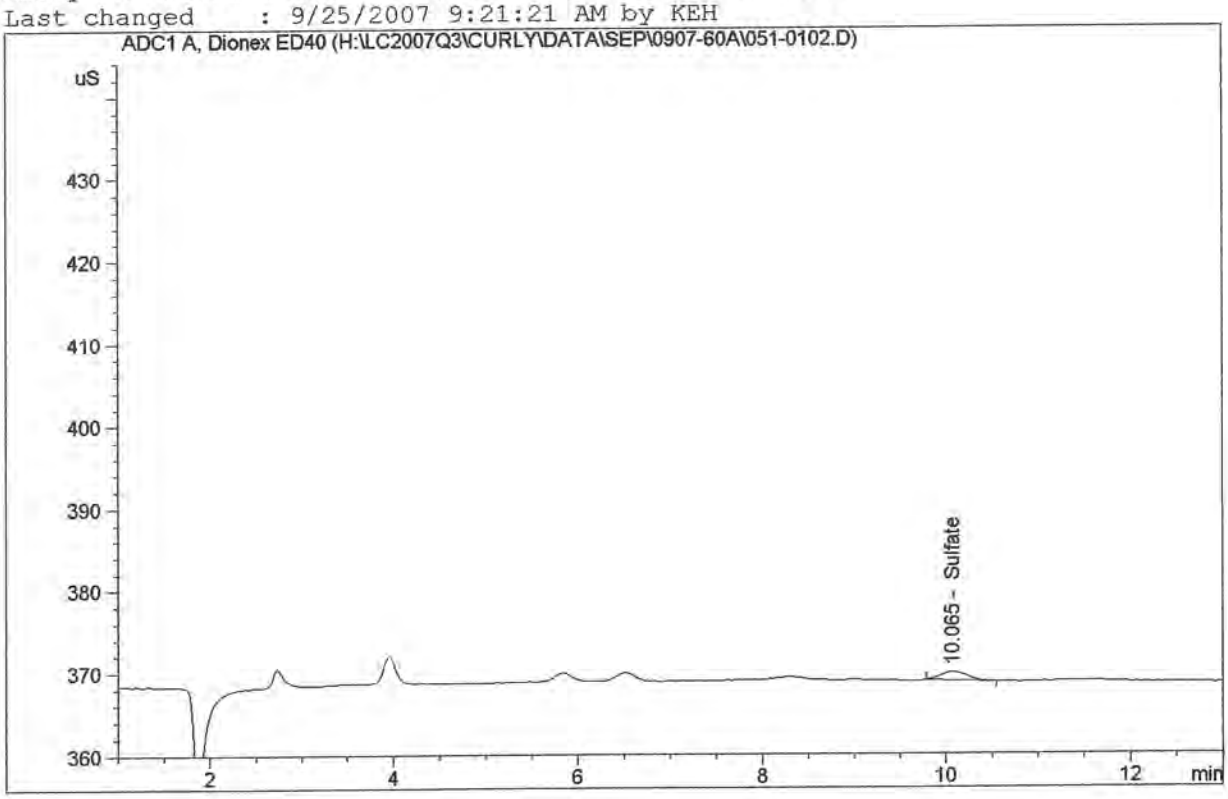
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.093 BP       20.81991 2.10298e-2 4.37839e-1     Sulfate

Totals :                                4.37839e-1

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 4:08:38 PM          Seq. Line :   1
Sample Name     : Standard 1                     Location : Vial 51
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

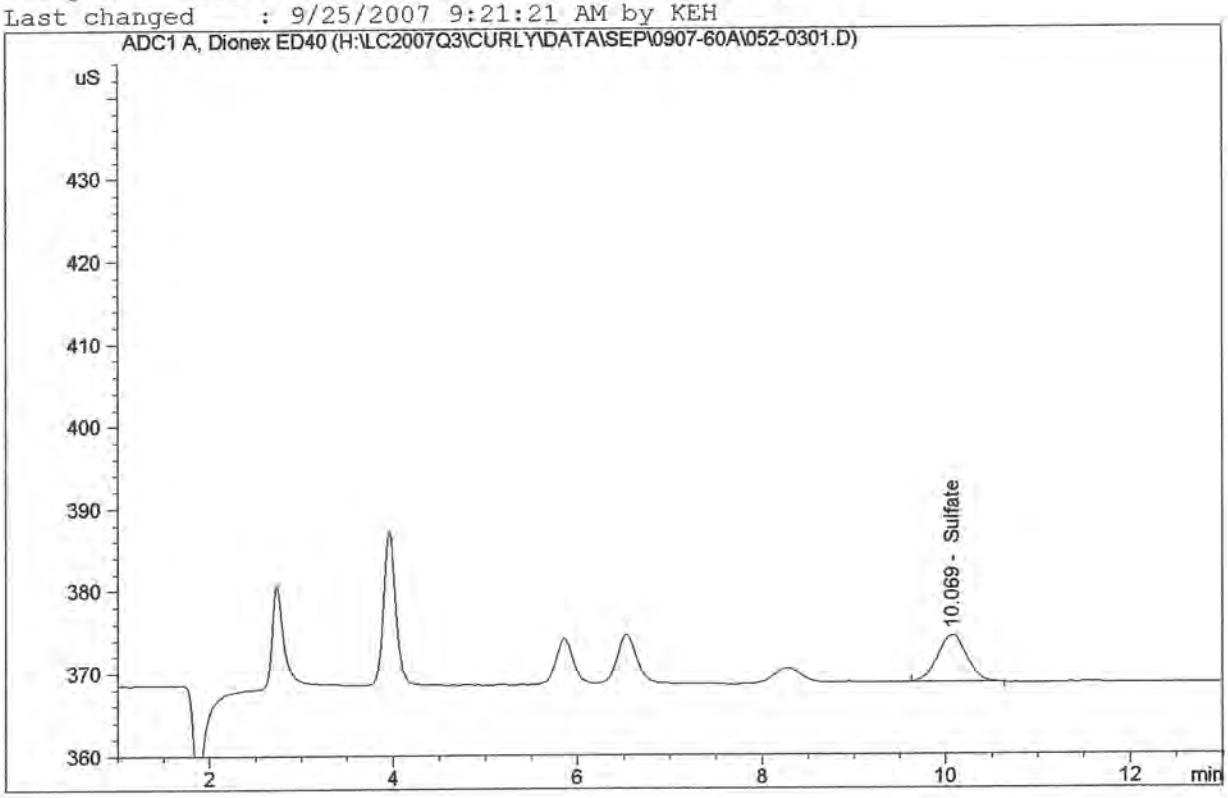
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.065 BP       21.82175 2.08855e-2 4.55758e-1     Sulfate

Totals :                              4.55758e-1

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 4:52:56 PM          Seq. Line :   3
Sample Name     : Standard 2                     Location : Vial 52
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

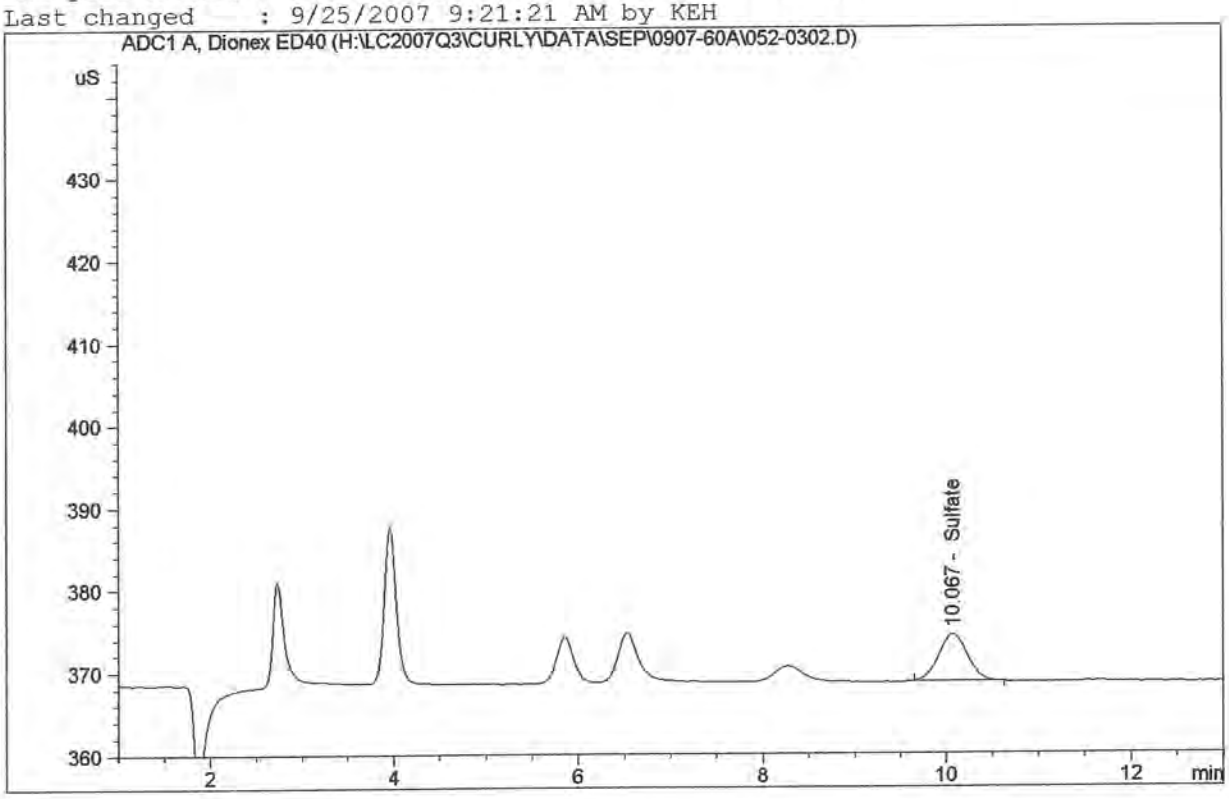
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.069 BB      126.60550 1.84031e-2    2.32994     Sulfate

Totals :                                2.32994

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 5:07:40 PM          Seq. Line :   3
Sample Name     : Standard 2                     Location : Vial 52
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

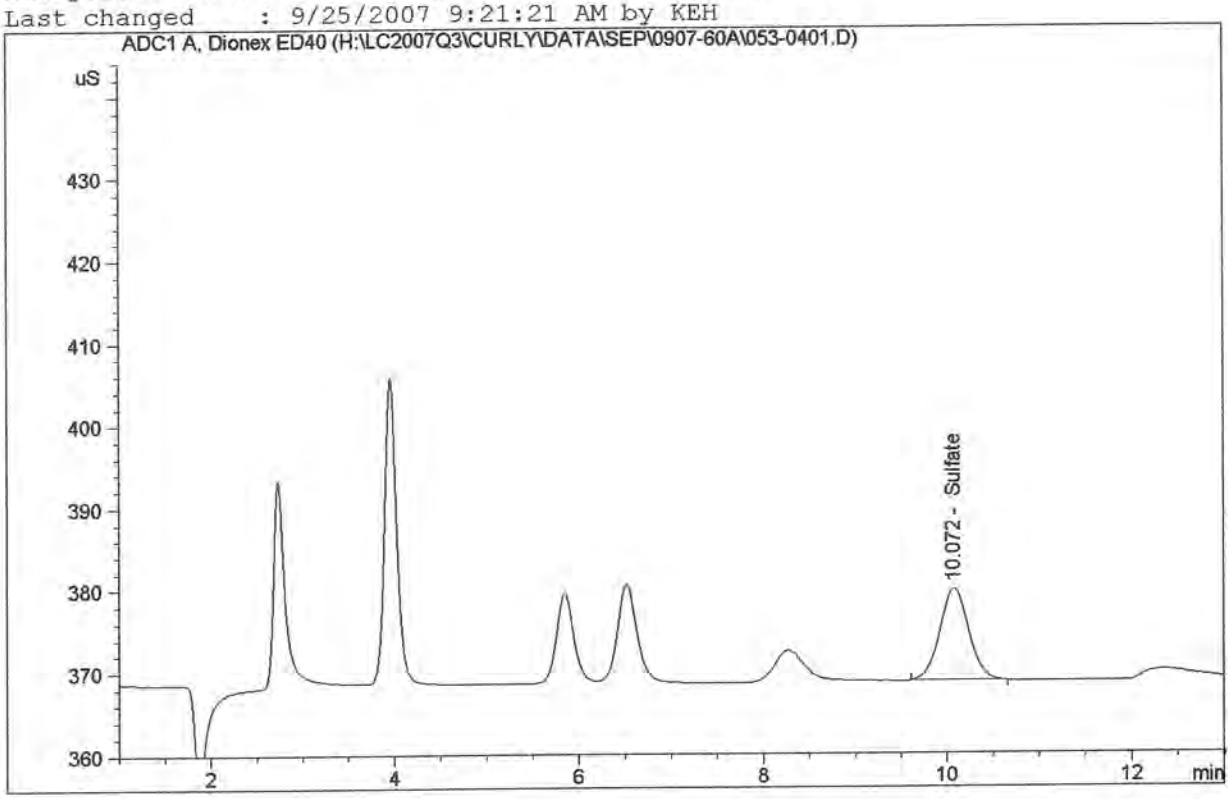
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.067 BB      126.22012 1.84047e-2    2.32304     Sulfate

Totals :                                2.32304

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 5:22:24 PM          Seq. Line :   4
Sample Name     : Standard 3                     Location : Vial 53
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

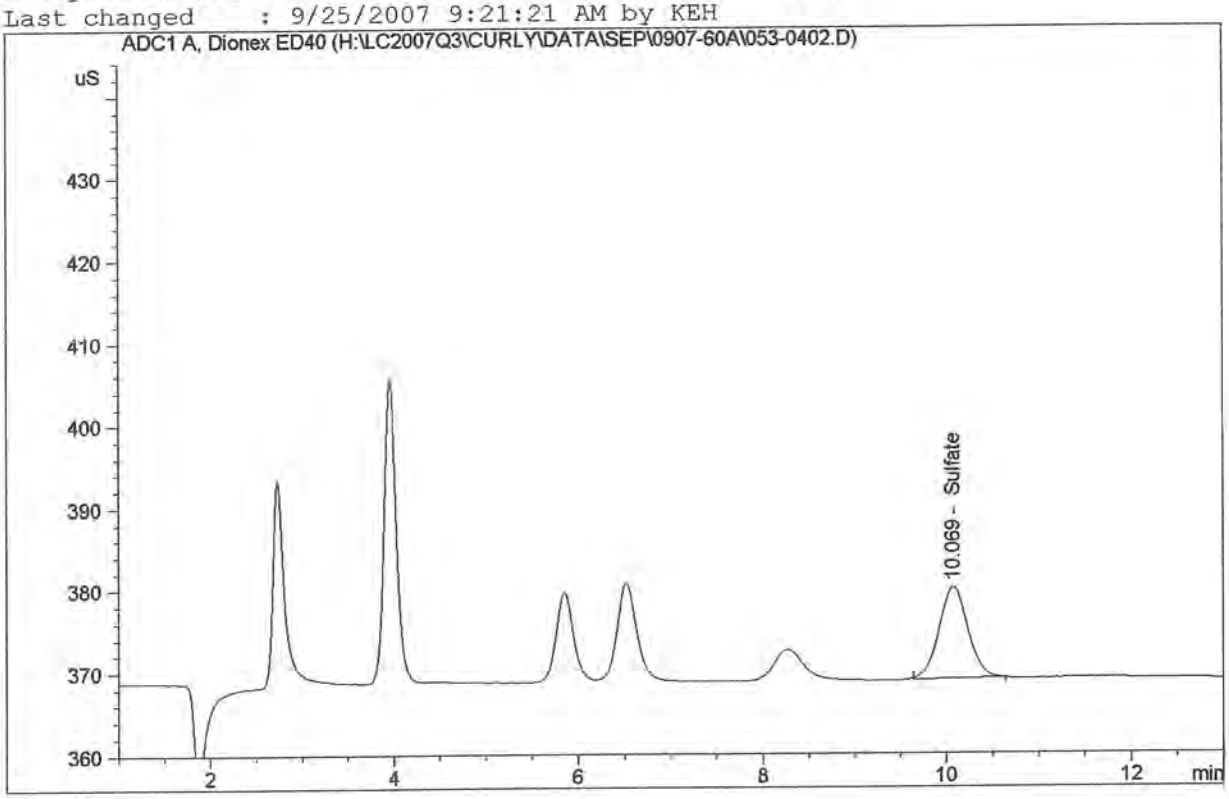
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
 10.072 BB      246.49857 1.81517e-2    4.47436    Sulfate

Totals :                                4.47436

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 5:37:11 PM          Seq. Line :   4
Sample Name     : Standard 3                     Location : Vial 53
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

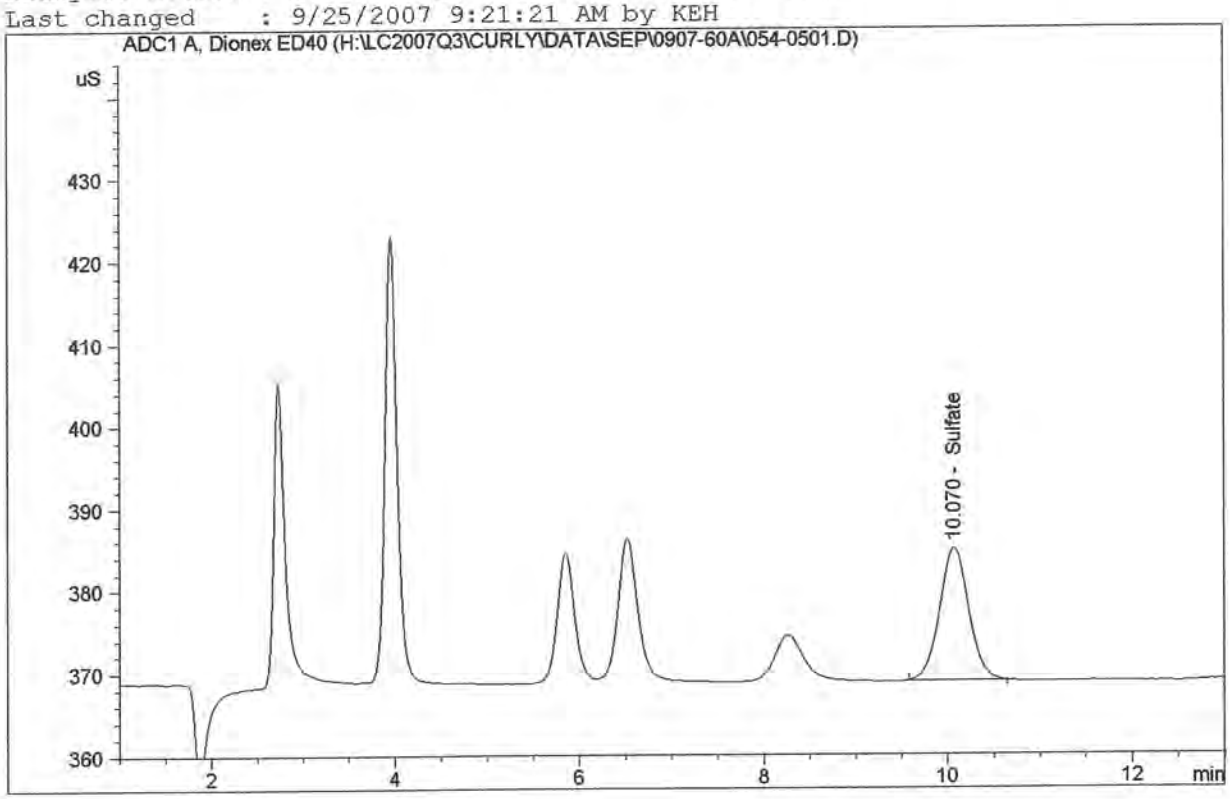
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.069 BB      242.55721 1.81560e-2    4.40387     Sulfate

Totals :                                4.40387

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 5:51:55 PM          Seq. Line :   5
Sample Name     : Standard 4                     Location : Vial 54
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

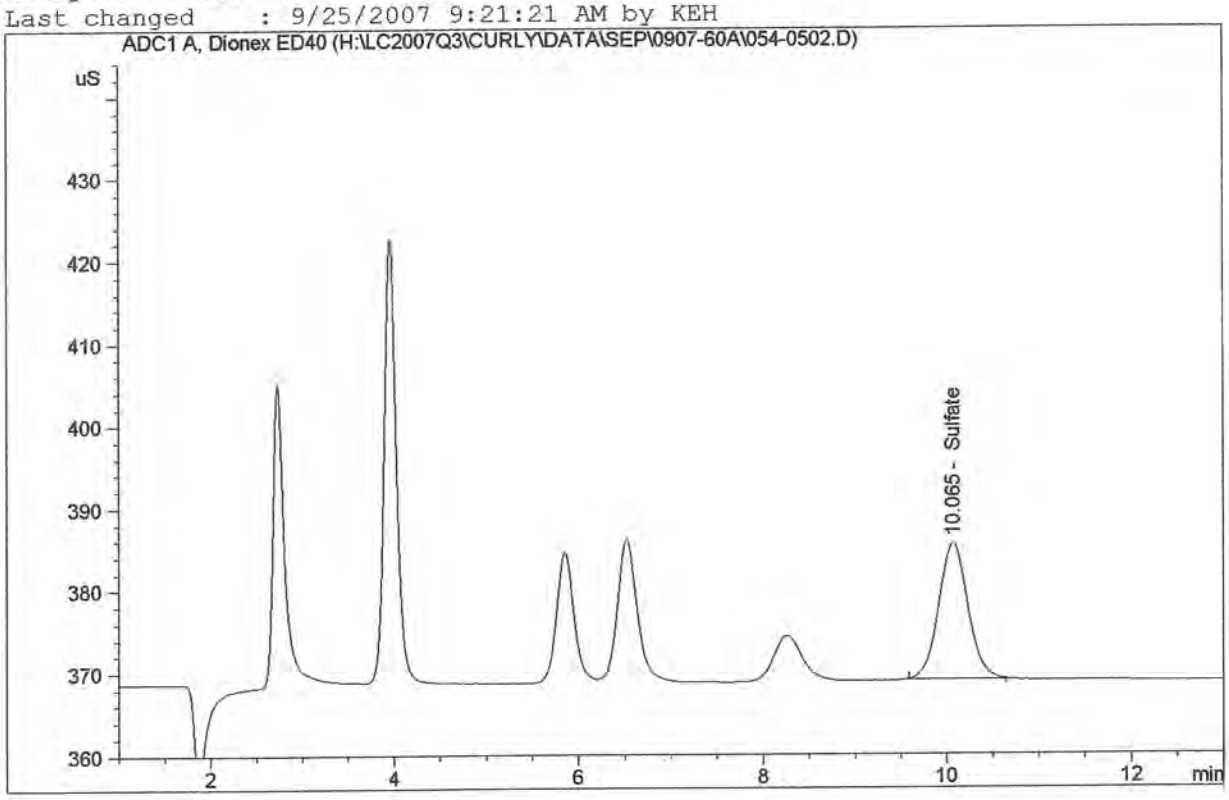
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.070 BB      353.34619 1.80714e-2    6.38546     Sulfate

Totals :                                 6.38546

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 6:06:39 PM          Seq. Line :   5
Sample Name     : Standard 4                     Location : Vial 54
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

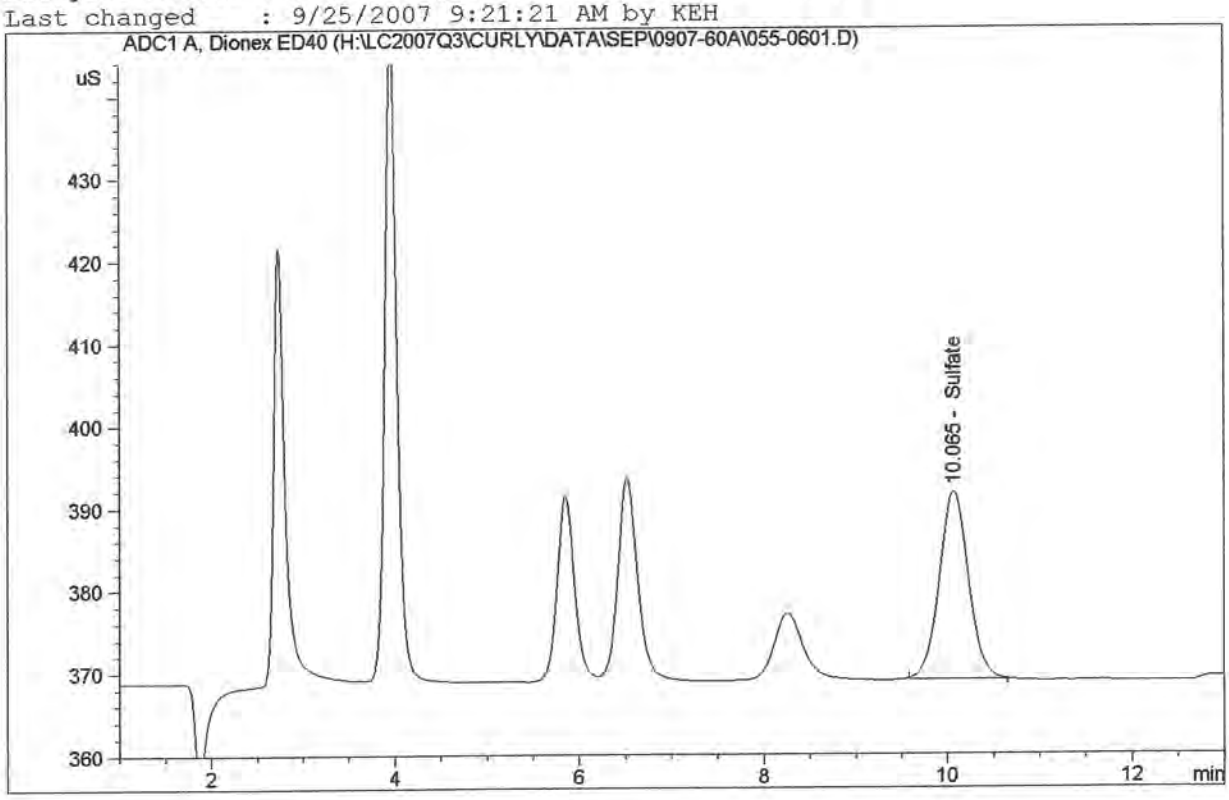
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
 10.065 BB      364.90781 1.80655e-2    6.59225     Sulfate

Totals :                                6.59225

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 6:21:24 PM          Seq. Line :   6
Sample Name     : Standard 5                     Location : Vial 55
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

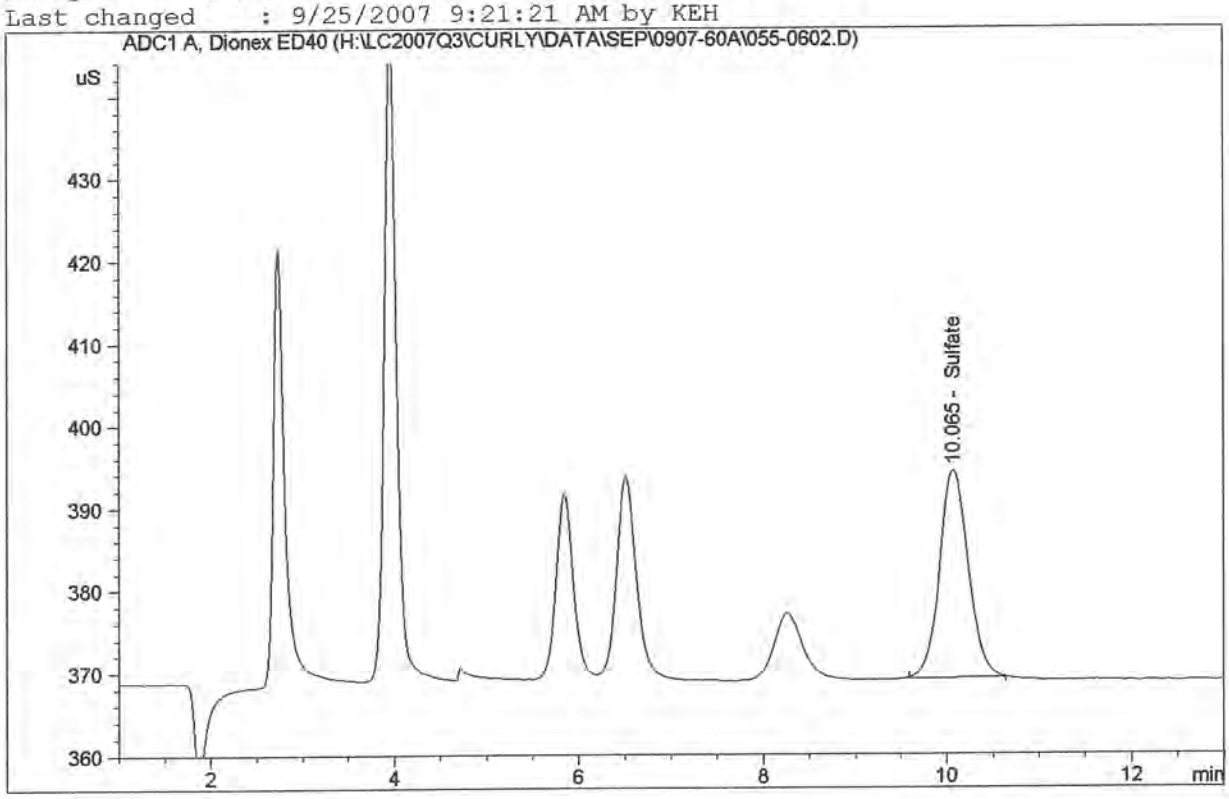
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.065 BB      500.21545 1.80170e-2    9.01238    Sulfate

Totals :                                9.01238

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 6:36:11 PM          Seq. Line :   6
Sample Name     : Standard 5                     Location : Vial 55
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

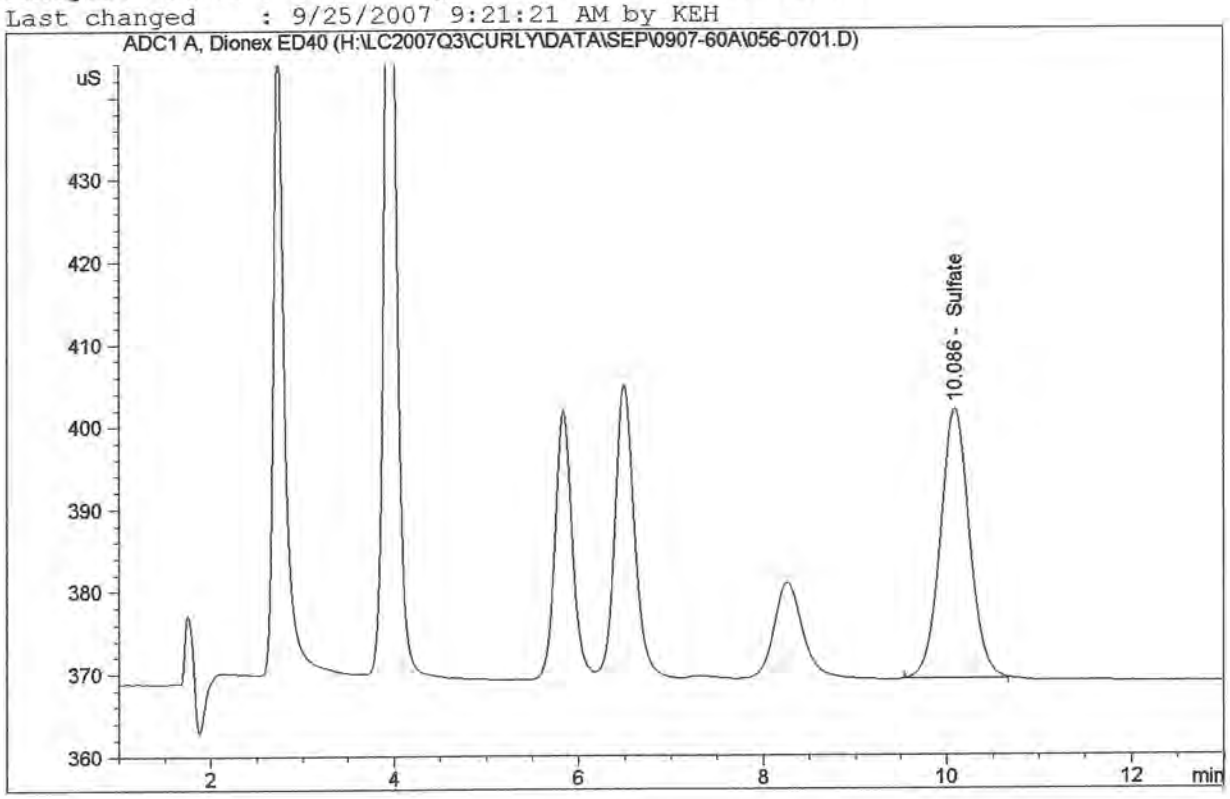
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.065 BB      547.19867 1.80058e-2    9.85273     Sulfate

Totals :                                9.85273

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 6:50:54 PM          Seq. Line :   7
Sample Name     : Standard 6                     Location : Vial 56
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

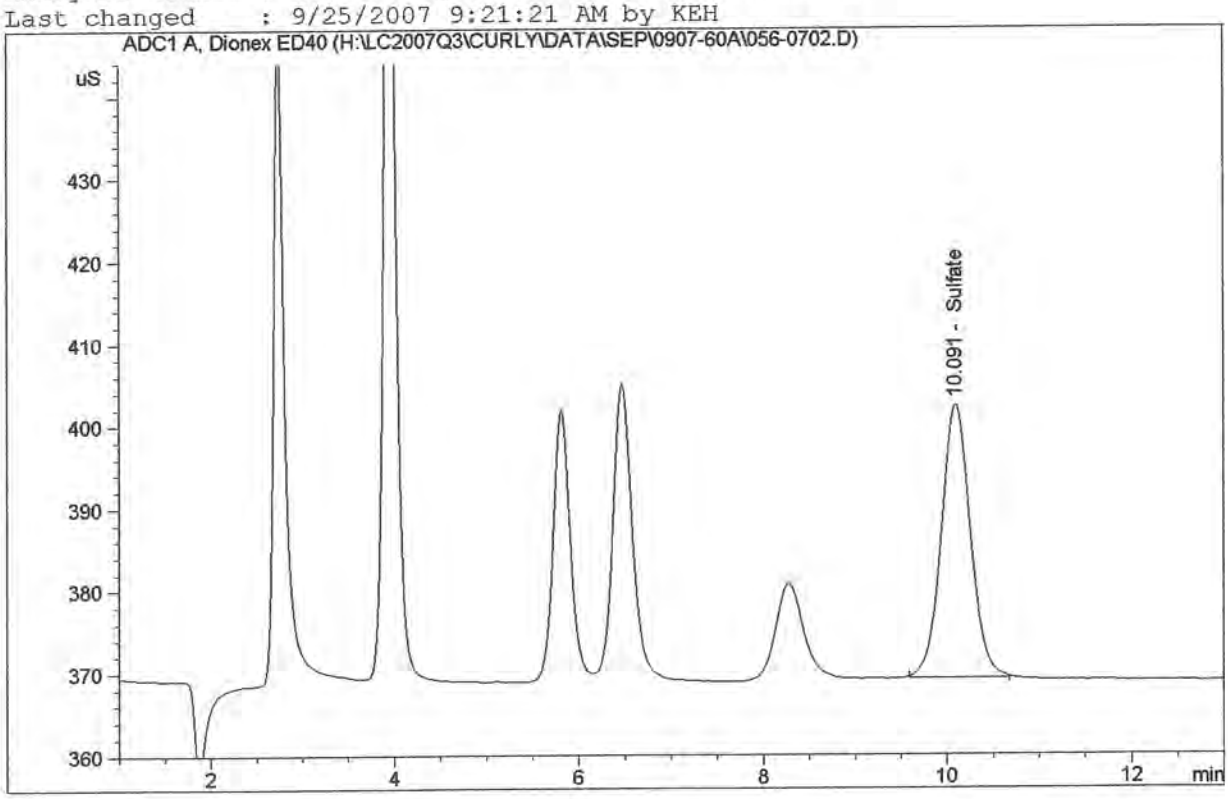
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.086 BB      716.32819 1.79775e-2   12.87781     Sulfate

Totals :                                12.87781

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==================================================================
Injection Date  : 9/24/2007 7:05:37 PM          Seq. Line :   7
Sample Name     : Standard 6                     Location : Vial 56
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==================================================================
                      External Standard Report
==================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

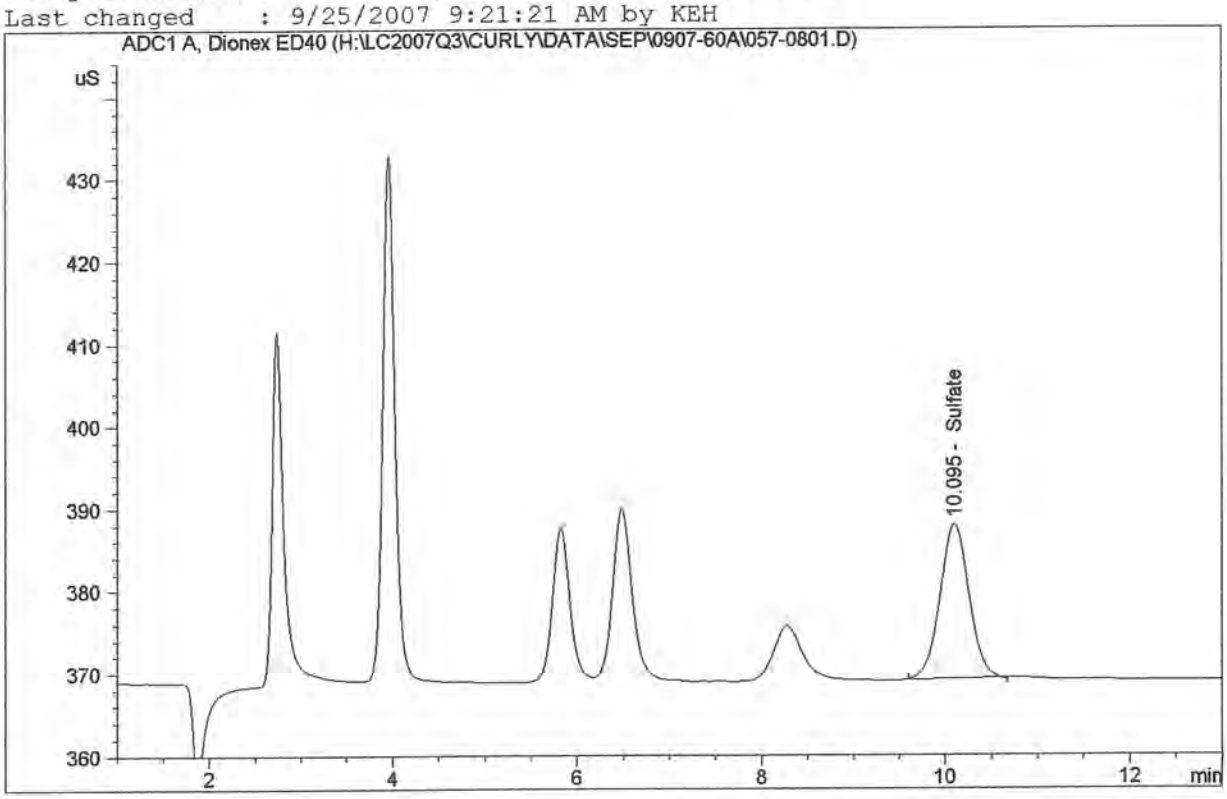
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.091 BB      722.18451 1.79768e-2   12.98256     Sulfate

Totals :                                12.98256

 Results obtained with enhanced integrator!
==================================================================
                     *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 7:20:23 PM          Seq. Line :   8
Sample Name     : Second Source                  Location : Vial 57
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Curly                        Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

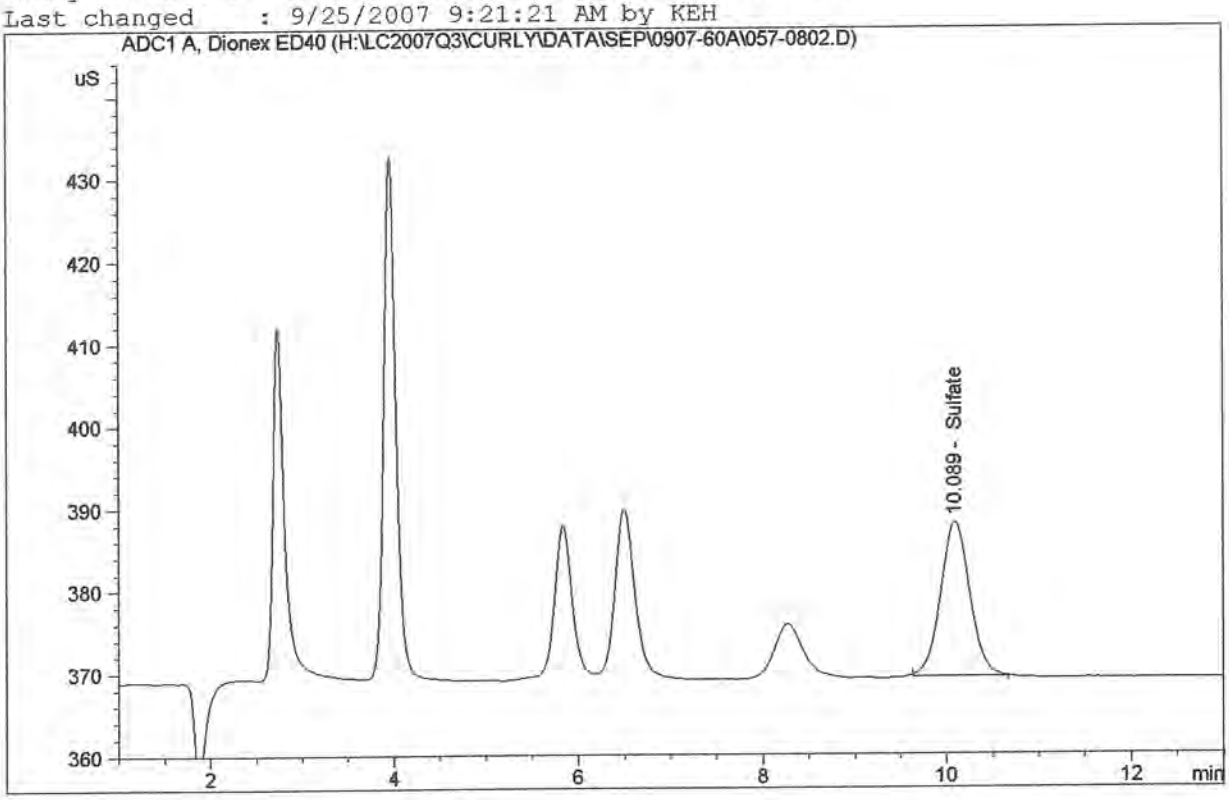
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.095 BP      408.34015 1.80464e-2    7.36909    Sulfate

Totals :                                7.36909

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 7:35:09 PM          Seq. Line :   8
Sample Name     : Second Source                  Location : Vial 57
Acq. Operator   : KEH                                Inj :   2
Acq. Instrument : Curly                        Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

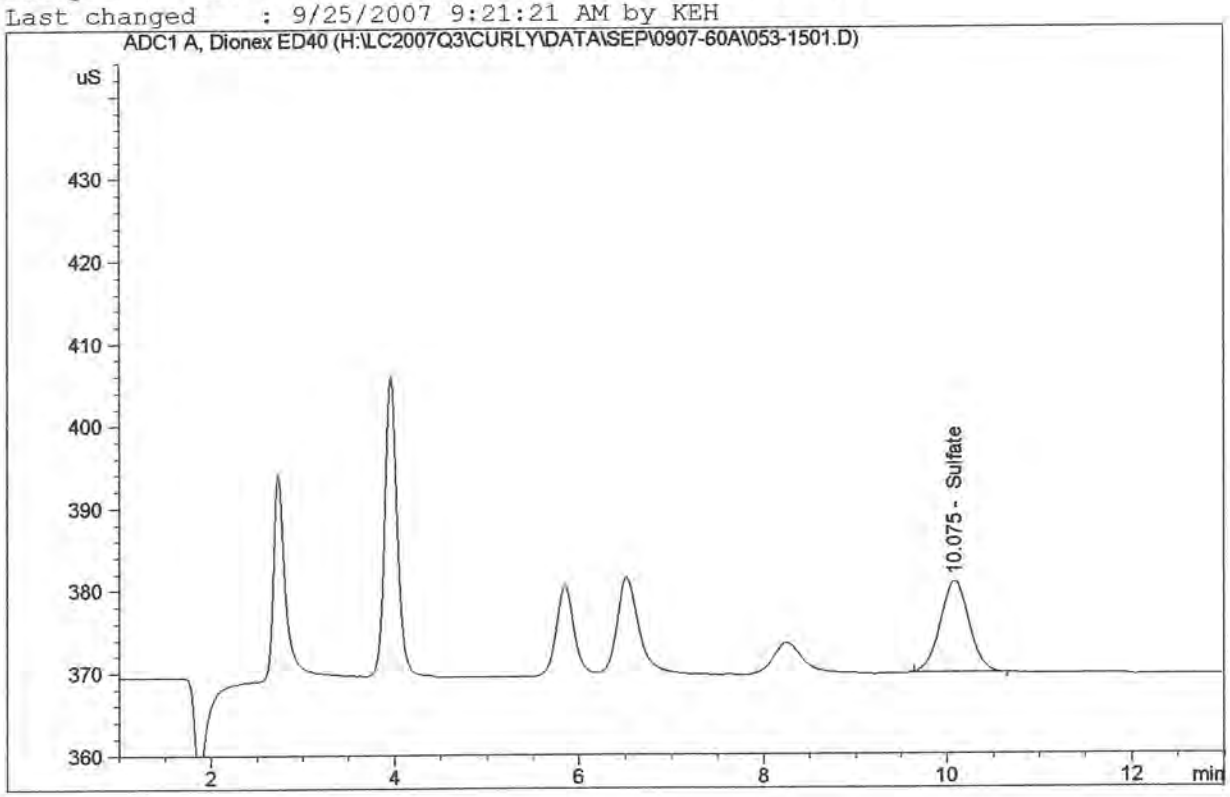
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.089 BB      412.65063 1.80448e-2    7.44619     Sulfate

Totals :                                7.44619

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 10:46:48 PM          Seq. Line :  15
Sample Name     : Standard 3                      Location : Vial 53
Acq. Operator   : KEH                                  Inj :   1
Acq. Instrument : Curly                          Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

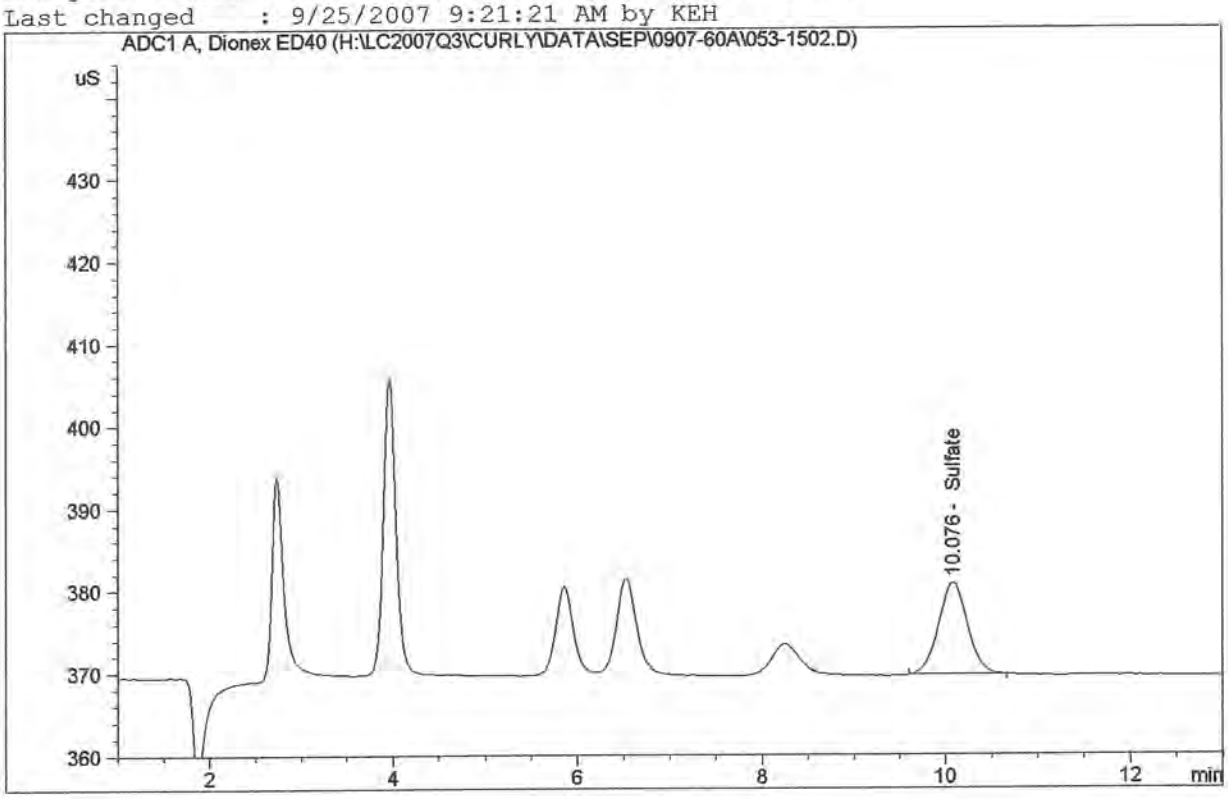
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.075 BB      241.27536 1.81574e-2    4.38094     Sulfate

Totals :                                4.38094

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/24/2007 11:01:34 PM          Seq. Line :  15
Sample Name     : Standard 3                      Location : Vial 53
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                          Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

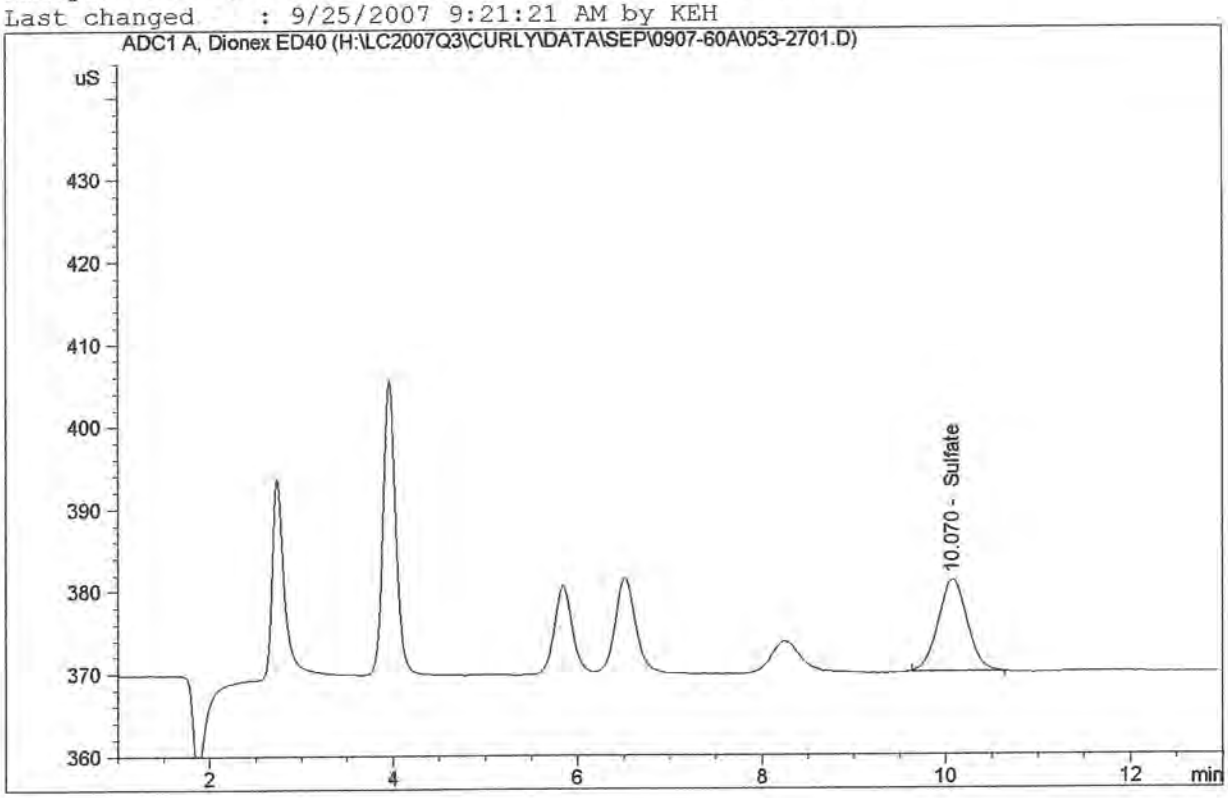
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.076 BB      244.91853 1.81534e-2    4.44610     Sulfate

Totals :                                4.44610

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/25/2007 4:40:48 AM          Seq. Line :  27
Sample Name     : Standard 3                     Location : Vial 53
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

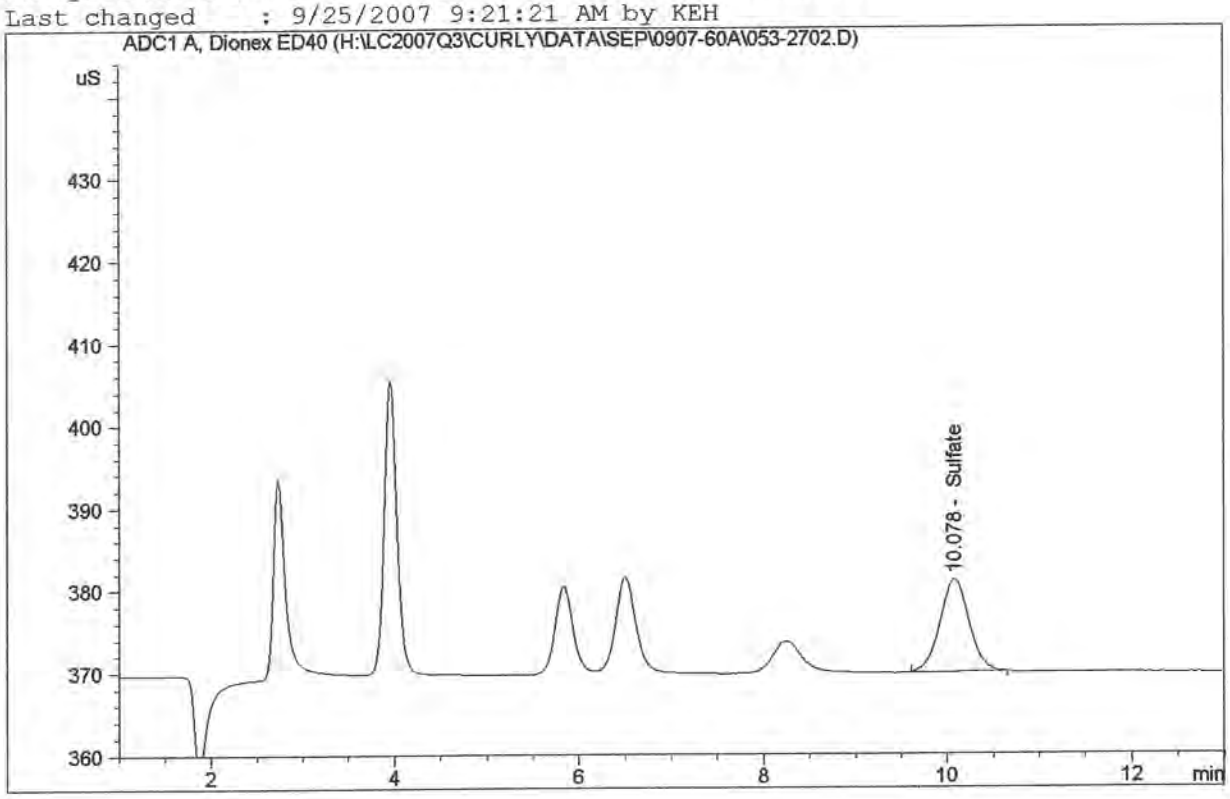
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.070 BB      246.38435 1.81518e-2    4.47232     Sulfate

Totals :                                4.47232

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/25/2007 4:55:31 AM          Seq. Line :  27
Sample Name     : Standard 3                     Location : Vial 53
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

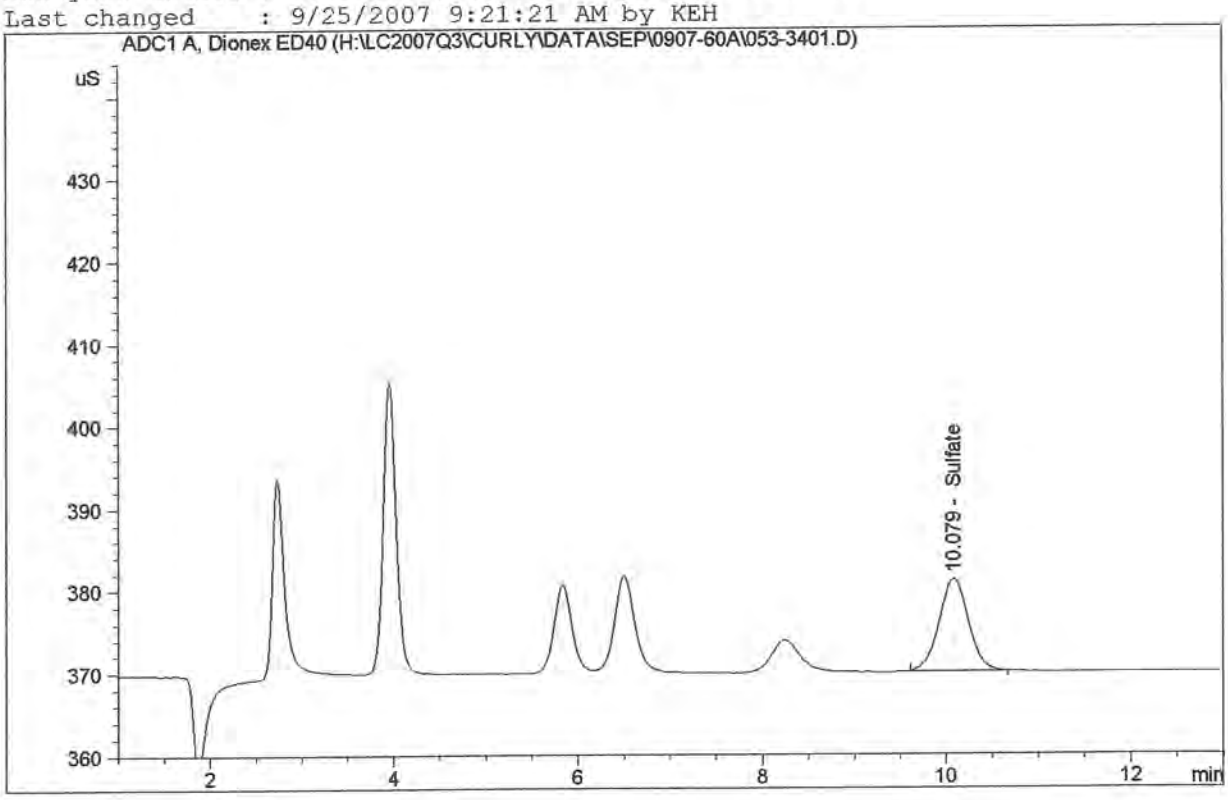
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.078 BB      248.84175 1.81492e-2    4.51627     Sulfate

Totals :                                4.51627

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/25/2007 8:07:15 AM          Seq. Line :  34
Sample Name     : Standard 3                     Location : Vial 53
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

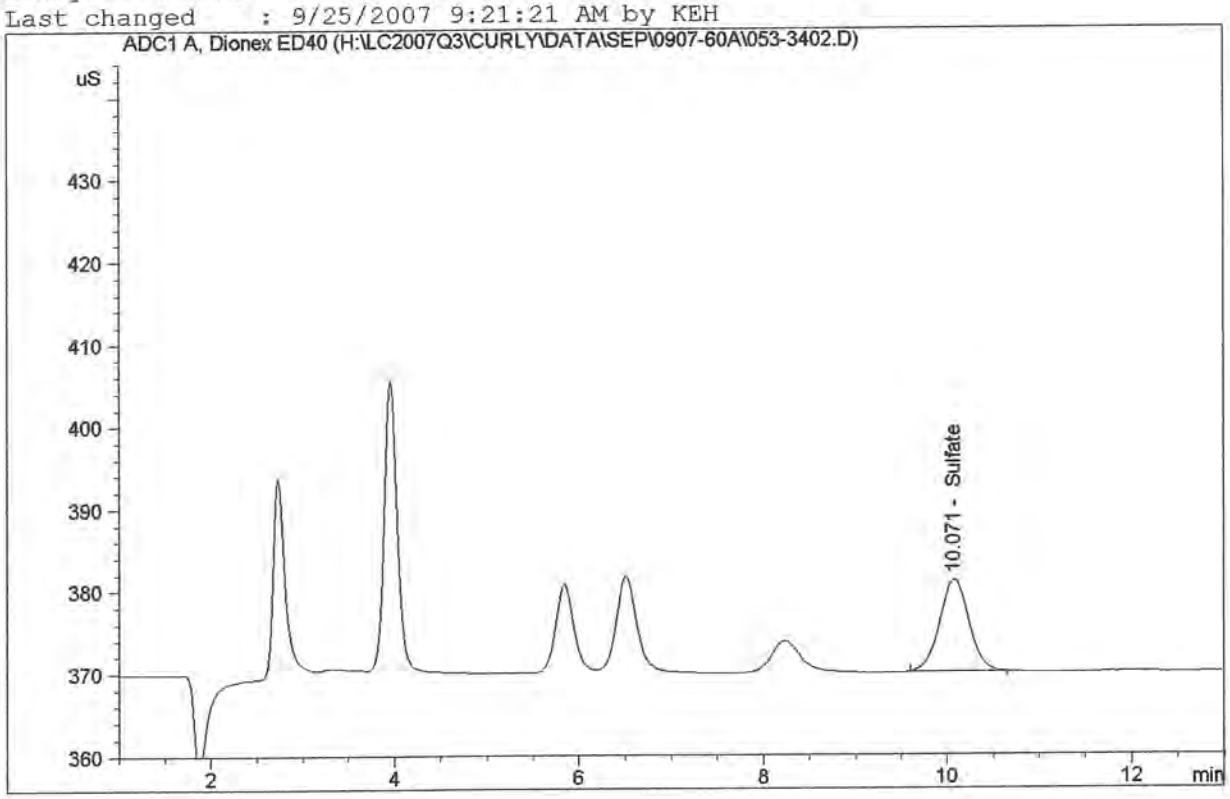
Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.079 BB      247.49028 1.81506e-2    4.49210     Sulfate

Totals :                                4.49210

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 9/25/2007 8:22:00 AM          Seq. Line :  34
Sample Name     : Standard 3                     Location : Vial 53
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Curly                         Inj Volume : 25 µl
Acq. Method     : H:\LC2007Q3\CURLY\METHODS\0707-07.M
Last changed    : 7/2/2007 5:15:05 PM by KEH
Analysis Method : H:\LC2007Q3\CURLY\METHODS\0907-60R.M
Last changed    : 9/25/2007 9:21:21 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Tuesday, September 25, 2007 9:21:18 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 A, Dionex ED40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.071 BB      248.32582 1.81497e-2    4.50705     Sulfate

Totals :                                4.50705

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Method Information

Column: Dionex IonPac AS14A (250 mm x 4 mm)
Mobile Phase: 8mM Na2CO3/1mMNAHCO3
Detection: Suppressed Conductivity
Flow Rate: 1.2 mL/min
Temp: 30C

==========

ANALOG DIGITAL CONVERTER

==========

	Signal 1
Description:	Dionex ED40
Source:	Signal
Unit:	uS
Units/Volt:	1000.000
Peakwidth (Data Rate):	0.053 Min (5.00 Hz)
Stop Time:	No Limit
Data Storage:	All

Start Signal Source: External Device Will Start 35900

Timed Event Table:
<no events>

1100 Quaternary Pump 1

Control

Column Flow	:	1.200 ml/min
Stoptime	:	13.00 min
Posttime	:	Off

Solvents

Solvent A	:	0.0 % (Water)
Solvent B	:	0.0 % ( )
Solvent C	:	0.0 % (0.5M Sodium Acetate/0.1M NaOH)
Solvent D	:	100.0 % (8mM Na2CO3/1mM NaHCO3)

PressureLimits

Minimum Pressure	:	0 bar
Maximum Pressure	:	400 bar

Auxiliary

Maximal Flow Ramp	:	100.00 ml/min^2
Primary Channel	:	Auto
Compressibility	:	83*10^-6/bar
Minimal Stroke	:	Auto

Store Parameters

Store Ratio A	:	Yes
Store Ratio B	:	Yes
Store Ratio C	:	Yes
Store Ratio D	:	Yes
Store Flow	:	Yes
Store Pressure	:	Yes

Agilent 1100 Autosampler 1

Injection

Injection Mode	:	Needle Wash
Injector volume	:	25.00 µl
Wash Vial	:	100
Optimization	:	none

Auxiliary

Drawspeed	:	100 µl/min
Ejectspeed	:	1000 µl/min
Draw position	:	2.0 mm

Time

Stoptime	:	As Pump
Posttime	:	Off

Agilent 1100 Column Thermostat 1

Temperature settings

Left temperature	:	30.0°C
Right temperature	:	Same as left
Enable analysis	:	When Temp. is within setpoint +/- 0.8°C
Store left temperature	:	No
Store right temperature	:	No

Time

Stoptime	:	As pump

Posttime	:	Off
Column Switching Valve	:	Column 1

Sequence Table:

Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 51	Standard 1	0707-07	2	Sample		
2	Vial 51	Standard 1	0707-07	2	Sample		
3	Vial 52	Standard 2	0707-07	2	Sample		
4	Vial 53	Standard 3	0707-07	2	Sample		
5	Vial 54	Standard 4	0707-07	2	Sample		
6	Vial 55	Standard 5	0707-07	2	Sample		
7	Vial 56	Standard 6	0707-07	2	Sample		
8	Vial 57	Second Source	0707-07	2	Sample		
9	Vial 58	DI H2O	0707-07	2	Sample		
10	Vial 61	Run 1 - CC	0707-07	2	Sample		
11	Vial 62	Run 2 - CC	0707-07	2	Sample		
12	Vial 63	Run 3 - CC	0707-07	2	Sample		
13	Vial 64	HPLC Blank	0707-07	2	Sample		
14	Vial 65	MS/Run 1 - CC	0707-07	2	Sample		
15	Vial 53	Standard 3	0707-07	2	Sample		
16	Vial 54	Standard 4	0707-07	2	Sample		
17	Vial 66	Run 1 post	0707-07	2	Sample		
18	Vial 67	Run 2 post	0707-07	2	Sample		
19	Vial 68	Run 3 post	0707-07	2	Sample		
20	Vial 69	Blank post	0707-07	2	Sample		
21	Vial 70	IHB post	0707-07	2	Sample		
22	Vial 71	MS/Run 2 post	0707-07	2	Sample		
23	Vial 72	Run 1 pre	0707-07	2	Sample		
24	Vial 73	Run 2 pre	0707-07	2	Sample		
25	Vial 74	Run 3 pre	0707-07	2	Sample		
26	Vial 75	Blank pre	0707-07	2	Sample		
27	Vial 53	Standard 3	0707-07	2	Sample		
28	Vial 54	Standard 4	0707-07	2	Sample		
29	Vial 76	IHB pre	0707-07	2	Sample		
30	Vial 77	L1885*100	0707-07	2	Sample		
31	Vial 78	L2452	0707-07	2	Sample		
32	Vial 51	Standard 1	0707-07	2	Sample		
33	Vial 52	Standard 2	0707-07	2	Sample		
34	Vial 53	Standard 3	0707-07	2	Sample		
35	Vial 54	Standard 4	0707-07	2	Sample		
36	Vial 55	Standard 5	0707-07	2	Sample		
37	Vial 56	Standard 6	0707-07	2	Sample		

This Is The Last Page Of This Report.

AIR SAMPLING ASSOCIATES, INC.

Appendix G:

Chain of Custodies

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 07-057	Page 1 of 4
Address:	Unit No.: Stack	Lab: WEST / ASAI
City: Hardin; State: MT; Zip Code:	Project Manager: Bill Mullins	Lab Contact: Lonnie Bull / Bill Helley
Run No.: Run 1	Test Method: 201A / 202	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Re EPA 202	Sulfates	Sample Volume	VAP. VOL.
Nozzle, PM10 Cyclone	9/6/07	1210	Acetone	1		X				
PM10 Tube, Connector, PM2.5	9/6/07	1215	Acetone	1		X				
PM2.5 Tube, Connector, Filter Inlet	9/6/07	1220	Acetone	1		X				
Filter	9/6/07	1220	Filter	1		X				
HPLC Rinse	9/6/07	1500	HPLC Water	1	Probe, Liner, Impingers	X	X	X	345	425
MeCl Rinse	9/6/07	1505	MeCl	1	Probe, Liner Impingers	X	X	X		258

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 6 Months

	Date	Time		Date	Time
1. Recovered By: Billy J. Mullins, Jr.	9/6/07	1510	1. Relinquished By: Billy J. Mullins, Jr.	9/6/07	1830
2. Received By: Patrick Sebastian	9/6/07	1830	2. Relinquished By: Patrick Sebastian	9/7/07	1100
3. Received By: Lonnie Bull	9/7/07	1100	3. Relinquished By		

Comments:

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	Project No.	Page	Lab
ADA-ES	07-057	2 of 4	WEST / ASAI
Address	Unit No.	Lab	
	Stack		
City: Hardin. State: MT Zip Code:	Project Manager: Bill Mullins	Lab Contact: Lonnie Bull / Bill Hefley	
Run No.: Run 2	Test Method: 201A/202	Lab Phone No.	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	EPA 202	Sulfates	Sample Volume	EVAP. Volume	
Nozzle, PM10 Cyclone	9/6/07	1445	Acetone	1		X					
PM10 Tube, Connector, PM2.5	9/6/07	1447	Acetone	1		X					
PM2.5 Tube, Connector, Filter Inlet	9/6/07	1450	Acetone	1		X					
Filter	9/6/07	1450	Filter	1		X					
HPLC Rinse	9/6/07	1650	HPLC Water	1	Probe Liner, Impingers	X	X	X	310	390	A68
MeCl Rinse	9/6/07	1652	Me Cl	1	Probe, Liner, Impingers	X	X	X		234	A68

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 6 Months

	Date	Time		Date	Time
1. Recovered By: Billy J. Mullins Jr.	9/6/07	1700	1. Relinquished By: Billy J. Mullins Jr.	9/6/07	1830
2. Received By: [signature]	9/6/07	1830	2. Relinquished By: [signature]	9/7/07	1100
3. Received By: [signature]	9/7/07	1100	3. Relinquished By		

Comments:

RONKER

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES			Project No.: 07-057			Page 3 of 4	Analysis				
Address			Unit No.: Stack			Lab: WEST / ASAI					
City: Hardin	State: MT	Zip Code	Project Manager: Bill Mullins			Lab Contact: Lonnie Bull / Bill Hefley					
Run No.: Run 3			Test Method: 201A/202			Lab Phone No.					
Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments		Particulate	EPA 202	Sulfates	Sample Volume	Evap. Volume
Nozzle, PM10 Cyclone, PM2.5 Imp.	9/6/07	1800	Acetone	1			X				
PM10 Tube, Connector, ~~Filter Debt~~	9/6/07	1805	Acetone	1			X				
PM2.5 Tube, Connector, ~~Filter Debt~~	9/6/07	1810	Acetone	1			X				
Filter	9/6/07	1810	Filter	1			X				
HPLC Rinse	9/6/07	1812	HPLC Water	1	Probe, Liner, Impingers		X	X	X	320	400
MeCl Rinse	9/6/07	1815	MeCl	1	Probe, Liner, Impingers		X	X	X		272
Acetone Blank	9/6/07	1645	Acetone	1			X				
HPLC Blank	9/6/07	1645	HPLC Water	1			X	X	X	180	260
MeCl Blank	9/6/07	1645	MeCl	1			X	X	X		400

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 6 Months

	Date	Time		Date	Time
1. Recovered By: Billy J. Mullins, Jr.	9/6/07	1815	1. Relinquished By: Billy J. Mullins Jr.	9/6/07	1830
2. Received By: [signature]	9/6/07	1830	2. Relinquished By: [signature]	9/7/07	1100
3. Received By: [signature]	9/7/07	1100	3. Relinquished By		

Comments:

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

AIR SAMPLING ASSOCIATES, INC.

Appendix H:

Resumes of Test Personnel

BILLY J. MULLINS, JR.; President

Education	Post Graduate Study Environmental Engineering at Southern Methodist University; Dallas, Texas 1970. M.S. 1969, New York University; New York, New York, in Civil Engineering (Air Resources). B.S. 1968, Texas Tech University; Lubbock, Texas, in Civil Engineering (Water Resources). Studies in Engineering at the U.S. Naval Academy; Annapolis, Maryland, 1963-1964
Professional Training Courses	Attended Short Course on Air Pollution Engineering at the University of Texas at Austin, February 1970. Attended four-week management course presented by the American Management Association, 1976.
Certification	Registered Professional Engineer Certified Visible Emissions Evaluator Licensed Private Pilot (Multi-Engine-Land, Instrument) Diplomat in the American Academy of Environmental Engineers Inductee into the Stack Sampling Hall of Fame Certified as Qualified Environmental Professional (QEP)
Professional Memberships	**Air & Waste Management Association** – Past Chairman, Past Vice Chairman, and Past Board of Directors of North Texas Chapter and Southwest Section; Past Chairman, Consultants Committee; Past Chairman, Source Measurement Committee **Source Evaluations Society** – Past President, Past Board of Directors **American Management Association**

Publications

Authored "Real World Experience with USEPA's New Sampling and Analytical Methods for Conducting Risk Burn," May 1998.

Co-authored "Sulfur Compound Emissions of the Petroleum Production Industry," December 1974.

Co-authored "Field Procedure for Stabilizing Hydrogen Sulfide Samples to be Analyzed Using Modified Methylene Blue Technique," presented at the Conference on Ambient Air Quality Measurements, Austin, Texas, March 1975.

Co-authored "Atmospheric Emissions Survey of the Sour Gas Industry," October 1975.

Co-authored "Technique for Insuring the Validity of Samples for High Concentrations of Sulfur Dioxide Using the EPA Method 5 Sampling Train," presented at the Third National Conference on Energy and the Environment, College Corner, Ohio, September 1975.

Teaching Experience

Conducted training seminars on sampling methods periodically since 1974 to present.

Conducted a one-day seminar on Part 75 Testing over ten times in 1993 and 1994.

Served as a lecturer in the Environmental Protection Agency's (EPA) training course number 450, "Source Sampling for Particulate Pollutants," for two years from January 1974 to October 1975 and March, 1992.

Conducted a two-day training course entitled "technical Assistance in Source Sampling" at Iowa State University, Ames, Iowa, for the Environmental Protection Agency (EPA), October 1974.

Conducted Environmental Protection Agency's (EPA) training course number 450, "Source Sampling for Particulate Pollutants," at Research Triangle Park, North Carolina, September 1975.

Teaching Experience (Cont'd)

Conducted a two-day short course entitled "Performing and Observing Source Sampling," Dallas, Texas, July 1976, May 1977, October 1977, November 1987 and November 1988; Lake Charles, Louisiana, May 1977; Casper Wyoming, May 1977; Point Comfort, Texas, November 1992.

Served as a lecturer in the Environmental Protection Agency's two-day seminar entitled "Asphalt Industry Environmental Solutions," presented in Dallas, Texas, March 21-22, 1979.

Conducted a two-day short course entitled "Performing and Observing Source Sampling," Phoenix, Arizona, August, 1990, for the State of Arizona, Department of Environmental Quality; Lincoln, Nebraska, March 1980, for the State of Nebraska, Air Quality Control Division.

Technical Experience

Directed and performed stack sampling on over 2000 sources of which over 500 were sampled simultaneously using more than one sampling train at several points in the flue gas stream; 1972-present.

Directed and performed over 200 short-term ambient air studies using mobile sampling vans and various ambient air sampling equipment; 1972-present.

Designed, directed and operated over 20 permanent ambient air networks of various size and duration for a variety of parameters; 1972-present.

Designed surface and underground drainage systems for residential subdivisions, public works projects, and shopping centers; 1969-1972.

Designed several residential subdivisions including lot layout, street design, drainage design, and utility design; 1969-1972.

Research Projects

Supervised and conducted a study made by the Hawaiian Sugar Planters' Association to characterize the emissions for several bagasse-fired boilers, April-May 1976.

Supervised and conducted a study made by the Rio Grande Valley Sugar Growers, Inc. to determine the area affected by the burning of sugarcane fields prior to harvesting, November 1974-April 1975.

Supervised and conducted a study by a lightweight aggregate manufacturer to develop a material balance around the process through sampling and analysis of several parameters, November 1973.

Conducted a study in New York City to attempt to develop a correlation in the ambient air between carbon dioxide and sulfur dioxide to provide a tool for predicting air pollution predicting air pollution episodes, January-May 1969.

Related Projects

Served as Chairman of the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Destin, Florida, 2002, and Santa Barbara, California, 1985.

Served as Co-Chairman of the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Destin, Florida, 2001.

Served as Session Chairman at the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Hershey, Pennsylvania, 1984; San Diego, California, 1993; and in Palm Coast, Florida, 1994.

PATRICK SELAKOVICH; Associate

Education	B.S.B.A. 1992, University of Arkansas; Fayetteville, Arkansas, in General Business.
Professional Training	Attended 24-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, April 1997. Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) & 'Train the Trainer', Gettysburg, Pennsylvania, July 1998. Also attended an 8-hour refresher course January 2000, January 2001, and May 2004. Attended OSHA General Industry Safety and Health Training, May 1999.
Professional Memberships	**Society For Human Resource Management**
Technical Experience	Participated in the sampling of over 150 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1996-present. Participated in EPA's 3-D probe study. May – August 1997. Experience with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: California Analytical Model 300-HFID Total Hydrocarbon Analyzer Servomex Model 1440 Carbon Dioxide Analyzer Servomex Model 1440 Oxygen Analyzer Thermo Electron Model 46C Oxides of Nitrogen Analyzer Thermo Electron Model 48C Oxides of Nitrogen Analyzer Western Research Model 721A Sulfur Dioxide Analyzer

AIR SAMPLING ASSOCIATES, INC.

SCOT JACKSON; Associate

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Technical Experience	Participated in the sampling of over 100 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1995-present. Experience with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: California Analytical Model 300-HFID Total Hydrocarbon Analyzer Servomex Model 1440 Carbon Dioxide Analyzer Servomex Model 1440 Oxygen Analyzer Thermo Electron Model 42C Oxides of Nitrogen Analyzer Thermo Electron Model 48C Oxides of Nitrogen Analyzer Western Research Model 721A Sulfur Dioxide Analyzer

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Education	B.A. June 1990, Hendrix College, in Business and Economics.
Technical Experience	Participated in the sampling of over 25 sources, including several of which were sampled simultaneously using more than one sampling train. Experience with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: California Analytical Model 300-HFID Total Hydrocarbon Analyzer Servomex Model 1440 Carbon Dioxide Analyzer Servomex Model 1440 Oxygen Analyzer Thermo Electron Model 42C Oxides of Nitrogen Analyzer Thermo Electron Model 48C Oxides of Nitrogen Analyzer Western Research Model 721A Sulfur Dioxide Analyzer

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STACK SAMPLING REPORT
FOR
PARTICULATE MATTER, HYDROGEN HALIDE & HALOGEN, AMMONIA, PM10/2.5, AND SULFUR TRIOXIDE TESTING
ON THE
COLORADO ENERGY MANAGEMENT, LLC
HARDIN POWER PLANT
SDA INLET DUCT AND STACK
HARDIN, MONTANA

PROJECT NO. 08-026

SEPTEMBER 2008

PREPARED FOR:
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AIR SAMPLING ASSOCIATES, INC.

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EXECUTIVE SUMMARY

Air Sampling Associates, Inc. of Lewisville, Texas conducted stack testing at the Colorado Energy Management, LLC, Hardin Power Plant, located in Hardin, Montana. The purpose of the stack testing was to determine the particulate matter emissions, hydrogen halide and halogen emissions, ammonia emissions, and sulfur trioxide emissions at the SDA Inlet Duct; and to determine the particulate matter emissions, hydrogen halide and halogen emissions, sulfur trioxide emissions, and PM10/2.5 emissions at the Stack. The testing was conducted on September 22, 23, and 24, 2008.

The sampling team consisted of Mr. Bill Mullins, Mr. Bill Hefley, Mr. Patrick Selakovich, Mr. John Stanley, and Mr. Dan Bert. Mr. Mullins was the test team leader.

Mr. Jerry Amrhein of ADA-ES was the project manager.

The procedures set forth in Title 40 of the Code of Federal Regulations, Part 60 (40CFR60), Appendix A, Test Methods 1, 2, 3B, 4, 5B, 17, 26A, 201A, 202, and Conditional Test Method 027 (CTM-027) and the National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI) Method 8A were followed during testing.

Triplicate samples for particulate matter collected at the SDA Inlet Duct according to EPA Test Method 17, in conjunction with EPA Test Methods 26A and CTM-027, indicated an average of 11,786.20 pounds per hour, based on the ‘front half’ analysis of the sampling train.

Triplicate samples for hydrogen halides & halogens collected at the SDA Inlet Duct according to EPA Test Method 26A, in conjunction with EPA Test Method 17 and CTM-027, indicated an average concentration of hydrogen bromide and an average concentration of bromine that were below the detectable limit of the sampling

procedure. The sampling results indicated an average concentration of hydrogen chloride that was equal to 0.914 mg/dscm and an average concentration of chlorine that was equal to 0.836 mg/dscm. The sampling results indicated an average concentration of hydrogen fluoride and an average concentration of fluoride that were below the detectable limit of the sampling procedure.

Triplicate samples for ammonia collected at the SDA Inlet Duct according to EPA CTM-027, in conjunction with EPA Test Methods 17 and 26A, indicated an average concentration of ammonia equal to 57.34 ppm. The amount of ammonia that was injected into the process was reduced during each test.

Triplicate samples for sulfur trioxide collected at the SDA Inlet Duct according to NCASI Method 8A indicated an average concentration of sulfur trioxide equal to 5.99 ppm.

Triplicate samples for particulate matter collected at the Stack according to EPA Test Methods 5B and 202 indicated an average of 20.07 pounds per hour, based on the analysis of the 'front half' of the sampling trains. The "back-half" of the sampling trains indicated a relatively large amount of particulate matter that had not been seen in previous testing. The analysis of the "back-half" particulate matter samples is suspect. Visual observations in the field indicated that the impinger solutions were clear with no cloudiness. The samples were purged for one-hour after the tests with pure nitrogen. Also, there were no visible emissions from the stack during the testing that would have indicated the level of emissions that were reported.

Triplicate samples for hydrogen halides & halogens collected at the Stack indicated an average concentration of hydrogen bromide and an average concentration of bromine that were below the detectable limit of the sampling procedure. The sampling results indicated an average concentration of hydrogen chloride that was below the detectable limit of the sampling procedure for one test. However, the hydrogen chloride results for the other two tests indicated a concentration of hydrogen chloride that was equal to an

average of 0.412 mg/dscm. The sampling results indicated an average concentration of chlorine that was equal to 0.474 mg/dscm. The sampling results indicated an average concentration of hydrogen fluoride and an average concentration of fluoride that were below the detectable limit of the sampling procedure.

Triplicate samples for particulate matter were collected at the Stack according to EPA Test Methods 201A and 202.

The average emission rate of particulate matter > PM_{10} was 0.0044 grains per dry standard cubic foot (gr/dscf). The average emission rate of particulate matter > PM_{10} was 10.76 lbs/hr.

The average emission rate of particulate matter < PM_{10} > $PM_{2.5}$ was 0.0031 grains per dry standard cubic foot (gr/dscf). The average emission rate of particulate matter < PM_{10} > $PM_{2.5}$ was 7.70 lbs/hr.

The average emission rate of particulate matter $PM_{2.5}$ was 0.0022 grains per dry standard cubic foot (gr/dscf). The average emission rate of particulate matter $PM_{2.5}$ was 5.27 lbs/hr.

The average emission rate of particulate matter total catch was 0.0656 grains per dry standard cubic foot (gr/dscf). The average emission rate of particulate matter total catch was 160.68 lbs/hr.

Triplicate samples for sulfur trioxide collected at the Stack according to NCASI Method 8A indicated an average concentration of sulfur trioxide equal to 1.22 ppm.

Billy J. Mullins, Jr. P.E., Q.E.P., D.E.E., QSTI

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 1: Summary of Sampling Results

Sampling Trains - Parameters	SDA Inlet Duct Average	Stack Average
EPA 5 / 17 / 26A / CTM027		
- Moisture (%)	11.12	15.50
- Flow Rate (DSCFM)	293,196	285,170
- Particulate Matter (lbs/hr – front half)	11,786.20	20.07
- Chlorine (mg/dscm)	0.836	0.474
- Hydrogen Chloride (mg/dscm)	0.914	<0.285
- Ammonia (ppm)	54.15	NA
NCASI 8A		
- Moisture (%)	10.50	15.66
- Sulfur Trioxide (ppm)	5.99	1.22

Table 2: Summary of PM10/2.5 Sampling Results - Stack

Parameter - Results	Average
Particulate Matter (> PM_{10})	
- gr/dscf	0.0044
- lbs/hr	10.76
Particulate Matter (< PM_{10} > $PM_{2.5}$)	
- gr/dscf	0.0031
- lbs/hr	7.70
Particulate Matter ($PM_{2.5}$)	
- gr/dscf	0.0022
- lbs/hr	5.27
Particulate Matter (Total Catch)	
- gr/dscf	0.0656
- lbs/hr	160.68

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 3: SDA Inlet Duct Particulate Matter, Hydrogen Halides & Halogens, and Ammonia Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	09/23/08	09/23/08	09/23/08	-----
Test Time	0910-1013	1250-1354	1744-1848	-----
*Flow Rate – DSCFM**	291,213	293,577	294,797	293,196
Stack Temp. - °F	336	333	330	333
O_2 - %Vol. (dry)	5.9	5.3	5.6	5.6
CO_2 - %Vol. (dry)	13.4	14.2	14.1	13.9
Percent Excess Air	38.1	33.1	35.7	35.6
Moisture Content - %	11.41	10.67	11.28	11.12
Percent Isokinetic	108.3	97.4	97.6	101.1
Sample Volume – DSCM	0.772	0.700	0.704	0.725
Particulate Matter				
– gr/dscf (Front Half)	3.8488	4.8056	5.4079	4.6874
– lbs/hr (Front Half)	9,605.40	12,090.55	13,662.65	11,786.20
Hydrogen Bromide				
– mg	<0.022	<0.024	<0.027	<0.024
– mg/dscm	<0.029	<0.035	<0.038	<0.034
Bromine				
– mg	<0.077	<0.081	<0.081	<0.080
– mg/dscm	<0.099	<0.115	<0.115	<0.110
Hydrogen Chloride				
– mg	1.118	0.317	0.592	0.676
– mg/dscm	1.448	0.453	0.841	0.914
Chlorine				
– mg	0.790	0.126	0.918	0.611
– mg/dscm	1.023	0.180	1.304	0.836
Hydrogen Fluoride				
– mg	<0.012	<0.013	<0.055	<0.027
– mg/dscm	<0.016	<0.019	<0.078	<0.038
Ammonia - ppm	96.04	47.98	28.00	57.34

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 4: SDA Inlet Duct Sulfur Trioxide Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	09/23/08	09/24/08	09/24/08	-----
Test Time	1530-1625	0745-0845	0947-1047	-----
*Sample Volume – DSCM**	0.480	0.532	0.529	0.514
Moisture Content - %	10.42	10.82	10.26	10.50
Sulfur Trioxide - ppm	3.51	12.99	1.48	5.99

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 5: Stack Particulate Matter
Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	09/23/08	09/23/08	09/24/08	-----
Test Time	1058-1302	1551-1756	0710-0914	-----
*Flow Rate – DSCFM**	287,645	282,484	285,381	285,170
Stack Temperature - ˚F	206	204	210	207
O_2 – % Volume dry	6.2	6.0	6.2	6.1
CO_2 – % Volume dry	13.4	13.7	13.4	13.5
Percent Excess Air	41.0	39.3	41.0	40.4
Moisture Content - %	15.36	15.22	15.91	15.50
Percent Isokinetic	98.5	100.2	103.2	100.6
Particulate Matter				
- gr/dscf (Front Half)	0.0073	0.0079	0.0094	0.0082
*- lbs/mmBtu (Front Half)***	0.0145	0.0155	0.0187	0.0162
- lbs/hr (Front Half)	17.94	19.22	23.05	20.07
Particulate Matter				
*- gr/dscf (Total)****	0.0775	0.0798	0.0746	0.0773
*- lbs/mmBtu (Total)***	0.1539	0.1564	0.1482	0.1528
*- lbs/hr (Total)****	191.03	193.14	182.36	188.84

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)
** Calculated using an F_d Factor of 9,780
*** See Discussion of Results

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 6: Stack Hydrogen Halides & Halogens Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	09/23/08	09/23/08	09/23/08	-----
Test Time	0910-1014	1354-1503	1823-1926	-----
*Flow Rate – DSCFM**	305,692	302,476	302,117	303,428
Stack Temp. - °F	207	208	207	207
O_2 - %Vol. (dry)	6.1	6.1	6.0	6.1
CO_2 - %Vol. (dry)	13.6	13.5	13.6	13.6
Percent Excess Air	40.2	40.1	39.2	39.8
Moisture Content - %	16.03	15.73	14.81	15.52
Percent Isokinetic	102.6	100.2	99.6	100.8
Sample Volume – DSCM	1.070	1.034	1.027	1.044
Hydrogen Bromide				
– mg	<0.030	<0.033	<0.032	<0.032
– mg/dscm	<0.028	<0.032	<0.031	<0.030
Bromine				
– mg	<0.087	<0.084	<0.076	<0.082
– mg/dscm	<0.081	<0.081	<0.074	<0.079
Hydrogen Chloride				
– mg	0.761	0.116	<0.032	<0.303
– mg/dscm	0.711	0.112	<0.031	<0.285
Chlorine				
– mg	0.514	0.507	0.464	0.495
– mg/dscm	0.480	0.490	0.452	0.474
Hydrogen Fluoride				
– mg	<0.017	<0.018	<0.017	<0.017
– mg/dscm	<0.016	<0.018	<0.017	<0.017

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 7: Stack Sulfur Trioxide
Summary of Sampling Results

Run No.	*1*	*2*	*3*	*Average*
Test Date	09/24/08	09/24/08	09/24/08	-----
Test Time	1407-1507	1600-1700	1745-1845	-----
*Sample Volume – DSCM**	0.521	0.517	0.517	0.518
Moisture Content - %	15.47	15.39	16.11	15.66
Sulfur Trioxide - ppm	1.29	0.87	1.49	1.22

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

SUMMARY OF RESULTS

Table 8: Summary of Particulate Matter (PM10/2.5) Sampling Results

Run No.	*2*	*3*	*4*	*Average*
Test Date	09/24/08	09/24/08	09/24/08	-----
Test Time	1308-1412	1505-1610	1700-1804	-----
*Flow Rate – DSCFM**	286,384	286,068	285,463	285,972
Stack Temp. - ˚F	211	214	211	212
O_2 - %Vol. (dry)	6.2	6.2	6.2	6.2
CO_2 - %Vol. (dry)	13.4	13.4	13.4	13.4
Percent Excess Air	41.0	41.0	41.0	41.0
Moisture Content - %	15.26	15.01	15.46	15.24
Percent Isokinetic	82.8	82.5	81.6	82.3
Particulate Matter (> PM_{10})				
- gr/dscf	0.0025	0.0051	0.0056	0.0044
- lbs/hr	6.19	12.43	13.67	10.76
Particulate Matter (< PM_{10} > $PM_{2.5}$)				
- gr/dscf	0.0016	0.0045	0.0033	0.0031
- lbs/hr	4.01	10.97	8.13	7.70
Particulate Matter ($PM_{2.5}$)				
- gr/dscf	0.0010	0.0017	0.0038	0.0022
- lbs/hr	2.37	4.20	9.24	5.27
Particulate Matter (Back-Half)				
- gr/dscf	0.0556	0.0673	0.0447	0.0559
- lbs/hr	136.39	165.05	109.39	136.94
Particulate Matter (Total Catch)				
- gr/dscf	0.0607	0.0786	0.0574	0.0656
- lbs/hr	148.95	192.65	140.43	160.68

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

DISCUSSION OF SAMPLING RESULTS

SDA Inlet Duct

Particulate Matter, Hydrogen Halides & Halogens, and Ammonia

The three tests for particulate matter, hydrogen halides & halogens, and ammonia taken at the SDA Inlet Duct appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train and pitot tubes showed no leaks before or after testing. The indicative parameters of the tests were in close agreement. The measured moisture contents (%M) were within 4.05% of the mean value. The measured flow rates (DSCFM) were within 0.68% of the mean value. The rates of sampling for the three tests were within the specified limits (90 to 110 percent isokinetic). The greatest deviation from 100% isokinetic was 8.3%.

The concentrations (gr/dscf – front half) of particulate matter for the three tests showed a range of -17.89 percent to +15.37 percent variation from the mean value of 4.6874 gr/dscf – front half.

The concentrations (mg/dscm) of hydrogen bromide and bromine for the three tests were below the minimum reporting limit of the reference method.

The concentrations of hydrogen chloride (mg/dscm) for the three tests showed a range of -50.44% to +58.42% variation from the mean value of 0.914 mg/dscm. The concentrations of chlorine (mg/dscm) of for the three tests showed a range of -78.46% to +56.04% variation from the mean value of 0.836 mg/dscm.

The concentrations (mg/dscm) of hydrogen fluoride and fluorine for the three tests were below the minimum reporting limit of the reference method.

The concentrations (ppm) of ammonia for the three tests varied as the rate of ammonia injection was reduced.

Sulfur Trioxide

The three tests for sulfur trioxide taken at the SDA Inlet Duct appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train showed no leaks before or after testing. The indicative parameters of the tests were in close agreement. The measured moisture contents (%M) were within 3.05% of the mean value.

The concentrations (ppm) of sulfur trioxide for the three tests showed a range of -75.31 percent to +116.74 percent variation from the mean value of 5.99 ppm.

Stack

Particulate Matter

The three tests for particulate matter at the Stack appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train and pitot tubes showed no leaks before or after testing. The indicative parameters of the tests were in close agreement. The measured moisture contents (%M) were within 2.67% of the mean value. The measured flow rates (DSCFM) were within 0.94% of the mean value. The rates of sampling for the

tests were within the specified limits (90% to 110% isokinetic). The greatest deviation from 100% isokinetic was 3.2%.

The concentrations (lbs/hr – front half) of particulate matter for the three tests showed a range of -10.61 percent to +14.85 percent variation from the mean value of 20.07 lbs/hr – front half.

The analysis of the "back-half" particulate matter samples is suspect. Visual observations in the field indicated that the impinger solutions were clear with no cloudiness. The samples were purged for one-hour after the tests with pure nitrogen. Also, there were no visible emissions from the stack during the testing that would have indicated the level of emissions that were reported.

Hydrogen Halides & Halogens

The three tests for particulate matter and hydrogen halides & halogens taken at the Stack appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train and pitot tubes showed no leaks before or after testing. The indicative parameters of the tests were in close agreement. The measured moisture contents (%M) were within 4.60% of the mean value. The measured flow rates (DSCFM) were within 0.75% of the mean value. The rates of sampling for the tests were within the specified limits (90% to 110% isokinetic). The greatest deviation from 100% isokinetic was 2.6%.

The concentrations (mg/dscm) of hydrogen bromide and bromine for the three tests were below the minimum reporting limit of the reference method.

The concentrations (mg/dscm) of hydrogen chloride for the third test was below the minimum reporting limit of the reference method. The concentrations of chlorine

(mg/dscm) for the three tests showed a range of -4.64% to +3.38% variation from the mean value of 0.474 mg/dscm.

The concentrations (mg/dscm) of hydrogen fluoride and fluorine for the three tests were below the minimum reporting limit of the reference method.

Sulfur Trioxide

The three tests for sulfur trioxide appeared to be a valid representation of the actual emissions during the tests. All leak checks performed on the reference method sampling train showed no leaks before or after testing. The measured moisture contents were within 2.90% of the mean value.

The concentrations (ppm) of sulfur trioxide for the three tests showed a range of -28.49 percent to +22.47 percent variation from the mean value of 1.22 ppm.

PM10/2.5

The first test for PM10/2.5 was not valid due to the sampling rate being below the required sampling rate of 80 percent. Therefore , an additional test was taken. The last three tests for PM10/2.5 appeared to be an accurate representation of the actual emissions during the tests. All leak checks performed on the sampling train and the pitot tubes indicated no leaks before or after each test. The indicative parameters calculated from the field data were in reasonable agreement. The measured moisture contents for the three runs were within 1.53% of the mean value. The measured flow rates (DSCFM) for the tests were within 0.18% of the mean value. The rates of sampling for the three tests were within the specified limits (80 to 120 percent isokinetic). The greatest deviation from 100% isokinetic was 18.4%. The particulate cut

size was 9.68 microns, which was within the specified limits in EPA 201A of 9 to 11 microns.

The concentrations (gr/dscf) of particulate matter > PM_{10} for the three tests showed a range of -43.18 percent to +27.27 percent variation from the mean value of 0.0044 gr/dscf.

The concentrations (gr/dscf) of particulate matter < PM_{10} > $PM_{2.5}$ for the three tests showed a range of -48.94 percent to +43.62 percent variation from the mean value of 0.0031gr/dscf.

The concentrations (gr/dscf) of particulate matter $PM_{2.5}$ for the three tests showed a range of -53.85 percent to +75.38 percent variation from the mean value of 0.0022 gr/dscf.

The concentrations (gr/dscf) of particulate matter total catch for the three tests showed a range of -12.46 percent to +19.88 percent variation from the mean value of 0.0656 gr/dscf.

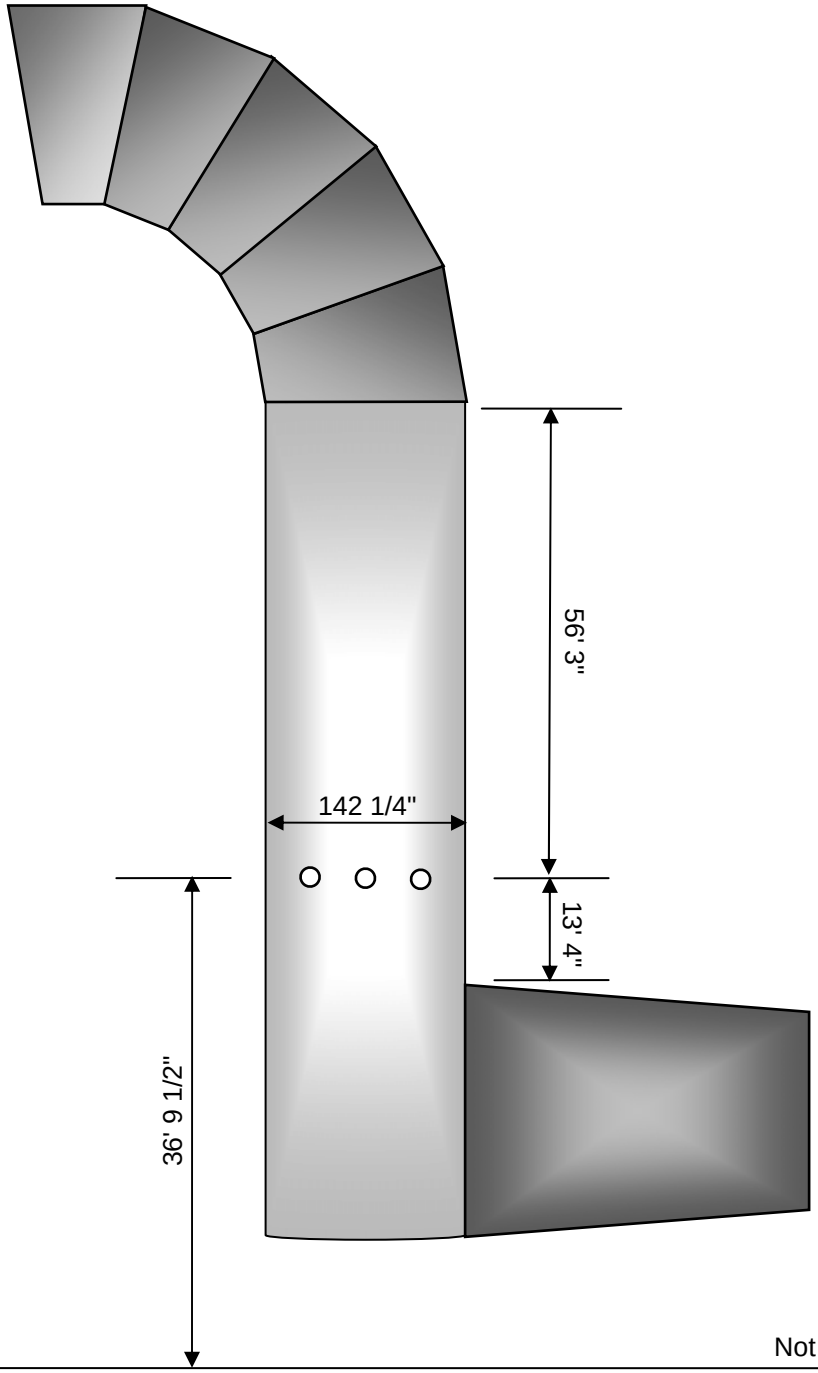
DESCRIPTION OF SAMPLING LOCATIONS

The sampling ports on the SDA Inlet Duct are approximately 36 feet 9 1/2 inches above the ground. The sampling ports are located 13 feet 4 inches (1.12 equivalent duct diameters) downstream from a bend in the duct and 56 feet 3 inches (4.75 equivalent duct diameters) upstream from a bend in the duct.

The sampling ports on the Hardin Unit No. 1 Stack (Boiler Stack) are approximately 123 feet 1 1/2 inches above the ground. The sampling ports are located 78 feet (8.57 stack diameters) downstream from the inlet to the stack and 127 feet (13.96 stack diameters) upstream from the outlet to the stack.

SAMPLING LOCATION

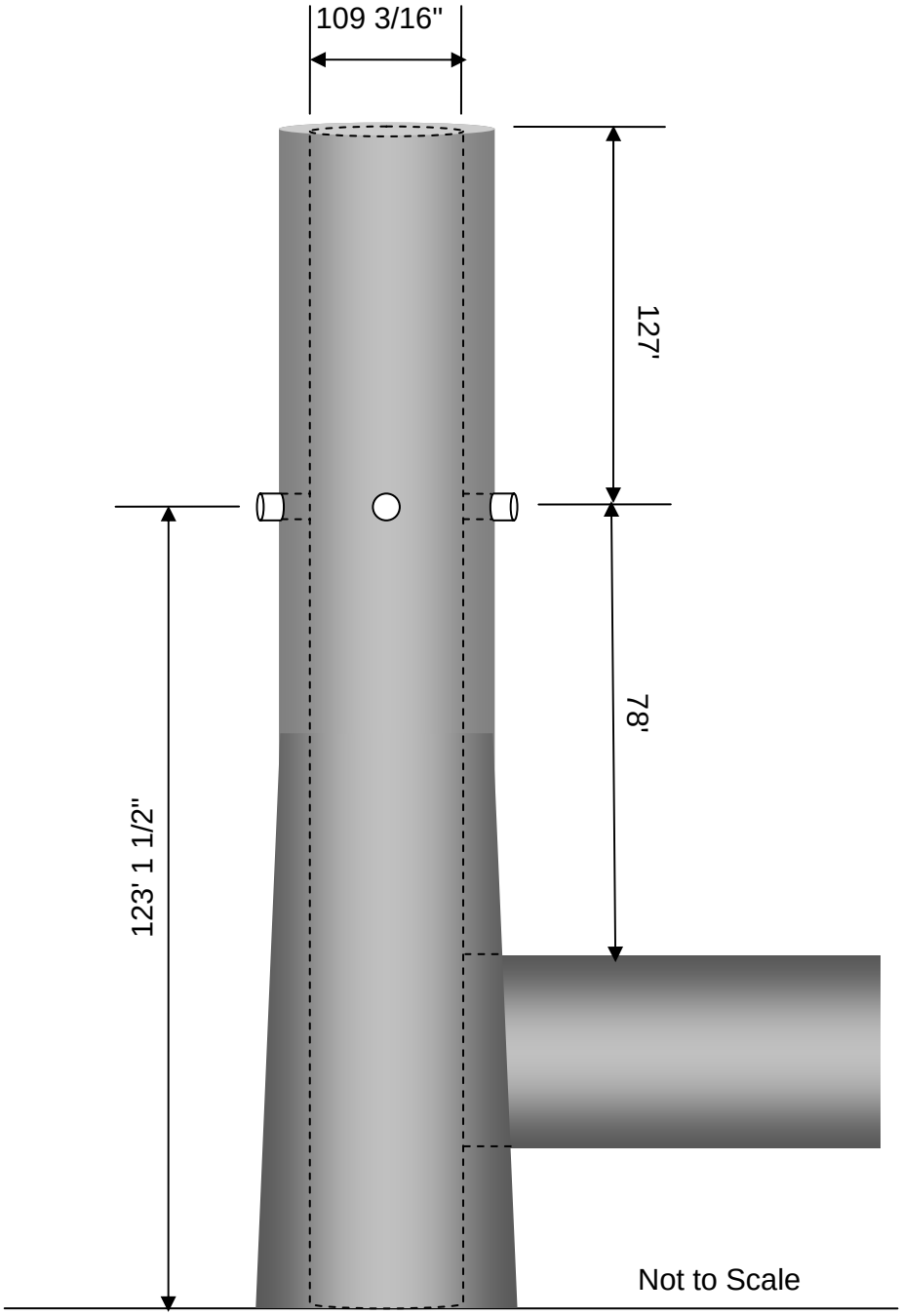
Figure 1: SDA Inlet Duct



Not to Scale

SAMPLING LOCATION

Figure 2: Stack



SAMPLING AND ANALYTICAL PROCEDURES

The procedures set forth in Title 40 of the Code of Federal Regulations, Part 60 (40CFR60), Appendix A, Test Methods 1, 2, 3B, 4, 5B, 17, 26A, 201A, 202, and Conditional Test Method CTM027; and the National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI) Method 8A were followed during testing.

Four Traverse points were sampled from three ports on the SDA Inlet Duct for a total of twelve traverse points. All traverse points were checked for cyclonic flow and the average angle was equal to 2.4 degrees. The pitot tube lines were checked for leaks before and after each test under a vacuum and a pressure. The lines were also checked for clearance and the manometer was zeroed before each test.

Six traverse points were sampled from two ports on the Stack for a total of twelve traverse points. All traverse points were checked for cyclonic flow and the average angle was equal to 6.0 degrees. The pitot tube lines were checked for leaks before and after each test under a vacuum and a pressure. The lines were also checked for clearance and the manometer was zeroed before each test.

Particulate Matter

Particulate matter samples were taken at the Stack sampling location according to EPA Test Methods 5B and 202. For each run, samples of ten minute duration were taken at each of the twelve traverse points for a total sampling time of 120 minutes. Data was recorded at five minute intervals.

The sampling train was leak checked at the end of the sampling probe at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest

vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The "front half" of the sampling train at the Stack sampling location contained the following components:

Stainless steel nozzle
Heated glass lined probe@ 320°F ± 25°F
Heated glass fiber filter @ 320°F ± 25°F

The "back half" of the sampling train at the Stack sampling location contained the following components:

Table 9: EPA Test Methods 5B / 202 Sampling Train Condenser/Absorbing System

Impinger No.	Impinger Type	Impinger Contents	Amount	Parameter Collected
1	Modified	H.P.L.C. H_2O	100 ml	Condensable PM & H_2O
2	Greenburg-Smith	H.P.L.C. H_2O	100 ml	Condensable PM & H_2O
3	Modified	Empty	-----	H_2O
4	Modified	Silica Gel	~ 200 g	H_2O

At the completion of each run, the "back half" of the sampling train was purged with nitrogen for 60 minutes at a rate of 20 liters per minute.

Integrated Orsat samples were collected during each test. The samples were analyzed according to EPA Method 3 to determine the stack gas molecular weight.

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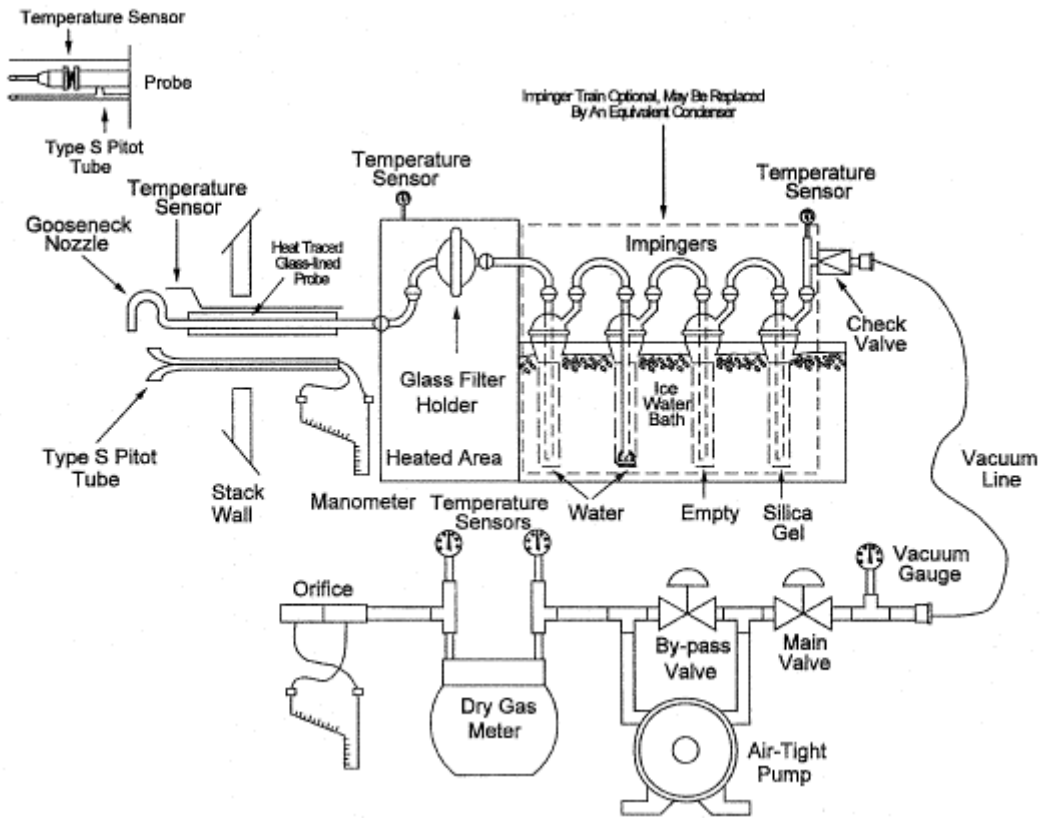
Figure 3: EPA Test Methods 5B and 202 Sampling Train



Particulate Matter, Hydrogen Halides & Halogens, and Ammonia

Particulate matter, hydrogen halides & halogens, and ammonia samples were taken at the SDA Inlet Duct and Stack sampling locations according to EPA Test Methods 1, 2, 3, 4, 5, 17, 26A, and CTM-027. For each run at the SDA Inlet Duct, samples of five minute duration were taken at each of twelve traverse points for a total test time of 60 minutes. Data was recorded at five minute intervals. For each run at the Stack, samples of five minute duration were taken at each of twelve traverse points for a total test time of 60 minutes. Data was recorded at five minute intervals.

The sampling trains were leak checked at the end of the sampling probe at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The 'front half' of the sampling train at the SDA Inlet Duct contained the following components:

Glass nozzle
Fiberglass Thimble
Heated glass lined probe @ 248°F ± 25°F
Heated glass filter bypass @ 248°F ± 25°F

The 'front half' of the sampling train at the Stack contained the following components:

Glass nozzle
Heated glass lined probe @ 248°F ± 25°F
Heated fiberglass filter @ 248°F ± 25°F

The ‘back half’ of the sampling trains at both sampling locations contained the following components:

Table 10: EPA Test Method 26A Condenser/Absorbing System

Impinger No.	Impinger Type	Impinger Contents	Amount	Parameter Collected
1	Greenburg-Smith	0.1N H_2SO_4	100 ml	Hydrogen Halides
2	Greenburg-Smith	0.1N H_2SO_4	100 ml	Hydrogen Halides
3	Modified	0.1N NaOH	100 ml	Halogens
4	Modified	0.1N NaOH	100 ml	Halogens
5	Modified	Silica Gel	~200 g	H_2O

A 100 milliliter aliquot of the Impinger No. 1 and No. 2 contents was taken from each run at the SDA Inlet Duct for Ion Chromatograph analysis to determine the concentrations of ammonia.

Integrated Orsat samples were collected at each sampling location during each test. The samples were analyzed according to EPA Method 3 to determine the stack gas molecular weight.

Figure 4: EPA Test Methods 17, 26A, and CTM027 SDA Inlet Duct Sampling Train

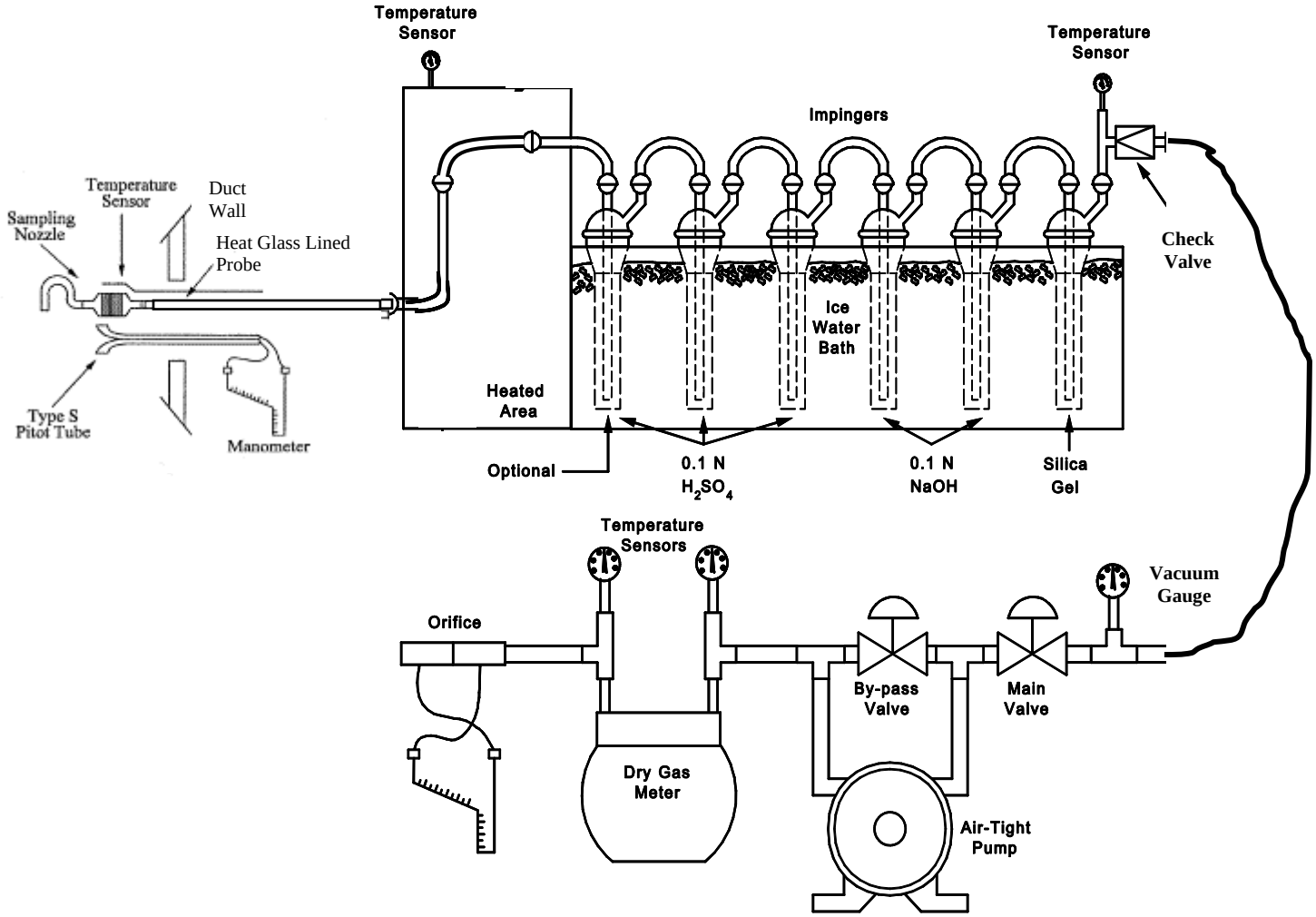
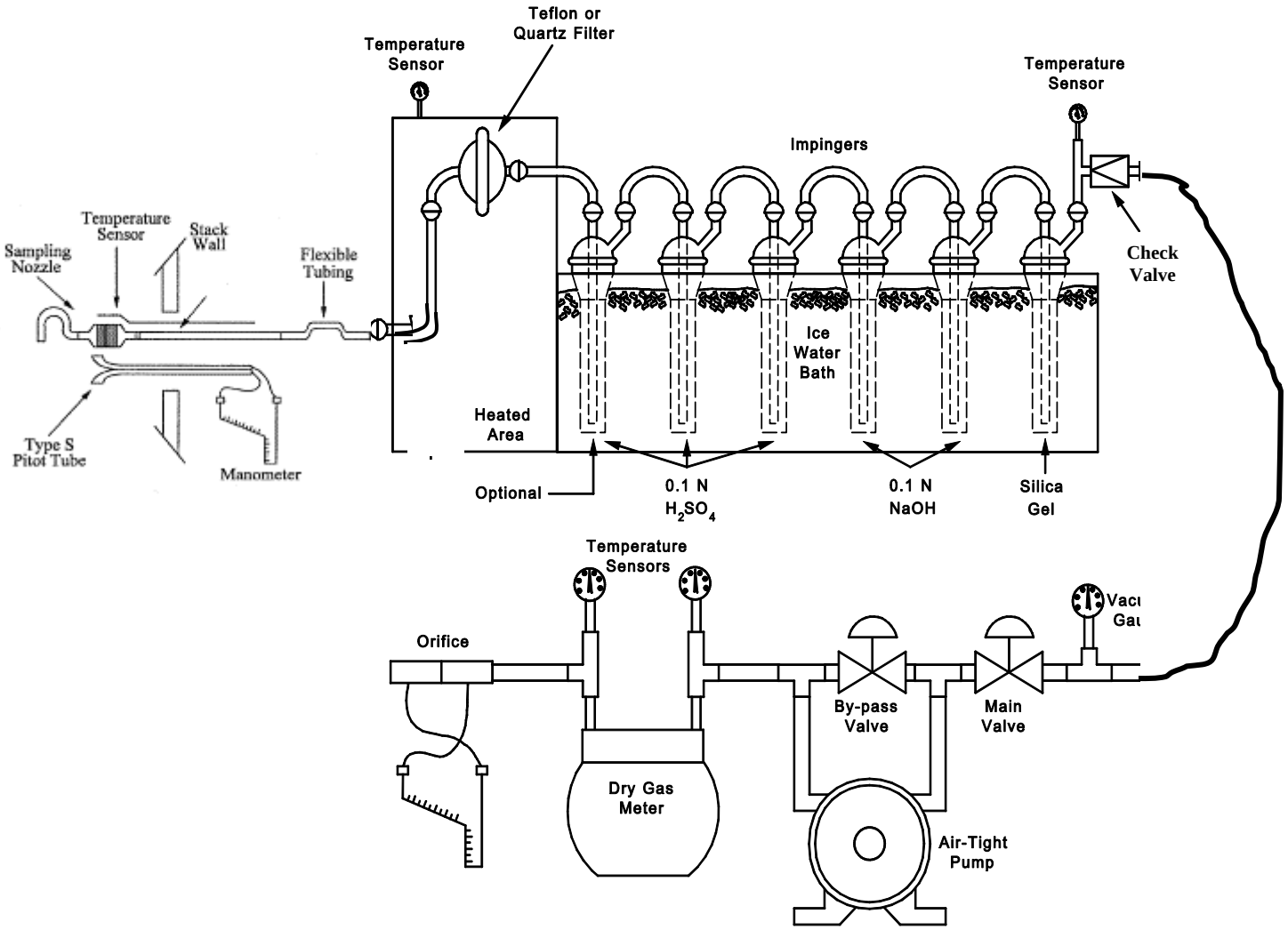


Figure 5: EPA Test Method 26A Stack Sampling Train - Stack



PM10/2.5

Six traverse points were sampled from each of the two ports on the stack for a total of twelve traverse points. All traverse points were previously checked for cyclonic flow and none was found to be present. For each run, samples of varying dwell time were taken at each of the twelve traverse points for a total sampling time of 61.2 minutes. The dwell time at each sampling point was proportional with the velocity at that point. Data was recorded at the beginning of each sample point.

The pitot tube lines were checked for leaks before and after each test under a vacuum and a pressure. The lines were also checked for clearance and the manometer was zeroed before each test.

The sampling train was leak checked at the end of the sampling probe at 15" of mercury vacuum before each test. This was done to predetermine the possibility of a diluted sample.

The “front-half” of the sampling train contained the following components:

Stainless steel nozzle
PM_{10} Sampler
$PM_{2.5}$ Sampler
Heated glass lined probe@ 250°F ± 25°F

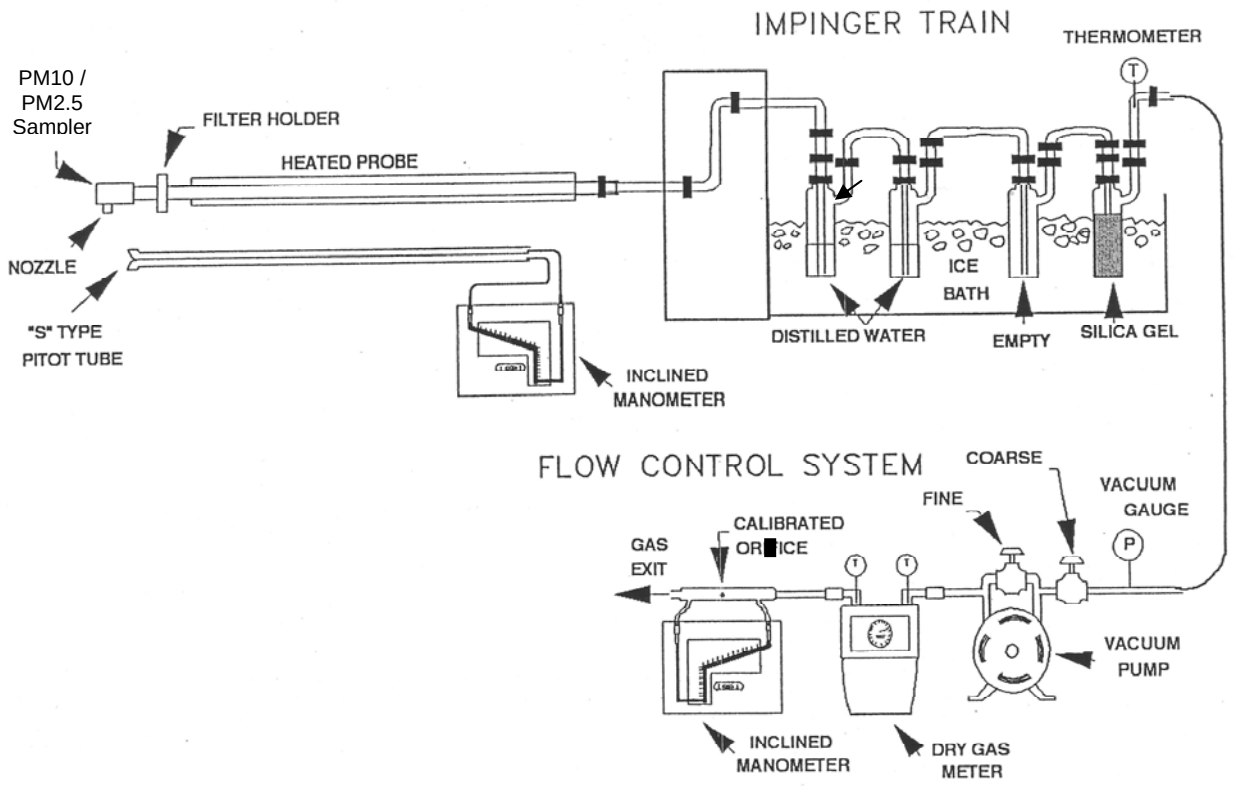
The “back-half” of the sampling train contained the following components:

Table 11: Reference Method 202 Sampling Train

Impinger No.	Impinger Type	Impinger Contents	Amount	Parameter Collected
1	Modified	H.P.L.C. H_2O	100 ml	Condensable PM & H_2O
2	Greenburg-Smith	H.P.L.C. H_2O	100 ml	Condensable PM & H_2O
3	Modified	Empty	-----	H_2O
4	Modified	Silica Gel	~ 200 g	H_2O

At the completion of each run, the “back-half” of the sampling train was purged with nitrogen for 60 minutes at a rate of 20 liters per minute.

Figure 6: EPA Methods 201A and 202 Sampling Train



Sulfur Trioxide

Triplicate samples for sulfur trioxide were taken at the SDA Inlet Duct and at the Stack sampling locations according to NCASI Method 8A. For each run, samples of 60 minute duration were taken at a single traverse point. Data was recorded at five minute intervals.

The sampling train was leak checked at the end of the sampling probe at 15" of mercury vacuum before each test, and again at the conclusion of each test at the highest vacuum recorded during sampling. This was done to predetermine the possibility of a diluted sample.

The 'front half' of the sampling train contained the following components:

Glass Sample Probe heated to 500˚ F
Quartz Filter heated to 500˚ F
Glass Condenser cooled to 140˚ F
Teflon tubing connected to Impingers

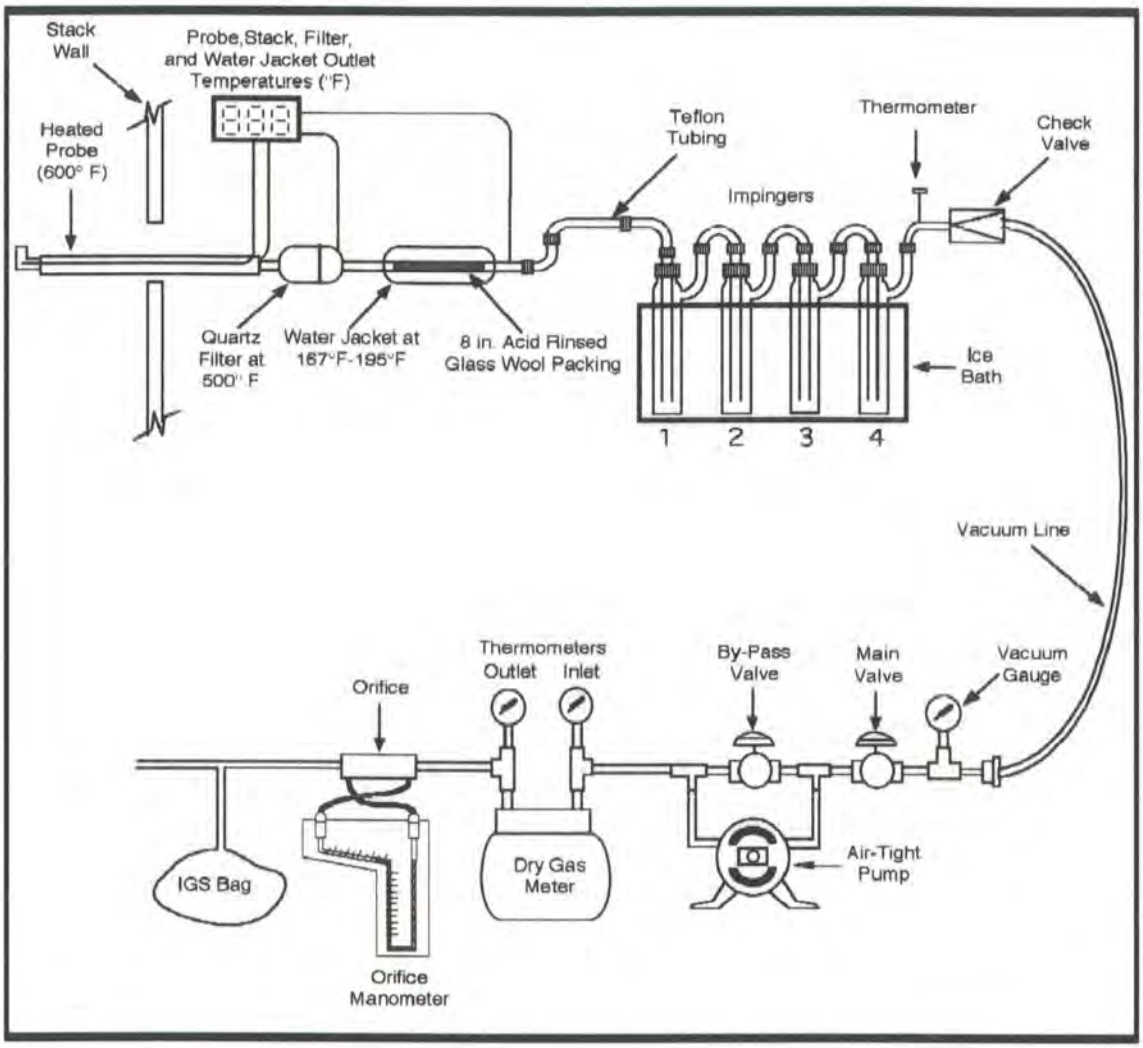
The 'back half' of the sampling train contained the following components:

Table 12: NCASI Method 8A Condenser/Absorbing System

Impinger No.	Impinger Type	Impinger Contents	Amount	Parameter Collected
1	Greenburg-Smith	3% H_2O_2	100 ml	H_2O
2	Modified	3% H_2O_2	100 ml	H_2O
3	Greenburg-Smith	DI H_2O	100 ml	H_2O
4	Modified	Silica Gel	~ 200 g	H_2O

The sampling train was purged from the inlet of the condenser with clean ambient air for 15 minutes at the completion of each test run.

Figure 7: NCASI Method 8A SDA Inlet Duct and Stack Sampling Train



TEST NARRATIVE

Personnel from Air Sampling Associates, Inc. arrived at the Colorado Energy Management, LLC, Hardin Power Plant, located in Hardin, Montana at 1:30 p.m. on Monday, September 22, 2008. The sampling trailer was placed into position and electrical power was established. The sampling equipment was moved onto the SDA Inlet Duct and the Stack before securing the equipment for the night at 5:30 p.m.

On Tuesday, September 23, 2008, personnel returned to the plant at 6:30 a.m. The sampling equipment was prepared for testing and the first test for halogens on the stack and the first test for particulate matter, halogens, and ammonia on the SDA Inlet Duct began at 9:10 a.m. Testing continued until three tests for particulate matter, halogens, and ammonia and one test for sulfur trioxide had been taken on the SDA Inlet Duct as well as three tests for halogens and two tests for particulate matter on the Stack had been taken by 7:26 p.m. The samples were recovered and personnel departed the plant at 8:15 p.m.

On Wednesday, September 24, 2008, personnel returned to the plant at 6:15 a.m. The sampling equipment was prepared for testing and two tests for sulfur trioxide were taken on the SDA Inlet Duct before moving the sampling equipment to the Stack location. The third test for particulate matter was taken on the Stack as well as four tests for PM10/2.5 and three tests for sulfur trioxide. A fourth test for PM10/2.5 was taken due to the first test being sampled at less than the desired isokinetic sampling rate. The last test was completed at 6:45 p.m.

The sampling equipment was moved off of the SDA Inlet Duct and the Stack and loaded into the sampling trailer. The samples were recovered and taken to Air Sampling Associates, Inc.'s office in Lewisville, Texas for analysis and shipment to the subcontracted laboratories.

Operations at the Colorado Energy Management, LLC, Hardin Power Plant, SDA Inlet Duct and Stack, located in Hardin, Montana, were completed at 8:15 p.m. on Wednesday, September 24, 2008.

APPENDICES

Appendix A:	**Location of Traverse Points**
Appendix B:	**Nomenclature and Equations for Calculation of Source Emissions**
Appendix C:	**Calibration Data**
Appendix D:	**Field Data**
Appendix E:	**EPA Test Methods 5B and 202 (Particulate Matter) Analytical Data -Stack**
Appendix F:	**EPA Test Methods 8A, 26A, and CTM027 (Sulfur Trioxide, Hydrogen Halides & Halogens, and Ammonia) Analytical Data – SDA Inlet Duct and Stack**
Appendix G:	**EPA Test Method 17 (Particulate Matter) Analytical Data – SDA Inlet Duct**
Appendix H:	**EPA Test Methods 201A and 202 (PM10/2.5) Analytical Data- Stack**
Appendix I:	**Chain of Custodies**
Appendix J:	**Resumes of Test Personnel**

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Appendix A:

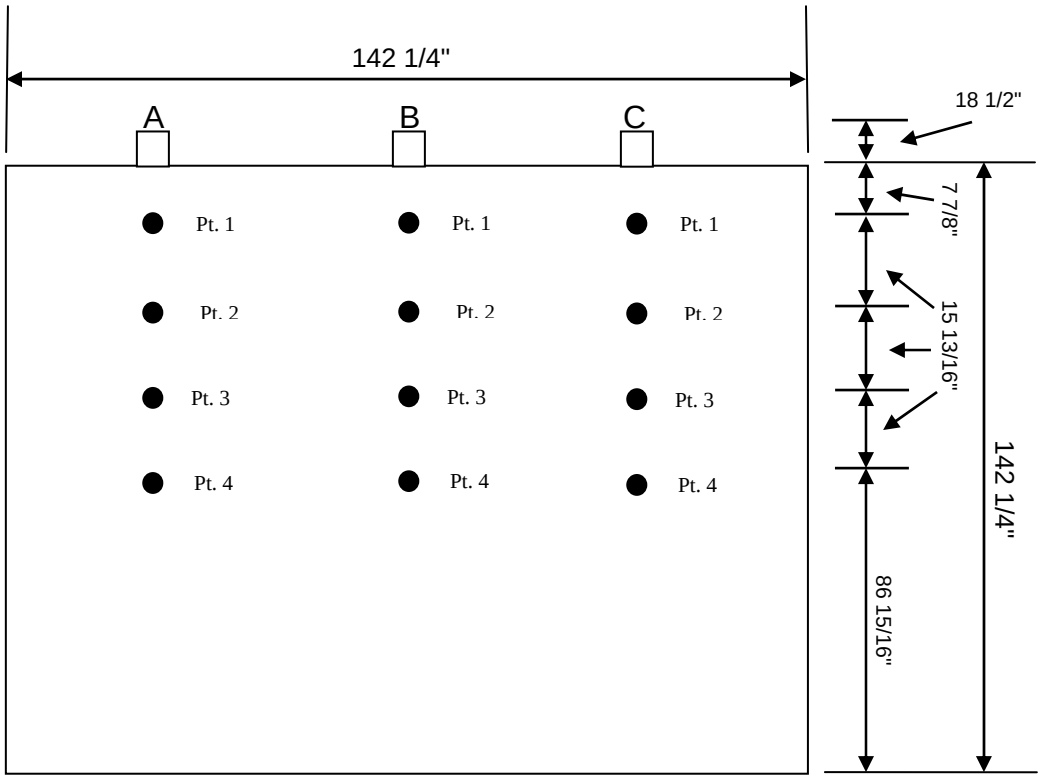
Location of Traverse Points

Appendix A

Location of Traverse Points SDA Inlet Duct

The sampling ports are located 13 feet 4 inches (1.12 equivalent duct diameters) downstream from a bend in the duct and 56 feet 3 inches (4.75 equivalent duct diameters) upstream from a bend in the duct. The locations of the traverse points were calculated as follows:

Figure 8: Location of Traverse Points - SDA Inlet Duct



Note: Physical limitations prevented the complete traversing of the SDA Inlet Duct.

Appendix A

Location of Traverse Points Stack

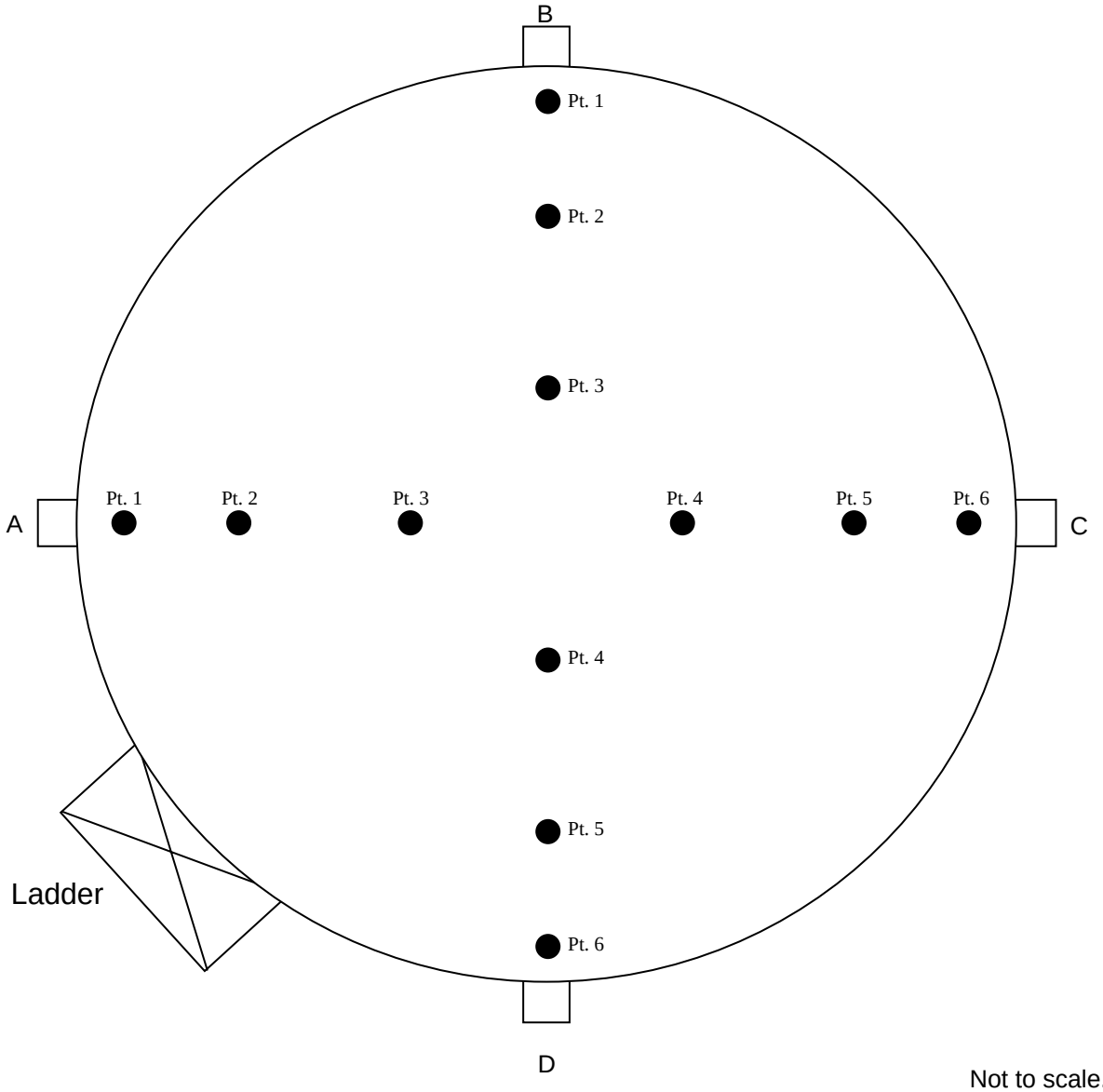
The sampling ports are located 78 feet (8.57 stack diameters) downstream from the inlet to the stack and 127 feet (13.96 stack diameters) upstream from the outlet to the stack. The locations of the traverse points were calculated as follows:

Table 13: Location of Velocity Traverse Points Boiler Stack

Port & Wall Thickness = 15 9/16 inches		
Inside Stack Diameter = 109 3/16 inches		
Point Number	Percent of Stack Diameter	Distance from Wall
1	4.4	4 13/16"
2	14.6	15 15/16"
3	29.6	32 5/16"
4	70.4	76 7/8"
5	85.4	93 1/4"
6	95.6	104 3/8"

Appendix A

Figure 9: Location of Traverse Points - Stack



Not to scale.

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Appendix B:

Nomenclature and Equations for Calculation of Source Emissions

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Nomenclature For Flow Rate and Moisture Calculations

Symbol	English Units	Metric Units	Description
A_s	in.^{2}	m^2	Stack Area
C_{an}	gr/dscf*	g/dscm*	Particulate – probe, cyclone, and filter
C_{ao}	gr/dscf*	g/dscm*	Particulate –total
C_{at}	gr/CF @ stack conditions	g/m3	Particulate – probe, cyclone, and filter
C_{au}	gr/CF @ stack conditions	g/m3	Particulate – total
C_{aw}	lbs/hr	kg/hr	Particulate – probe, cyclone, and filter
C_{ax}	lbs/hr	kg/hr	Particulate - total
C_p			Pitot Tube Calibration Factor
D_n	in.	m	Sampling Nozzle Diameter
%EA			Percent Excess Air at Sampling Point
g	32.2 ft/sec^2		Acceleration of gravity
%I			Percent Isokinetic
%M			Percent Moisture in the Stack Gas by Volume
M_d			Mole Fraction of Dry Gas
m_f	mg	mg	Particulate – probe, cyclone, and filter
mt	mg	mg	Particulate -total
M_{water}	18 lb/lb-mole		Molecular Weight of Water
MW	lb/lb-mole	g/g-mole	Molecular Weight of Stack Gas
MW_{air}	28.84 lb/lb-mole		Molecular Weight of Air
MW_d	lb/lb-mole	g/g-mole	Molecular Weight of Dry Stack Gas

Symbol	English Units	Metric Units	Description
P_b	"Hg Absolute	mm Hg	Barometric Pressure
P_m	"H_2O	mm H_2O	Orifice Pressure drop
Ps	"Hg Absolute	mm Hg	Stack Pressure
ΔP	"H_2O	mm H_2O	Velocity Head of Stack Gas
P_{std}	29.92" Hg	760 mm Hg	Standard Barometric Pressure
Q_a	ACFM	m^3/hr	Stack Gas Volume at Actual Stack Conditions
Q_s	DSCFM*	dscm/hr*	Stack Gas Volume at 29.92" Hg, 528° R, dry
R	21.83" Hg-ft^3/lb-mole °R		Universal Gas Constant
T_m	°F	°C	Average Gas Meter Temperature
T_t	min	min	Net Time of Test
T_s	°F	°C	Stack Temperature
T_{std}	528 °R	293 °K	Standard Temperature
V_m	ft^3	m^3	Volume of Dry Gas Sampled @ Meter Conditions
Vm_{std}	dscf*	dscm*	Volume of Dry Gas Sampled @ Standard Conditions
V_s	fpm	m/sec	Stack Velocity @ Stack Conditions
V_w	ml	ml	Total Water Collected in Impingers and Silica Gel
Vw_{gas}	scf*	scm*	Volume of Water Vapor Collected @ Standard Conditions

Symbol	English Units	Metric Units	Description
ρ_{air}	0.0748 lbs/ft^3		Density of Air
ρ_{water}	1 g/ml		Density of Water
ρ_{man}	62.32 lbs/ft^3		Density of Manometer Oil (Inches of Water)

Standard Conditions: 29.92" Hg, 68° F (760 mm Hg, 20 °C)

AIR SAMPLING ASSOCIATES, INC.

EXAMPLE CALCULATIONS

1. Volume of dry gas sampled at standard conditions. *

$$V_{m_{std}} = V_m \left(\frac{T_{std}}{T_m + 460} \right) \left[\frac{P_b + \frac{P_m}{13.6}}{P_{std}} \right]$$

$$V_{m_{std}} = 17.65\ V_m \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460} \right] = \text{dscf}$$

$$V_{m_{std}} = \text{dscf} \times 0.028317 = \text{dscm}$$

2. Volume of water vapor collected at standard conditions. *

$$V_{w_{gas}} = \frac{(V_w - gms\ SO_2 - gms\ H_2S)\ \rho_{water}\ RT_{std}}{P_{std}\ M_{water}\ 453.6}$$

$$V_{w_{gas}} = 0.0472\ (V_w - gms\ SO_2 - gms\ H_2S) = scf$$

$$V_{w_{gas}} = scf \times 0.028317 = scm$$

3. Percent moisture in stack gas.

$$\%M = \frac{V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} \times 100 = \%$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

4. Mole fraction of dry gas.

$$M_d = \frac{100 - \%M}{100}$$

5. Average molecular weight of dry stack gas.

$$MW_d = \left[\%CO_2 \times \frac{44}{100}\right] + \left[\%O_2 \times \frac{32}{100}\right] + \left[\%N_2 \times \frac{28}{100}\right] + \left[\%CO \times \frac{28}{100}\right] = lb/lb\text{-}mole$$

$$= g/g\text{-}mole$$

6. Molecular weight of stack gas.

$$MW = MW_d \times M_d + 18\,(1 - M_d) = \frac{lb}{lb\text{-}mole} = g/g\text{-}mole$$

7. Percent excess air at sampling point.

$$\%EA = \frac{100\,[\%O_2 - (0.5\,\%CO)]}{0.265\,(\%N_2) - [\%O_2 - (0.5\,\%CO)]}$$

8. Stack Pressure.

$$P_s = P_b + \frac{Stack\ Pressure\ "H_2O}{13.6} = "Hg\ Absolute$$

$$P_s = "Hg\ Abs. \times 25.4 = mm\ Hg$$

9. Stack velocity at stack conditions.

$$V_s = C_p\,60\left[\frac{2g \times \rho_{man} \times P_{std} \times MW_{air} \times (T_s + 460) \times \Delta P}{12 \times \rho_{air} \times P_s \times MW \times T_{std}}\right]^{1/2}$$

$$V_s = 5{,}123.8\,C_p\left[\frac{(T_s + 460)}{P_s \times MW}\right]^{1/2} \sqrt{\Delta P}\ \text{average} = \text{fpm}$$

$$V_s = \text{fpm} \times 0.00508 = \text{m/sec}$$

10. Dry stack gas volume at standard conditions. *

$$Q_s = \frac{1}{144} V_s \text{ x } A_s \text{ x } M_d \text{ x } \frac{T_{std}}{T_s + 460} \text{ x } \frac{P_s}{P_{std}}$$

$$Q_s = \frac{0.123\, V_s \text{ x } A_s \text{ x } M_d \text{ x } P_s}{T_s + 460} = DSCFM$$

$$Q_s = DSCFM \text{ x } 1.6990 = dscm/hr$$

11. Actual stack gas volume at stack conditions.

$$Q_a = \frac{V_s \text{ x } A_s}{144} = ACFM$$

$$Q_a = ACFM \text{ x } 1.6990 = m^3/hr$$

12. Percent Isokinetic

$$\%I = \frac{V_{mstd} \text{ x } (T_s + 460) \text{ x } P_{std} \text{ x } 100 \text{ x } 144\, in.^2/ft^2}{M_d \text{ x } T_{std} \text{ x } P_s \text{ x } T_t \text{ x } V_s \left(\frac{\Pi \text{ x } D_n^2}{4} \right)}$$

$$\%I = \frac{1039 \text{ x } V_{mstd} \text{ x } (T_s + 460)}{M_d \text{ x } P_s \text{ x } T_t \text{ x } V_s \text{ x } D_n^2}$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

13. Particulate – Probe, cyclone, and filter.

$$C_{an} = \frac{m_f}{V_{m_{std}}} x \frac{1\,gr}{64.8\,mg}$$

$$C_{an} = 0.0154 \text{ x } \frac{mf}{V_{m_{std}}} \text{ gr/dscf } *$$

$$C_{an} = \text{gr/dscf x } 2.290 = \text{g/dscm } *$$

14. Particulate total.

$$C_{ao} = 0.0154 \text{ x } \frac{m_t}{V_{m_{std}}} = gr\,/\,dscf\ *$$

$$C_{ao} = \text{gr/dscf x } 2.290 = \text{g/dscm } *$$

15. Particulate – probe, cyclone, and filter at stack conditions.

$$C_{at} = C_{an} \text{ x } \frac{P_s}{P_{std}} \text{ x } \frac{(T_{std})}{(T_s + 460)} \text{ x } M_d$$

$$C_{at} = \frac{17.65 \text{ x } C_{an} \text{ x } Ps \text{ x } Md}{Tx + 460} = \text{gr/CF}$$

$$C_{at} = \text{gr/CF x } 2.290 = \text{g/m}^3$$

16. Particulate – total, at stack conditions.

$$C_{au} = \frac{17.65 \text{ x } C_{ao} \text{ x } P_s \text{ x } M_d}{T_s + 460} = \text{gr/CF}$$

$$C_{au} = \text{gr/CF x } 2.290 = \text{g/m}^3$$

* 29.92" Hg, 68° F (760 mm Hg, 20 °C)

17. Particulate – probe, cyclone, and filter.

$$C_{aw} = C_{an} \text{ x } Q_s \text{ x } \frac{60 \text{ min.}}{1 \text{hr}} x \frac{1 \text{lb}}{7{,}000 \text{ gr}}$$

$$C_{aw} = 0.00857 \text{ x } C_{an} \text{ x } Q_s = \text{lbs/hr}$$

$$C_{aw} = \text{lbs/hr x } 0.4536 = \text{kg/hr}$$

18. Particulate – total.

$$C_{ax} = 0.00857 \text{ x } C_{ao} \text{ x } Q_s = \text{lbs/hr}$$

$$C_{ax} = \text{lbs/hr x } 0.4536 = \text{kg/hr}$$

19. Ammonia – ppm.

$$\text{ppm} = \frac{\text{mgs}}{\text{Vm}_{\text{std}} \text{ (dscm)}} x \frac{24.04}{17}$$

*29.92" Hg, 68° F (760 mm Hg, 20 °C)

SOURCE EMISSION SURVEY

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: SDA Inlet Duct (EPA 17, 26A, CTM-027)

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
DATE			09/23/08	09/23/08	09/23/08
BEGIN TIME			0910	1250	1744
END TIME			1013	1354	1848
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	27.07	27.11	27.10
		(mm Hg)	(688.00)	(689.00)	(688.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	0.730	0.551	0.560
		(mm H2O)	(18.500)	(14.000)	(14.200)
	DGM CALIBRATION FACTOR		0.974	0.974	0.974
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	28.989	26.502	26.734
	@ METER CONDITIONS	(m^3)	(0.821)	(0.750)	(0.757)
	LEAK CHECK VOLUME	ft.^3	1.240	0.842	0.631
T(m)	AVERAGE GAS METER	DEG.F	49	54	55
	TEMPERATURE	(DEG.C)	(9)	(12)	(13)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	27.265	24.708	24.867
	@ STANDARD CONDITIONS*	(DSCM)	(0.772)	(0.700)	(0.704)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	74.4	62.5	67.0
V(w[gas])	VOLUME WATER VAPOR	SCF	3.512	2.950	3.162
	COLLECTED @ STANDARD	(SCM)	(0.099)	(0.084)	(0.090)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS BY VOLUME	%	11.41	10.67	11.28
Md	MOL FRACTION OF DRY GAS		0.8859	0.8933	0.8872
Tt	NET TIME OF TEST	MINUTES	60	60	60

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: SDA Inlet Duct (EPA 17, 26A, CTM-027)

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
CO2		%	13.4	14.2	14.1
O2		%	5.9	5.3	5.6
CO		%	0.0	0.0	0.0
N2		%	80.7	80.5	80.3
%EA	EXCESS AIR @ SAMPLING POINT	%	38.1	33.1	35.7
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.38 (30.38)	30.48 (30.48)	30.48 (30.48)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.97 (28.97)	29.15 (29.15)	29.07 (29.07)
Cp	PITOT TUBE CALIBRATION		0.821	0.821	0.821
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	0.896 (22.800)	0.894 (22.700)	0.908 (23.100)
DELTA P ^(1/2)		"H2O	0.939	0.938	0.946
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	336 (169)	333 (167)	330 (166)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg) "H20	25.78 (655.00) -17.50	25.88 (657.00) -16.70	25.85 (657.00) -17.00
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	4,078 (21)	4,046 (21)	4,080 (21)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	20,235 (13)	20,235 (13)	20,235 (13)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS* WET STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR) WSCFH	291,213 (494,771) 19,723,197	293,577 (498,787) 19,718,594	294,797 (500,860) 19,936,677
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	573,037 (973,590)	568,479 (965,846)	573,361 (974,140)
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.193 (0.005)	0.193 (0.005)	0.193 (0.005)
%I	PERCENT ISOKINETIC	%	108.3	97.4	97.6

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: SDA Inlet Duct (EPA 17, 26A, CTM-027)

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
Mf	PARTICULATE - PROBE, CYCLONE AND FILTER	mg	6,814.1	7,710.1	8,732.4
Mt	PARTICULATE - TOTAL	mg	---	---	---
Can	PARTICULATE - PROBE, CYCLONE AND FILTER	gr/DSCF*	3.8488	4.8056	5.4079
		(g/DSCM)	(8.8137)	(11.0047)	(12.3842)
Cao	PARTICULATE - TOTAL	gr/DSCF*	---	---	---
		(g/DSCM)	---	---	---
Cat	PARTIC.-PROBE, CYCLONE AND FILTER @ STACK COND.	gr/CF	1.9490	2.4727	2.7710
		(g/m3)	(4.4632)	(5.6625)	(6.3456)
Cau	PARTICULATE - TOTAL @ STACK CONDITIONS	gr/CF	---	---	---
		(g/m3)	---	---	---
Caw	PARTICULATE - PROBE, CYCLONE AND FILTER	LBS/HR	9,605.40	12,090.55	13,662.65
		(Kg/HR)	(4,357.01)	(5,484.27)	(6,197.38)
Cax	PARTICULATE - TOTAL	LBS/HR	---	---	---
		(Kg/HR)	---	---	---

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION SURVEY

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: SDA Inlet Duct (CCT)

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
DATE			09/23/08	09/24/08	09/24/08
BEGIN TIME			1530	0745	0947
END TIME			1625	0845	1047
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	27.11	27.10	27.10
		(mm Hg)	(689.00)	(688.00)	(688.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	0.300	0.300	0.300
		(mm H2O)	(7.600)	(7.600)	(7.600)
	DGM CALIBRATION FACTOR		0.974	0.974	0.974
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	18.177	19.476	19.758
	@ METER CONDITIONS	(m^3)	(0.515)	(0.552)	(0.559)
	LEAK CHECK VOLUME	ft.^3	0.000	0.000	0.000
T(m)	AVERAGE GAS METER	DEG.F	53	36	46
	TEMPERATURE	(DEG.C)	(12)	(2)	(8)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	16.968	18.797	18.692
	@ STANDARD CONDITIONS*	(DSCM)	(0.480)	(0.532)	(0.529)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	41.8	48.3	45.3
V(w[gas])	VOLUME WATER VAPOR	SCF	1.973	2.280	2.138
	COLLECTED @ STANDARD	(SCM)	(0.056)	(0.065)	(0.061)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS BY VOLUME	%	10.42	10.82	10.26
Md	MOL FRACTION OF DRY GAS		0.8958	0.8918	0.8974
Tt	NET TIME OF TEST	MINUTES	55	60	60

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: SDA Inlet Duct (CCT)

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
CO2		%	0.0	0.0	0.0
O2		%	0.0	0.0	0.0
CO		%	0.0	0.0	0.0
N2		%	100.0	100.0	100.0
%EA	EXCESS AIR @ SAMPLING POINT	%	0.0	0.0	0.0
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.00 (28.00)	28.00 (28.00)	28.00 (28.00)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	26.96 (26.96)	26.92 (26.92)	26.97 (26.97)

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SULFUR TRIOXIDE EMISSION DATA

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: SDA Inlet Duct (CCT)

RUN NUMBER	RUN NUMBER		
	1	2	3
DATE	09/23/08	09/24/08	09/24/08
START TIME	1530	0745	0947
END TIME	1625	0845	1047
N - NORMALITY OF Ba(ClO4)2	0.0000	0.0000	0.0000
ML(I) - ml IN IMPINGER	0.00	0.00	0.00
ML(A) - ml IN ALIQUOT	0.00	0.00	0.00
ML(B) - ml OF Ba(ClO4)2 TO TITRATE	0.00	0.00	0.00
ML(BB) - ml OF Ba(ClO4)2 TO TITRATE BLANK	0.00	0.00	0.00
Tm - AVERAGE GAS METER TEMPERATURE, DEG.F	53	36	46
Vm - VOLUME OF DRY GAS SAMPLED @ METER CONDITIONS, FT^3	18.177	19.476	19.758
Pb - BAROMETRIC PRESSURE, "Hg Abs.	27.11	27.10	27.10
Qs - STACK GAS VOLUME DRY @ STANDARD CONDITIONS, *SCFM	—	—	—
C(I) - SO3 IN IMPINGERS IN mgs	5.606	22.952	2.606
ppm SO3	3.51	12.99	1.48
C(SO3) - EMISSION RATE OF SO3, lbs/day	—	—	—
Cs - EMISSION RATE OF SULFUR, lbs/day	—	—	—

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

C(I) = ML(I) * [ML(B) - ML(BB)] * N * 40 / ML(A)
ppm SO3 = 0.6021 * C(I) * [Tm + 460] / Vm * Pb
C(SO3) = ppm SO3 * Qs * 0.0002991
Cs = C(SO3) / 2.5

SOURCE EMISSION SURVEY

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (Method 5/202)

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
DATE			09/23/08	09/23/08	09/24/08
BEGIN TIME			1058	1551	0710
END TIME			1302	1756	0914
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	27.11	27.14	27.14
		(mm Hg)	(689.00)	(689.00)	(689.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	1.633	1.617	1.700
		(mm H2O)	(41.500)	(41.100)	(43.200)
	DGM CALIBRATION FACTOR		0.997	0.997	0.997
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	91.120	91.433	91.612
	@ METER CONDITIONS	(m^3)	(2.580)	(2.589)	(2.594)
	LEAK CHECK VOLUME	ft.^3	0.000	0.000	0.000
T(m)	AVERAGE GAS METER	DEG.F	86	89	69
	TEMPERATURE	(DEG.C)	(30)	(32)	(21)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	80.207	80.128	83.339
	@ STANDARD CONDITIONS*	(DSCM)	(2.271)	(2.269)	(2.360)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	308.4	304.7	334.1
V(w[gas])	VOLUME WATER VAPOR	SCF	14.556	14.382	15.770
	COLLECTED @ STANDARD	(SCM)	(0.412)	(0.407)	(0.447)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS BY VOLUME	%	15.36	15.22	15.91
Md	MOL FRACTION OF DRY GAS		0.8464	0.8478	0.8409
Tt	NET TIME OF TEST	MINUTES	120	120	120

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (Method 5/202)

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
CO2		%	13.4	13.7	13.4
O2		%	6.2	6.0	6.2
CO		%	0.0	0.0	0.0
N2		%	80.4	80.3	80.4
%EA	EXCESS AIR @ SAMPLING POINT	%	41.0	39.3	41.0
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.39 (30.39)	30.43 (30.43)	30.39 (30.39)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.49 (28.49)	28.54 (28.54)	28.42 (28.42)
Cp	PITOT TUBE CALIBRATION		0.823	0.823	0.823
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	3.444 (87.500)	3.304 (83.900)	3.442 (87.400)
DELTA P ^(1/2)		"H2O	1.855	1.816	1.853
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	206 (97)	204 (96)	210 (99)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg) "H20	27.00 (686.00) -1.50	27.05 (687.00) -1.20	27.08 (688.00) -0.88
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	7,279 (37)	7,102 (36)	7,291 (37)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	9,363 (6)	9,363 (6)	9,363 (6)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS* WET STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR) WSCFH	287,645 (488,709) 20,390,714	282,484 (479,940) 19,991,791	285,381 (484,862) 20,362,540
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	473,257 (804,064)	461,779 (784,563)	474,047 (805,406)
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.168 (0.004)	0.168 (0.004)	0.168 (0.004)
%I	PERCENT ISOKINETIC	%	98.5	100.2	103.2

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (Method 5/202)

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
Mf	PARTICULATE - PROBE, CYCLONE AND FILTER	mg	37.9	41.3	51.0
Mt	PARTICULATE - TOTAL	mg	403.6	415.1	403.5
Can	PARTICULATE - PROBE, CYCLONE AND FILTER	gr/DSCF* (g/DSCM)	0.0073 (0.0167)	0.0079 (0.0182)	0.0094 (0.0216)
Cao	PARTICULATE - TOTAL	gr/DSCF* (g/DSCM)	0.0775 (0.1775)	0.0798 (0.1827)	0.0746 (0.1707)
Cat	PARTIC.-PROBE, CYCLONE AND FILTER @ STACK COND.	gr/CF (g/m3)	0.0044 (0.0101)	0.0048 (0.0110)	0.0057 (0.0131)
Cau	PARTICULATE - TOTAL @ STACK CONDITIONS	gr/CF (g/m3)	0.0469 (0.1074)	0.0486 (0.1113)	0.0447 (0.1024)
Caw	PARTICULATE - PROBE, CYCLONE AND FILTER	LBS/HR (Kg/HR)	17.94 (8.14)	19.22 (8.72)	23.05 (10.45)
Cax	PARTICULATE - TOTAL	LBS/HR (Kg/HR)	191.03 (86.65)	193.14 (87.61)	182.36 (82.72)

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION SURVEY

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (26A)

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
DATE			09/23/08	09/23/08	09/23/08
BEGIN TIME			0910	1354	1823
END TIME			1014	1503	1926
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	27.11	27.11	27.14
		(mm Hg)	(689.00)	(689.00)	(689.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	1.379	1.317	1.283
		(mm H2O)	(35.000)	(33.500)	(32.600)
	DGM CALIBRATION FACTOR		0.997	0.997	0.997
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	41.543	41.524	41.261
	@ METER CONDITIONS	(m^3)	(1.176)	(1.176)	(1.168)
	LEAK CHECK VOLUME	ft.^3	0.000	0.000	0.000
T(m)	AVERAGE GAS METER	DEG.F	68	86	87
	TEMPERATURE	(DEG.C)	(20)	(30)	(31)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	37.788	36.520	36.259
	@ STANDARD CONDITIONS*	(DSCM)	(1.070)	(1.034)	(1.027)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	152.8	144.4	133.5
V(w[gas])	VOLUME WATER VAPOR	SCF	7.212	6.816	6.301
	COLLECTED @ STANDARD	(SCM)	(0.204)	(0.193)	(0.178)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS BY VOLUME	%	16.03	15.73	14.81
Md	MOL FRACTION OF DRY GAS		0.8397	0.8427	0.8519
Tt	NET TIME OF TEST	MINUTES	60	60	60

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (26A)

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
CO2		%	13.6	13.5	13.6
O2		%	6.1	6.1	6.0
CO		%	0.0	0.0	0.0
N2		%	80.3	80.4	80.4
%EA	EXCESS AIR @ SAMPLING POINT	%	40.2	40.1	39.2
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.42 (30.42)	30.40 (30.40)	30.42 (30.42)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.43 (28.43)	28.45 (28.45)	28.58 (28.58)
Cp	PITOT TUBE CALIBRATION		0.823	0.823	0.823
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	3.954 (100.400)	3.850 (97.800)	3.763 (95.600)
DELTA P ^(1/2)		"H2O	1.987	1.961	1.939
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	207 (97)	208 (98)	207 (97)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg) "H20	26.99 (686.00) -1.60	27.00 (686.00) -1.50	27.04 (687.00) -1.30
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	7,812 (40)	7,711 (39)	7,596 (39)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	9,363 (6)	9,363 (6)	9,363 (6)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS* WET STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR) WSCFH	305,692 (519,371) 21,842,944	302,476 (513,907) 21,536,205	302,117 (513,297) 21,278,343
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	507,944 (862,997)	501,403 (851,884)	493,913 (839,158)
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.155 (0.004)	0.155 (0.004)	0.155 (0.004)
%I	PERCENT ISOKINETIC	%	102.6	100.2	99.6

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION SURVEY

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (CCT)

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
DATE			09/24/08	09/24/08	09/24/08
BEGIN TIME			1407	1600	1745
END TIME			1507	1700	1845
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	27.08	27.02	26.99
		(mm Hg)	(688.00)	(686.00)	(686.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	0.300	0.300	0.300
		(mm H2O)	(7.600)	(7.600)	(7.600)
	DGM CALIBRATION FACTOR		0.974	0.974	0.974
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	20.209	20.321	20.266
	@ METER CONDITIONS	(m^3)	(0.572)	(0.575)	(0.574)
	LEAK CHECK VOLUME	ft.^3	0.000	0.000	0.000
T(m)	AVERAGE GAS METER	DEG.F	65	71	69
	TEMPERATURE	(DEG.C)	(18)	(22)	(21)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	18.413	18.266	18.265
	@ STANDARD CONDITIONS*	(DSCM)	(0.521)	(0.517)	(0.517)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	71.4	70.4	74.3
V(w[gas])	VOLUME WATER VAPOR	SCF	3.370	3.323	3.507
	COLLECTED @ STANDARD	(SCM)	(0.095)	(0.094)	(0.099)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS BY VOLUME	%	15.47	15.39	16.11
Md	MOL FRACTION OF DRY GAS		0.8453	0.8461	0.8389
Tt	NET TIME OF TEST	MINUTES	60	60	60

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (CCT)

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	1	2	3
CO2		%	0.0	0.0	0.0
O2		%	0.0	0.0	0.0
CO		%	0.0	0.0	0.0
N2		%	100.0	100.0	100.0
%EA	EXCESS AIR @ SAMPLING POINT	%	0.0	0.0	0.0
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.00 (28.00)	28.00 (28.00)	28.00 (28.00)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	26.45 (26.45)	26.46 (26.46)	26.39 (26.39)

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SULFUR TRIOXIDE EMISSION DATA

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (CCT)

RUN NUMBER	RUN NUMBER		
	1	2	3
DATE	09/24/08	09/24/08	09/24/08
START TIME	1407	1600	1745
END TIME	1507	1700	1845
N - NORMALITY OF Ba(ClO4)2	0.0000	0.0000	0.0000
ML(I) - ml IN IMPINGER	0.00	0.00	0.00
ML(A) - ml IN ALIQUOT	0.00	0.00	0.00
ML(B) - ml OF Ba(ClO4)2 TO TITRATE	0.00	0.00	0.00
ML(BB) - ml OF Ba(ClO4)2 TO TITRATE BLANK	0.00	0.00	0.00
Tm - AVERAGE GAS METER TEMPERATURE, DEG.F	65	71	69
Vm - VOLUME OF DRY GAS SAMPLED @ METER CONDITIONS, FT^3	20.209	20.321	20.266
Pb - BAROMETRIC PRESSURE, "Hg Abs.	27.08	27.02	26.99
Qs - STACK GAS VOLUME DRY @ STANDARD CONDITIONS, *SCFM	---	---	---
C(I) - SO3 IN IMPINGERS IN mgs	2.233	1.490	2.561
ppm SO3	1.29	0.87	1.49
C(SO3) - EMISSION RATE OF SO3, lbs/day			
Cs - EMISSION RATE OF SULFUR, lbs/day			

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

C(I) = ML(I) * [ML(B) - ML(BB)] * N * 40 / ML(A)
ppm SO3 = 0.6021 * C(I) * [Tm + 460] / Vm * Pb
C(SO3) = ppm SO3 * Qs * 0.0002991
Cs = C(SO3) / 2.5

SOURCE EMISSION SURVEY

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (201A/202)

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
DATE			09/24/08	09/24/08	09/24/08
BEGIN TIME			1030	1308	1505
END TIME			1135	1412	1610
P(b)	BAROMETRIC PRESSURE	"Hg Abs.	27.14	27.08	27.02
		(mm Hg)	(689.00)	(688.00)	(686.00)
P(m)	ORIFICE PRESSURE DROP	"H2O	0.410	0.370	0.370
		(mm H2O)	(10.400)	(9.400)	(9.400)
	DGM CALIBRATION FACTOR		0.997	0.997	0.997
V(m)	VOLUME DRY GAS SAMPLED	ft.^3	24.297	23.211	23.365
	@ METER CONDITIONS	(m^3)	(0.688)	(0.657)	(0.662)
	LEAK CHECK VOLUME	ft.^3	0.000	0.000	0.000
T(m)	AVERAGE GAS METER	DEG.F	70	75	80
	TEMPERATURE	(DEG.C)	(21)	(24)	(27)
V(m[std])*	VOLUME DRY GAS SAMPLED	DSCF	21.984	20.757	20.656
	@ STANDARD CONDITIONS*	(DSCM)	(0.623)	(0.588)	(0.585)
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	89.6	79.2	77.3
V(w[gas])	VOLUME WATER VAPOR	SCF	4.229	3.738	3.649
	COLLECTED @ STANDARD	(SCM)	(0.120)	(0.106)	(0.103)
	CONDITIONS*				
%M	MOISTURE IN STACK GAS BY VOLUME	%	16.13	15.26	15.01
Md	MOL FRACTION OF DRY GAS		0.8387	0.8474	0.8499
Tt	NET TIME OF TEST	MINUTES	61	61	61

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (201A/202)

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 1	2	3
CO2		%	13.4	13.4	13.4
O2		%	6.2	6.2	6.2
CO		%	0.0	0.0	0.0
N2		%	80.4	80.4	80.4
%EA	EXCESS AIR @ SAMPLING POINT	%	41.0	41.0	41.0
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.39 (30.39)	30.39 (30.39)	30.39 (30.39)
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.39 (28.39)	28.50 (28.50)	28.53 (28.53)
Cp	PITOT TUBE CALIBRATION		0.823	0.823	0.823
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	3.442 (87.400)	3.442 (87.400)	3.442 (87.400)
DELTA P ^(1/2)		"H2O	1.853	1.853	1.853
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	210 (99)	211 (99)	214 (101)
Ps	STACK PRESSURE	"Hg Abs. (mm Hg) "H20	27.05 (687.00) -1.20	26.97 (685.00) -1.50	26.90 (683.00) -1.60
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	7,299 (37)	7,301 (37)	7,323 (37)
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	9,363 (6)	9,363 (6)	9,363 (6)
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS* WET STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR) WSCFH	284,631 (483,588) 20,362,299	286,384 (486,566) 20,277,366	286,068 (486,030) 20,195,411
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	474,560 (806,277)	474,699 (806,514)	476,127 (808,940)
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.160 (0.004)	0.131 (0.003)	0.131 (0.003)
%I	PERCENT ISOKINETIC	%	59.2	82.8	82.5

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION SURVEY

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (201A/202)

SOURCE EMISSION CALCULATIONS

SYMBOL	DESCRIPTION	UNITS	RUN NUMBER 4		
DATE			09/24/08		
BEGIN TIME			1700		
END TIME			1804		
P(b)	BAROMETRIC PRESSURE	"Hg Abs. (mm Hg)	26.99 (686.00)		
P(m)	ORIFICE PRESSURE DROP	"H2O (mm H2O)	0.370 (9.400)		
	DGM CALIBRATION FACTOR		0.997		
V(m)	VOLUME DRY GAS SAMPLED @ METER CONDITIONS LEAK CHECK VOLUME	ft.^3 (m^3) ft.^3	23.004 (0.651) 0.000		
T(m)	AVERAGE GAS METER TEMPERATURE	DEG.F (DEG.C)	78 (26)		
V(m[std])*	VOLUME DRY GAS SAMPLED @ STANDARD CONDITIONS*	DSCF (DSCM)	20.389 (0.577)		
V(w)	TOTAL WATER COLLECTED, IMPINGERS & SILICA GEL	ml	79.0		
V(w[gas])	VOLUME WATER VAPOR COLLECTED @ STANDARD CONDITIONS*	SCF (SCM)	3.729 (0.106)		
%M	MOISTURE IN STACK GAS BY VOLUME	%	15.46		
Md	MOL FRACTION OF DRY GAS		0.8454		
Tt	NET TIME OF TEST	MINUTES	61		

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

SOURCE EMISSION CALCULATIONS

JOB NUMBER: 08-026
JOB NAME: ADA-ES
LOCATION: Hardin, Montana
UNIT TESTED: Stack (201A/202)

			RUN NUMBER		
SYMBOL	DESCRIPTION	UNITS	4		
CO2		%	13.4		
O2		%	6.2		
CO		%	0.0		
N2		%	80.4		
%EA	EXCESS AIR @ SAMPLING POINT	%	41.0		
MWd	MOLECULAR WEIGHT OF DRY STACK GAS	LB/LB-MOLE (g/g-MOLE)	30.39 (30.39)		
MW	MOLECULAR WEIGHT OF STACK GAS	LB/LB-MOLE (g/g-MOLE)	28.48 (28.48)		
Cp	PITOT TUBE CALIBRATION		0.823		
DELTA P	VELOCITY HEAD OF STACK GAS	"H2O (mm H20)	3.442 (87.400)		
DELTA P ^(1/2)		"H2O	1.853		
Ts	STACK TEMPERATURE	DEG. F (DEG. C)	211 (99)		
Ps	STACK PRESSURE	"Hg Abs. (mm Hg) "H20	26.91 (684.00) -1.10		
Vs	STACK VELOCITY @ STACK CONDITIONS	FPM (m/SEC.)	7,311 (37)		
As	STACK AREA	(SQ.INCHES) (SQ.METERS)	9,363 (6)		
Qs	DRY STACK GAS VOLUME @ STANDARD CONDITIONS* WET STACK GAS VOLUME @ STANDARD CONDITIONS*	DSCFM (DSCM/HR) WSCFH	285,463 (485,002) 20,259,972		
Qa	ACTUAL STACK GAS VOLUME @ STACK CONDITIONS	ACFM (m^3/HR)	475,395 (807,696)		
Dn	SAMPLING NOZZLE DIAM.	IN. (m)	0.131 (0.003)		
%I	PERCENT ISOKINETIC	%	81.6		

* 68 Deg.F, 29.92 "Hg (20 Deg.C, 760 mm Hg)

AIR SAMPLING ASSOCIATES, INC.

Appendix C:

Calibration Data

AIR SAMPLING ASSOCIATES, INC.

Appendix C

Table 14: Calibration Data

Pre-Test Calibrations:

Equipment	Calibration Factor	Calibration Date
Dry Gas Meter 2-1	0.997	08/19/08
Digital Temperature Indicator 2-1		08/19/08
Dry Gas Meter 2-1 Orifice		08/19/08
Dry Gas Meter 2-2	0.974	08/18/08
Digital Temperature Indicator 2-2		08/18/08
Dry Gas Meter 2-2 Orifice		08/18/08
Pitot Tube 3-2	0.823	07/03/08
Pitot Tube 3-3	0.823	07/03/08
Pitot Tube 3-4	0.821	05/01/08
Nozzle 3-2	0.168	03/03/08
Nozzle 7-2	0.193	01/18/08
Nozzle 08-026-1	0.155	09/24/08
Nozzle 08-026-2	0.160	09/24/08
Nozzle 08-026-3	0.131	09/24/08

AIR SAMPLING ASSOCIATES, INC.

Post-Test Calibrations:

Equipment	Calibration Factor	Calibration Date
Dry Gas Meter 2-1	0.982	10/03/08
Digital Temperature Indicator 2-1		10/03/08
Dry Gas Meter 2-2	0.981	10/03/08
Digital Temperature Indicator 2-2		10/03/08
Pitot Tube 3-2	0.823	10/03/08
Pitot Tube 3-3	0.824	10/06/08
Pitot Tube 3-4	0.821	10/06/08
Nozzle 3-2	0.169	10/10/08
Nozzle 7-2	0.192	10/10/08
Nozzle 08-026-1	0.155	09/30/08
Nozzle 08-026-2	0.160	09/30/08
Nozzle 08-026-3	0.131	09/30/08

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-1

Date Calibration Performed: 08/19/08

ΔH Setting (" H_2O)	C_{DG}
0.50	1.009
1.00	1.012
1.50	0.994
2.00	0.990
3.00	0.989
4.00	0.987
Average	0.997

Variation +: 1.50%

Variation -: -1.00%

Certified by: Patrick Selakovich 8/19/08

Calibrator (Signature / Date)

Bill Hefley 8/19/08

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-1

Date Calibration Performed: 08/19/08

Run 1 at 0.5" ΔH Pb = 29.55 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	10:34	5.005	cf	80	°F	-0.2	" H_2O		293.205	cf	83	°F	79	°F	0.50	" H_2O
Start	10:22	0.000	cf	80	°F	-0.2	" H_2O		288.202	cf	81	°F	79	°F	0.50	" H_2O
Average		5.005	cf	80	°F	-0.2	" H_2O		5.003	cf	82	°F	79	°F	0.50	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{4.875} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{4.834} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{1.009}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-1

Date Calibration Performed: 08/19/08

Run 1 at 1.0" ΔH Pb = 29.55 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	10:45	5.202	cf	80	°F	-0.4	" H_2O		298.897	cf	86	°F	81	°F	1.00	" H_2O
Start	10:36	0.000	cf	80	°F	-0.4	" H_2O		293.704	cf	83	°F	80	°F	1.00	" H_2O
Average		5.202	cf	80	°F	-0.4	" H_2O		5.193	cf	85	°F	81	°F	1.00	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.065} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.005} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{1.012}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-1

Date Calibration Performed: 08/19/08

Run 1 at 1.5" ΔH Pb = 29.55 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	11:03	10.450	cf	80	°F	-0.6	" H_2O	309.850	cf	91	°F	82	°F	1.50	" H_2O
Start	10:48	0.000	cf	80	°F	-0.6	" H_2O	299.205	cf	85	°F	81	°F	1.50	" H_2O
Average		10.450	cf	80	°F	-0.6	" H_2O	10.645	cf	88	°F	82	°F	1.50	" H_2O

$$\textit{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.169} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.230} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{mstd}}{\textit{Dry Gas Meter } V_{mstd}} = \underline{0.994}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-1

Date Calibration Performed: 08/19/08

Run 1 at 2.0" ΔH Pb = 29.55 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	11:20	10.380	cf	80	°F	-0.8	" H_2O	321.049	cf	93	°F	84	°F	2.00	" H_2O
Start	11:07	0.000	cf	80	°F	-0.8	" H_2O	310.408	cf	88	°F	82	°F	2.00	" H_2O
Average		10.380	cf	80	°F	-0.8	" H_2O	10.641	cf	91	°F	83	°F	2.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.096} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.201} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.990}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-1

Date Calibration Performed: 08/19/08

Run 1 at 3.0" ΔH

Pb = 29.55 " Hg

Wet Test Meter C_f = 1.009

Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	11:33	10.765	cf	80	°F	-1.0	" H_2O		332.586	cf	96	°F	85	°F	3.00	" H_2O
Start	11:22	0.000	cf	80	°F	-1.0	" H_2O		321.529	cf	91	°F	84	°F	3.00	" H_2O
Average		10.765	cf	80	°F	-1.0	" H_2O		11.057	cf	94	°F	85	°F	3.00	" H_2O

$$\text{Wet Test Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.465} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.583} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{msd}}{\text{Dry Gas Meter } V_{msd}} = \underline{0.989}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-1

Date Calibration Performed: 08/19/08

Run 1 at 4.0" ΔH Pb = 29.55 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	11:46	10.130	cf	81	°F	-1.4	" H_2O		343.511	cf	98	°F	86	°F	4.00	" H_2O
Start	11:36	0.000	cf	81	°F	-1.4	" H_2O		333.104	cf	94	°F	85	°F	4.00	" H_2O
Average		10.130	cf	81	°F	-1.4	" H_2O		10.407	cf	96	°F	86	°F	4.00	" H_2O

$$\text{Wet Test Meter } V_{m_{std}} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{9.820} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{m_{std}} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{9.953} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{m_{std}}}{\text{Dry Gas Meter } V_{m_{std}}} = \underline{0.987}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 2-1

Date Calibration Performed: 08/19/08

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	10:10	32° F	32° F
Ambient Air	10:11	80° F	80° F
Boiling Water	10:12	212° F	214° F
Oven	10:13	250° F	252° F
Oven	10:14	300° F	303° F
Oven	10:15	350° F	352° F
Oven	10:16	400° F	402° F

Meter Adjusted? No

ASTM Reference Thermometer:

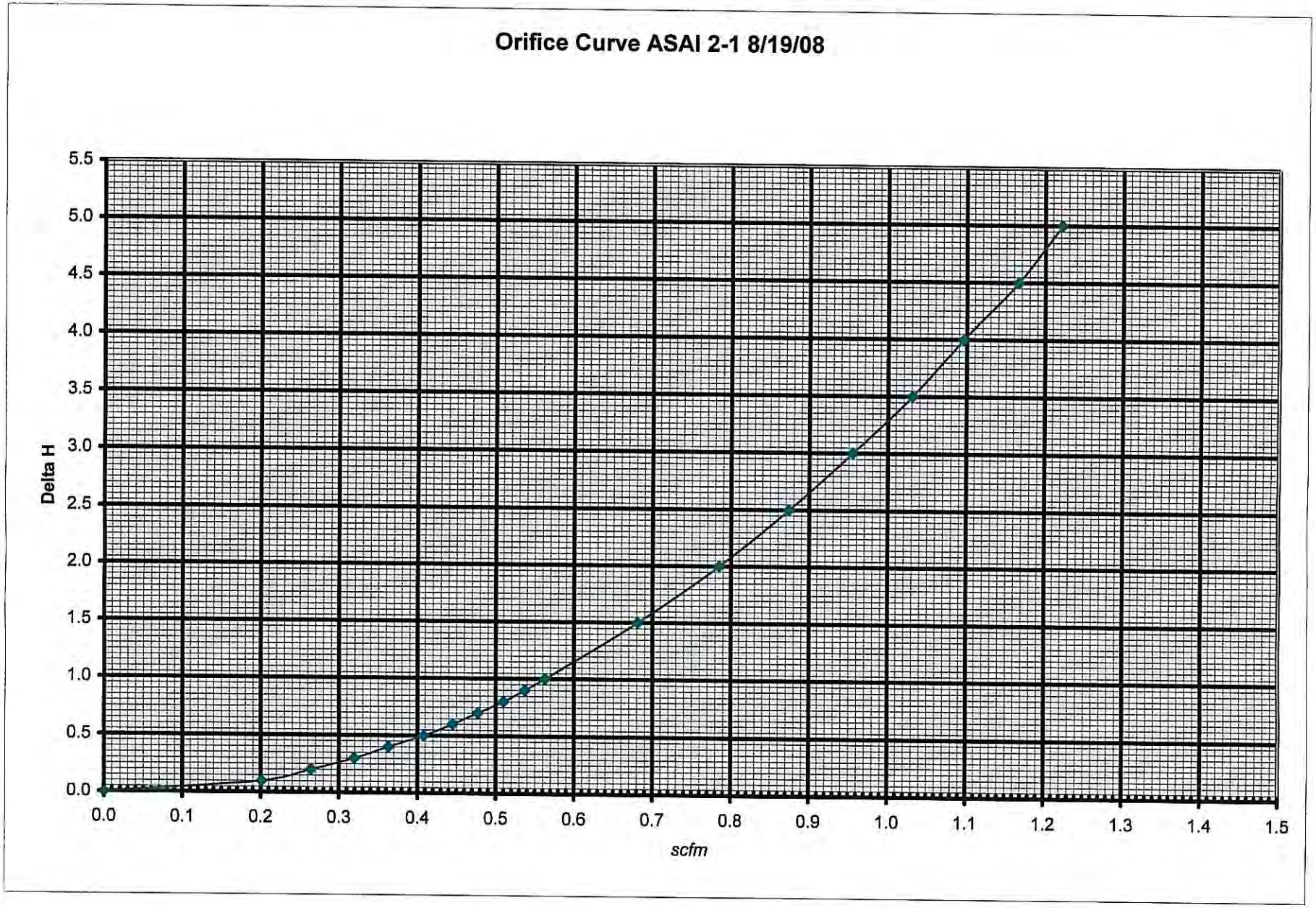
SN: 06000047	Range:	-0.1°C to 1360.6°C
SN:	Range:	
SN:	Range:	

Certified by: Patrick Selakovich 8/19/08

Calibrator (Signature / Date)

Bill Hefley 8/19/08

QA Officer (Signature / Date)


Orifice Curve ASAI 2-1 8/19/08
Delta H
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
scfm

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 08/18/08

ΔH Setting (" H_2O)	C_{DG}
0.50	0.976
1.00	0.977
1.50	0.975
2.00	0.974
3.00	0.971
4.00	0.971
Average	0.974

Variation +: 0.31%

Variation -: -0.31%

Certified by: Patrick Selakovich 8/18/08

Calibrator (Signature / Date)

Bill Hefley 8/18/08

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 08/18/08

Run 1 at 0.5" ΔH Pb = 29.57 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	9:18	5.040	cf	82	°F	-0.4	" H_2O		400.350	cf	77	°F	76	°F	0.50	" H_2O
Start	9:05	0.000	cf	82	°F	-0.4	" H_2O		395.205	cf	77	°F	76	°F	0.50	" H_2O
Average		5.040	cf	82	°F	-0.4	" H_2O		5.145	cf	77	°F	76	°F	0.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{4.892} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.011} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.976}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 08/18/08

Run 1 at 1.0" ΔH Pb = 29.57 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	9:29	5.235	cf	82	°F	-0.5	" H_2O		406.252	cf	79	°F	76	°F	1.00	" H_2O
Start	9:20	0.000	cf	82	°F	-0.5	" H_2O		400.912	cf	78	°F	76	°F	1.00	" H_2O
Average		5.235	cf	82	°F	-0.5	" H_2O		5.340	cf	79	°F	76	°F	1.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{5.080} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{5.200} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.977}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 08/18/08

Run 1 at 1.5" ΔH Pb = 29.57 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	9:46	10.562	cf	81	°F	-0.7	" H_2O	417.423	cf	82	°F	76	°F	1.50	" H_2O
Start	9:31	0.000	cf	81	°F	-0.7	" H_2O	406.604	cf	79	°F	76	°F	1.50	" H_2O
Average		10.562	cf	81	°F	-0.7	" H_2O	10.819	cf	81	°F	76	°F	1.50	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.263} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.530} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.975}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 08/18/08

Run 1 at 2.0" ΔH Pb = 29.57 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0								*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m			Meter Reading		Temperature In		Out		P_m	
End	10:02	10.531	cf	81	°F	-0.8	" H_2O		428.809	cf	83	°F	77	°F	2.00	" H_2O
Start	9:49	0.000	cf	81	°F	-0.8	" H_2O		418.015	cf	81	°F	76	°F	2.00	" H_2O
Average		10.531	cf	81	°F	-0.8	" H_2O		10.794	cf	82	°F	77	°F	2.00	" H_2O

$$\textit{Wet Test Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.230} \text{ dcsf}$$

$$\textit{Dry Gas Meter } V_{msd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.499} \text{ dcsf}$$

$$\textit{Calibration Factor } (C_{DG}) = \frac{\textit{Wet Test Meter } V_{msd}}{\textit{Dry Gas Meter } V_{msd}} = \underline{0.974}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 08/18/08

Run 1 at 3.0" ΔH Pb = 29.57 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	10:15	10.857	cf	81	°F	-1.1	" H_2O	440.651	cf	84	°F	77	°F	3.00	" H_2O
Start	10:04	0.000	cf	81	°F	-1.1	" H_2O	429.505	cf	82	°F	77	°F	3.00	" H_2O
Average		10.857	cf	81	°F	-1.1	" H_2O	11.146	cf	83	°F	77	°F	3.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{10.539} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.853} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.971}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Dry Gas Meter Calibration

Meter Console No. ASAI 2-2

Date Calibration Performed: 08/18/08

Run 1 at 4.0" ΔH Pb = 29.57 " Hg

Wet Test Meter C_f = 1.009 Console Pump Vacuum = -5.0 " Hg

	Wet Test Meter No. ASAI-0							*Dry Gas Meter*							
	Time	Meter Reading		Temp.		P_m		Meter Reading		Temperature In		Out		P_m	
End	10:28	10.240	cf	81	°F	-1.3	" H_2O	452.010	cf	86	°F	77	°F	4.00	" H_2O
Start	10:18	0.000	cf	81	°F	-1.3	" H_2O	441.509	cf	84	°F	77	°F	4.00	" H_2O
Average		10.240	cf	81	°F	-1.3	" H_2O	10.501	cf	85	°F	77	°F	4.00	" H_2O

$$\text{Wet Test Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] \times C_f = \underline{9.935} \text{ dcsf}$$

$$\text{Dry Gas Meter } V_{mstd} = 17.65 \times V_m \left[\frac{P_b + \frac{P_m}{13.6}}{(T_m + 460)} \right] = \underline{10.231} \text{ dcsf}$$

$$\text{Calibration Factor } (C_{DG}) = \frac{\text{Wet Test Meter } V_{mstd}}{\text{Dry Gas Meter } V_{mstd}} = \underline{0.971}$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 2-2

Date Calibration Performed: 08/18/08

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	7:41	32° F	32° F
Ambient Air	7:42	81° F	81° F
Boiling Water	7:43	212° F	212° F
Oven	7:44	250° F	251° F
Oven	7:45	300° F	301° F
Oven	7:46	350° F	350° F
Oven	7:47	400° F	400° F

Meter Adjusted? Yes

ASTM Reference Thermometer: SN: 06000047 Range: -0.1°C to 1360.6°C

Range:

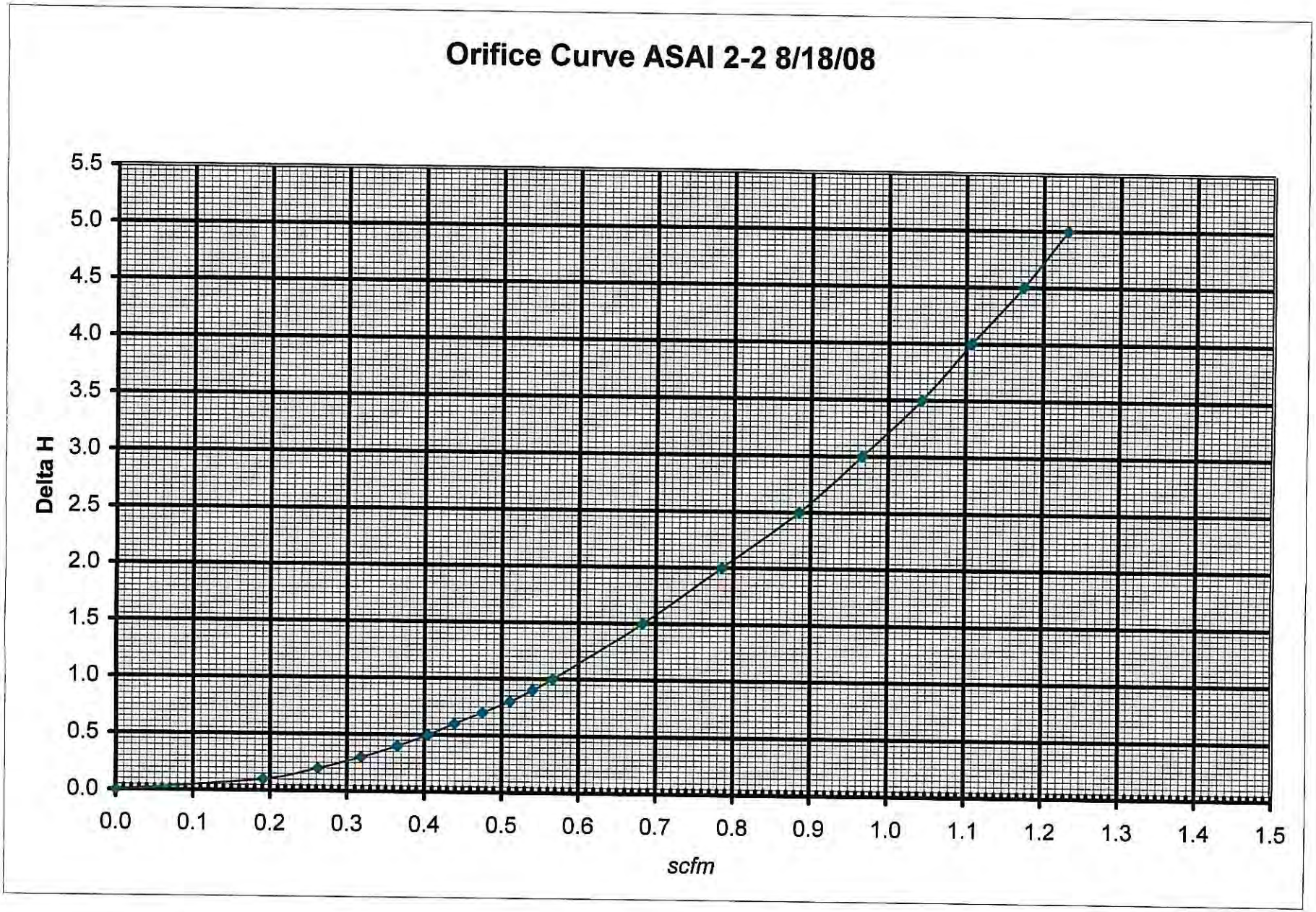
Range:

Certified by: Patrick Selakovich 8/18/08

Calibrator (Signature / Date)

Bill Hefley 8/18/08

QA Officer (Signature / Date)


Orifice Curve ASAI 2-2 8/18/08
Delta H
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
scfm

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 07/03/08
I.D. # ASAI 3-2
C_{pstd}: 0.990

Time: 6:00
T_s: 83 °F
Pb: 29.65 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.35	0.35	0.35	0.592	0.50	0.707	0.828	0.50	0.707	0.828
50	0.55	0.55	0.55	0.742	0.79	0.889	0.826	0.79	0.889	0.826
60	0.79	0.79	0.79	0.889	1.15	1.072	0.821	1.15	1.072	0.821
70	1.08	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.41	1.40	1.40	1.183	2.05	1.432	0.818	2.05	1.432	0.818
90	1.78	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.55	0.55	0.55	0.742	0.80	0.894	0.821	0.80	0.894	0.821
50	0.55	0.55	0.55	0.742	0.80	0.894	0.821	0.80	0.894	0.821
Average							0.823			0.823

Summary of Results:

Normal high side calibraiton factor: 0.823
variation +: 0.61%
variation -: -0.61%
Normal low side calibration factor: 0.823
variation +: 0.61%
variation -: -0.61%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.823

Certified by: *Patrick Selakovich 7/03/08*
Calibrator (Signature/Date)

Bill Hefley 7/03/08
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 07/03/08 Time: 6:30
I.D. # ASAI 3-3 T_s: 84 °F
C_{pstd}: 0.990 Pb: 29.65 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.35	0.35	0.35	0.592	0.51	0.714	0.820	0.51	0.714	0.820
50	0.55	0.55	0.55	0.742	0.79	0.889	0.826	0.79	0.889	0.826
60	0.79	0.79	0.79	0.889	1.15	1.072	0.821	1.15	1.072	0.821
70	1.08	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.41	1.40	1.40	1.183	2.00	1.414	0.828	2.00	1.414	0.828
90	1.78	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.55	0.55	0.55	0.742	0.79	0.889	0.826	0.79	0.889	0.826
50	0.55	0.55	0.55	0.742	0.79	0.889	0.826	0.79	0.889	0.826
Average							0.823			0.823

Summary of Results:

Normal high side calibraiton factor: 0.823
variation +: 0.61%
variation -: -0.36%
Normal low side calibration factor: 0.823
variation +: 0.61%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.823

Certified by: Patrick Selakovich 7/03/08
Calibrator (Signature/Date)

Bill Hefley 7/03/08
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 05/01/08 Time: 12:45
I.D. # ASAI 3-4 T_s: 82 °F
C_{pstd}: 0.990 Pb: 29.29 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.35	0.35	0.35	0.592	0.50	0.707	0.828	0.50	0.707	0.828
50	0.55	0.55	0.55	0.742	0.80	0.894	0.821	0.80	0.894	0.821
60	0.78	0.78	0.78	0.883	1.15	1.072	0.815	1.15	1.072	0.815
70	1.07	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.40	1.40	1.40	1.183	2.05	1.432	0.818	2.05	1.432	0.818
90	1.77	1.80	1.80	1.342	2.65	1.628	0.816	2.65	1.628	0.816
50	0.55	0.55	0.55	0.742	0.80	0.894	0.821	0.80	0.894	0.821
50	0.55	0.55	0.55	0.742	0.80	0.894	0.821	0.80	0.894	0.821
Average							0.821			0.821

Summary of Results:

Normal high side calibraiton factor: 0.821
variation +: 0.85%
variation -: -0.73%
Normal low side calibration factor: 0.821
variation +: 0.85%
variation -: -0.73%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.821

Certified by: Patrick Selakovich 5/01/08 — Calibrator (Signature/Date)

Bill Hefley 5/01/08 — QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 3
Date Calibration Performed: 03/03/08

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.121	0.168	0.233	0.316	0.364	0.397	0.497	0.231
Measurement 2	0.122	0.169	0.230	0.317	0.364	0.396	0.496	0.234
Measurement 3	0.122	0.168	0.232	0.318	0.364	0.397	0.497	0.232
Measurement 4	0.122	0.169	0.231	0.319	0.365	0.397	0.495	0.233
Measurement 5	0.121	0.168	0.234	0.319	0.367	0.396	0.498	0.231
Measurement 6	0.122	0.167	0.231	0.317	0.366	0.398	0.496	0.231
Measurement 7	0.120	0.168	0.234	0.318	0.367	0.396	0.496	0.232
Measurement 8	0.122	0.168	0.231	0.319	0.364	0.396	0.496	0.231
Measurement 9	0.122	0.168	0.233	0.319	0.365	0.397	0.498	0.230
Measurement 10	0.122	0.168	0.232	0.317	0.365	0.397	0.496	0.232
Average	0.122	0.168	0.232	0.318	0.365	0.397	0.497	0.232

Patrick Selakovich 3/03/08

Calibrator (Signature / Date)

Bill Hefley 3/03/08

QA Officer (Signature / Date)

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI 08-026
Date Calibration Performed: 09/24/08

	-1	-2	-3	-4	-5	-6	-7
Measurement 1	0.156	0.160	0.131				
Measurement 2	0.155	0.161	0.131				
Measurement 3	0.156	0.161	0.131				
Measurement 4	0.154	0.160	0.131				
Measurement 5	0.156	0.160	0.131				
Measurement 6	0.155	0.161	0.131				
Measurement 7	0.156	0.161	0.131				
Measurement 8	0.155	0.160	0.131				
Measurement 9	0.154	0.160	0.131				
Measurement 10	0.156	0.160	0.131				
Average	0.155	0.160	0.131		#####	#####	#####

Certified by: John Stanley 9-24-08

Calibrator (Signature / Date)

Bill Hefley 9-24-08

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Post-test Calibration Data

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

ENVIRONMENTAL SUPPLY COMPANY

Quality - Service - Reliability

ASAI 2-1 10-03-08

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the GREEN cells, YELLOW cells are calculated.

DATE: 10/03/2008

METER PART #: C-5000-SO

METER SERIAL #: 1500

CRITICAL ORIFICE SET SERIAL #: 1427s

BAROMETRIC PRESSURE (in Hg):	INITIAL	FINAL	AVG (P_{bar})
	29.62	29.61	29.615

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (In Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (In H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
24	1	0.6439	13	369.202	374.335	5.133	80	79	79	78	78	78.5	6.00	2.15	5.0091	4.9250	0.983		1.75
	2	0.6439	13	374.335	379.465	5.130	80	79	81	78	78	79	6.00	2.15	5.0015	4.9250	0.985		1.75
	3	0.6439	13	379.465	384.595	5.130	81	81	83	78	79	80.25	6.00	2.15	4.9899	4.9205	0.986		1.75
																AVG =	0.985	0.29	
12	1	0.3194	17	353.002	358.116	5.114	78	74	76	74	75	74.75	12.00	0.51	5.0052	4.8951	0.978		1.69
	2	0.3194	17	358.116	363.231	5.115	78	76	77	74	75	75.5	12.00	0.51	4.9992	4.8951	0.979		1.68
	3	0.3194	17	363.231	368.351	5.120	78	77	77	75	76	76.25	12.00	0.51	4.9970	4.8951	0.980		1.68
																AVG =	0.979	-0.29	
	1					.0						0							
	2					.0						0							
	3					.0						0							
																AVG =			

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.982

AVERAGE $\Delta H_@$ = 1.72

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H \left(\frac{V_m(std)}{V_m}\right)$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 2-1

Date Calibration Performed: 10/03/08

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	11:45	32° F	32° F
Ambient Air	11:46	78° F	78° F
Boiling Water	11:47	212° F	213° F
Oven	11:48	250° F	252° F
Oven	11:49	300° F	303° F
Oven	11:50	350° F	352° F
Oven	11:51	400° F	402° F

Meter Adjusted? No

NIST Reference Calibrator: SN: 06000047 Range: -0.2°C to 1,360.6°C

Range:

Range:

Certified by: Patrick Selakovich 10/03/08

Calibrator (Signature / Date)

Bill Hefley 10/03/08

QA Officer (Signature / Date)

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the GREEN cells, YELLOW cells are calculated.

Quality - Service - Reliability

ENVIRONMENTAL SUPPLY COMPANY

ASAI 2-2 10/03/08

DATE: 10/03/2008

METER PART #: C-5000-SO

METER SERIAL #: 1509

CRITICAL ORIFICE SET SERIAL #: 1427s

BAROMETRIC PRESSURE (In Hg):	INITIAL	FINAL	AVG (P_{bar})
	29.61	29.61	29.61

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (In Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (In H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
12	1	0.3194	15	894.502	899.641	5.139	82	77	79	76	77	77.25	12.00	0.51	5.0054	4.8762	0.974		1.69
	2	0.3194	15	899.641	904.783	5.142	82	79	80	77	78	78.5	12.00	0.51	4.9967	4.8762	0.976		1.69
	3	0.3194	15	904.783	909.922	5.139	82	80	80	78	80	79.5	12.00	0.51	4.9845	4.8762	0.978		1.69
																AVG =	0.976	-0.50	
24	1	0.6439	15	909.922	915.062	5.140	83	82	83	80	80	81.25	6.00	2.15	4.9896	4.9106	0.984		1.75
	2	0.6439	15	915.062	920.201	5.139	83	83	85	80	81	82.25	6.00	2.15	4.9794	4.9106	0.986		1.75
	3	0.6439	15	920.201	925.344	5.143	83	85	86	81	82	83.5	6.00	2.15	4.9718	4.9106	0.988		1.75
																AVG =	0.986	0.50	
	1					.0						0							
	2					.0						0							
	3					.0						0							
																AVG =			

D-30

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The folbwing equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = **0.981**

AVERAGE $\Delta H_@$ = **1.72**

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions
K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions
T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)
K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H \left(\frac{V_m(std)}{V_m}\right)$$

AIR SAMPLING ASSOCIATES, INC.

Calibration Data

Digital Temperature Indicator Calibration

DTI Unit No. ASAI 2-2

Date Calibration Performed: 10/03/08

Reference Point	Time	ASTM Reference Thermometer (°F)	DTI (°F)
Ice Bath	14:25	32° F	31° F
Ambient Air	14:26	82° F	81° F
Boiling Water	14:27	212° F	212° F
Oven	14:28	250° F	250° F
Oven	14:29	300° F	300° F
Oven	14:30	350° F	350° F
Oven	14:40	400° F	399° F

Meter Adjusted? No

ASTM Reference Thermometer: SN: 06000047 Range: -0.1°C to 1,360.6°

Range:

Range:

Certified by: Patrick Selakovich 10/03/08

Calibrator (Signature / Date)

Bill Hefley 10/03/08

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 10/03/08
I.D. # ASAI 3-2
C_{pstd}: 0.990

Time: 16:00
T_s: 87 °F
Pb: 29.57 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.35	0.35	0.35	0.592	0.50	0.707	0.828	0.50	0.707	0.828
50	0.55	0.55	0.55	0.742	0.79	0.889	0.826	0.79	0.889	0.826
60	0.79	0.79	0.79	0.889	1.15	1.072	0.821	1.15	1.072	0.821
70	1.07	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.40	1.40	1.40	1.183	2.05	1.432	0.818	2.05	1.432	0.818
90	1.77	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.55	0.55	0.55	0.742	0.79	0.889	0.826	0.79	0.889	0.826
50	0.55	0.55	0.55	0.742	0.79	0.889	0.826	0.79	0.889	0.826
Average							0.823			0.823

Summary of Results:

Normal high side calibraiton factor: 0.823
variation +: 0.61%
variation -: -0.61%
Normal low side calibration factor: 0.823
variation +: 0.61%
variation -: -0.61%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.823

Certified by: John Stanley 10/3/08 — Calibrator (Signature/Date)

Bill Hefley 10/3/08 — QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 10/06/08
I.D. # ASAI 3-3
C_{pstd}: 0.990

Time: 10:00
T_s: 75 °F
Pb: 29.57 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.36	0.36	0.36	0.600	0.52	0.721	0.824	0.52	0.721	0.824
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
60	0.80	0.80	0.80	0.894	1.15	1.072	0.826	1.15	1.072	0.826
70	1.09	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.43	1.40	1.40	1.183	2.00	1.414	0.828	2.00	1.414	0.828
90	1.81	1.80	1.80	1.342	2.60	1.612	0.824	2.60	1.612	0.824
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
50	0.56	0.56	0.56	0.748	0.81	0.900	0.823	0.81	0.900	0.823
Average							0.824			0.824

Summary of Results:

Normal high side calibraiton factor: 0.824
variation +: 0.49%
variation -: -0.36%
Normal low side calibration factor: 0.824
variation +: 0.49%
variation -: -0.36%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.824

Certified by: John Stanley 10/6/08
Calibrator (Signature/Date)

Bill Hefley 10/6/08
QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

CALIBRATION DATA
PITOT TUBE CALIBRATION DATA

Date: 10/06/08 Time: 10:10
I.D. # ASAI 3-4 T_s: 75 °F
C_{pstd}: 0.990 Pb: 29.57 " Hg

fps Mark	Desired Calibration Standard	Calibration Standard Start	Calibration Standard End	√ Standard Average	High	√ High	Cal. Factor	Low	√ Low	Cal. Factor
20	0.09	0.09	0.09	0.300	0.13	0.361	0.824	0.13	0.361	0.824
30	0.20	0.20	0.20	0.447	0.29	0.539	0.822	0.29	0.539	0.822
40	0.36	0.35	0.35	0.592	0.50	0.707	0.828	0.50	0.707	0.828
50	0.56	0.55	0.55	0.742	0.80	0.894	0.821	0.80	0.894	0.821
60	0.80	0.78	0.78	0.883	1.15	1.072	0.815	1.15	1.072	0.815
70	1.09	1.10	1.10	1.049	1.60	1.265	0.821	1.60	1.265	0.821
80	1.43	1.40	1.40	1.183	2.05	1.432	0.818	2.05	1.432	0.818
90	1.81	1.80	1.80	1.342	2.65	1.628	0.816	2.65	1.628	0.816
50	0.56	0.55	0.55	0.742	0.80	0.894	0.821	0.80	0.894	0.821
50	0.56	0.55	0.55	0.742	0.80	0.894	0.821	0.80	0.894	0.821
Average							0.821			0.821

Summary of Results:

Normal high side calibraiton factor: 0.821
variation +: 0.85%
variation -: -0.73%
Normal low side calibration factor: 0.821
variation +: 0.85%
variation -: -0.73%

Certification:
I certify that the Type S pitot tube, the standard type pitot tube, and the calibration setup meet or exceed all specifications, criteria and/or applicable design features and hereby assign a pitot tube calibration factor C_p of: 0.821

Certified by: John Stanley 10/06/08 — Calibrator (Signature/Date)
Bill Hefley 10/06/08 — QA Officer (Signature/Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 3
Date Calibration Performed: 10/10/08

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.121	0.170	0.233	0.316	0.364	0.397	0.497	0.231
Measurement 2	0.122	0.169	0.230	0.317	0.364	0.396	0.496	0.234
Measurement 3	0.122	0.168	0.232	0.318	0.364	0.397	0.497	0.232
Measurement 4	0.122	0.169	0.231	0.319	0.365	0.397	0.495	0.233
Measurement 5	0.121	0.169	0.234	0.319	0.367	0.396	0.498	0.231
Measurement 6	0.122	0.168	0.231	0.317	0.366	0.398	0.496	0.231
Measurement 7	0.120	0.169	0.234	0.318	0.367	0.396	0.496	0.232
Measurement 8	0.122	0.169	0.231	0.319	0.364	0.396	0.496	0.231
Measurement 9	0.122	0.169	0.233	0.319	0.365	0.397	0.498	0.230
Measurement 10	0.122	0.170	0.232	0.317	0.365	0.397	0.496	0.232
Average	0.122	0.169	0.232	0.318	0.365	0.397	0.497	0.232

Patrick Selakovich 10/10/08

Calibrator (Signature / Date)

Bill Hefley 10/10/08

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI - 7
Date Calibration Performed: 10/10/08

	-1	-2	-3	-4	-5	-6	-7	-8
Measurement 1	0.113	0.190	0.258	0.306	0.377	0.424	0.486	0.257
Measurement 2	0.114	0.193	0.258	0.308	0.376	0.425	0.488	0.260
Measurement 3	0.114	0.193	0.257	0.307	0.375	0.427	0.486	0.259
Measurement 4	0.115	0.193	0.257	0.308	0.377	0.427	0.488	0.259
Measurement 5	0.114	0.191	0.258	0.309	0.377	0.426	0.486	0.259
Measurement 6	0.114	0.191	0.255	0.308	0.377	0.425	0.487	0.259
Measurement 7	0.115	0.192	0.258	0.309	0.378	0.425	0.488	0.259
Measurement 8	0.114	0.191	0.257	0.308	0.377	0.426	0.487	0.258
Measurement 9	0.115	0.193	0.258	0.309	0.377	0.426	0.486	0.257
Measurement 10	0.115	0.190	0.258	0.307	0.377	0.424	0.487	0.259
Average	0.114	0.192	0.257	0.308	0.377	0.426	0.487	0.259

Patrick Selakovich 10/10/08
Calibrator (Signature / Date)

Bill Hefley 10/10/08
QA Officer (Signature / Date)

Calibration Data
Nozzle Calibration

Nozzle Set No. ASAI 08-026
Date Calibration Performed: 09/30/08

	-1	-2	-3	-4	-5	-6	-7
Measurement 1	0.156	0.160	0.131				
Measurement 2	0.156	0.161	0.132				
Measurement 3	0.155	0.160	0.130				
Measurement 4	0.155	0.162	0.131				
Measurement 5	0.156	0.160	0.132				
Measurement 6	0.155	0.162	0.131				
Measurement 7	0.155	0.162	0.131				
Measurement 8	0.155	0.160	0.132				
Measurement 9	0.155	0.161	0.130				
Measurement 10	0.156	0.162	0.131				
Average	0.155	0.161	0.131		#####	#####	#####

Certified by: John Stanley 9-30-08

Calibrator (Signature / Date)

Bill Hefley 9-30-08

QA Officer (Signature / Date)

AIR SAMPLING ASSOCIATES, INC.

Appendix D:

Field Data

Job Number 08-026 ✓ EPA 17/26A/027 Field Data

Job Name ADA - Hardin, MT ✓

Run Number 1 ✓

Unit SDA Inlet Duct ✓

Date 9/23/08 ✓

Operator Sekakovich/Bert ✓

Impinger Box No. 2-3 ✓

Meter Box No. 2-2 ✓

Read and Record at the start of each point

Purge to: –

Purge time: –

Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 46

Assumed Moisture % 10.5

Probe length 5'

C Factor 8.2 ΔP 0.86-0.70 to reference

Initial Leak @ 15.0 "Hg = 0.006 cfm

Final Leak @ 3.5 "Hg = 0.003 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
A-4	0910 ✓	640.710	1.05	0.85	0.85	0.0	339	240	260	38	46	45	—	INTEGRATED
3	0915	643.46	0.91	0.74	0.74	0.0	337	240	261	35	46	45	—	ORSAT
2	0920	646.06	0.88	0.72	0.72	0.0	337	245	258	33	48	45	—	
1	0925	648.75	0.49	0.40	0.40	0.0	338	246	268	32	49	46	—	NH_3 Value
END	0930	650.704	—	—	—	—	—	—	—	—	—	—	—	66%
B-4	0932	650.704	1.10	0.89	0.89	0.0	338	242	258	33	51	46	—	Port change
3	0937	653.65	1.10	0.89	0.89	0.0	337	238	255	33	52	47	—	
2	0942	654.44	1.05	0.85	0.85	0.0	339	245	258	33	52	47	—	
1	0947	659.20	0.68	0.56	0.56	0.0	339	245	257	35	52	47	—	
END	0952	661.480	—	—	—	—	—	—	—	—	—	—	—	
C-4	0953	661.480	0.99	0.81	0.81	0.0	335	245	246	35	53	48	—	Port change
3	0958	664.10	0.99	0.81	0.81	0.0	336	241	256	35	53	48	—	
2	1003	665.82	0.99	0.81	0.81	0.0	336	244	257	34	53	48	—	
1	1008	668.52	0.52	0.43	0.43	0.0	315	245	256	35	53	49	—	
END	1013 ✓	671.713	—	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p 0.821 (P5)

Volume Collected V_m ~~30.197~~ 28.989 ft^3 (P5)

Water Collected V_w 74.4 ml

Time of Test T_t 60 min

Stack Pressure P_s -17.5 "H_2O

Pitot Tip No. 3-4

Baro. Press. P_b 27.07 "Hg

Probe Tip Dia. D_n 0.193 in.

% CO_2 13.4 % CO 0.0

% O_2 5.9 % N_2 80.7

Barometer No. ADA

Nozzle No. 7-2 ✓

Total Volume of Leak Checks After Start — (1.240) Ft^3

V_m X Dry Gas Meter Calibration Factor ~~31.003~~ X 0.974 ✓

Area Stack A_s 20,235 in^2 28.763 (P5)

Version 2 April 4 2008

Impinger Bpx No. 2-3

Impinger 1	Final Weight	786.6
	Initial Weight	735.5
	Increase	51.1
Impinger 2	Final Weight	758.3
	Initial Weight	749.9
	Increase	8.4
Impinger 3	Final Weight	751.7
	Initial Weight	749.5
	Increase	2.2
Impinger 4	Final Weight	753.4
	Initial Weight	752.7
	Increase	0.7
Impinger 5	Final Weight	635.3
	Initial Weight	634.7
	Increase	0.6
Impinger 6	Final Weight	978.6
	Initial Weight	967.2
	Increase	11.4
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	51.1
Impinger 2	8.4
Impinger 3	2.2
Impinger 4	0.7
Impinger 5	0.6
Impinger 6	11.4
Impinger 7	
Impinger 8	
Total	74.4 = V_w

Filter No. THIMBLE 58

P_b = 27.07
V_m = ~~30.197~~ 28.989 (PS)
V_w = 74.4
P_m = 0.730
Avg ΔP = 0.896

Avg $\sqrt{\Delta P}$ = 0.939
C_p = 0.821
P_s = -17.5 "H_2O
T_m = 49 °F
T_s = 336 °F

%CO_2 = 13.4
%O_2 = 5.9
%CO = 0.0
%N_2 = 80.7
A_s = 20.235
D_n = 0.193
T_t = 60

25.78 "Hg
509 °R
796 °R

Moisture Content:

%M = 11.41 ~~11.00~~ (PS) M_d = 0.8859 ~~0.8900~~ (PS) MW_d = 30.380 MW = 28.97 ~~29.02~~ (PS)

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times \frac{28.989}{\cancel{30.197}} \left[\frac{27.07 + \frac{0.730}{13.6}}{49 + 460}\right] = 27.265 \text{ sft}^3 \text{ (PS)}$$

~~28.401~~ ~~8.497~~ 0.454 scfm (PS)

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 74.4 = 3.512 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{3.512}{\cancel{28.401}\ 27.265 + 3.512} \times 100 = 11.41 \text{ (PS)} \quad \cancel{11.00}\ \%$$

$$V_s = 5123.8 \times 0.821 \sqrt{\frac{796}{25.78 \times \cancel{29.02}\ 28.97}} \times 0.939 = 4078 \text{ (PS)} \quad \cancel{4074} \text{ fpm}$$

$$\%I = 1039 \times \frac{27.265}{\cancel{28.401}} \times \frac{796}{\cancel{0.8900}\ 0.8859 \times 25.78 \times \cancel{4074}\ 4078 \times 60 \times (0.193)^2} = 108.3 \quad \cancel{112.4}\ \% \quad \cancel{108.5} \text{ (BH)}$$

ACFM: ~~572,543~~ 573,037 (PS)
SCFM: ~~299273~~ 291,213 (PS)
WSCFH: ~~19,705,798~~ 19,723,187
%EA: 38.1

Checked by: P. Selak
Date: 9/26/08

Job Number 08-026 ✓
Job Name ADA- Hardin, MT ✓
Run Number 2 ✓
Unit SDA Inlet Duct ✓
Date 9/23/08 ✓
Operator Selakovich/Bart ✓
Impinger Box No. 2-3 ✓
Meter Box No. 2-2 ✓

EPA 17/26A/027 Field Data

Read and Record at the start of each point

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 48
Assumed Moisture % 11
Probe length 5'
C Factor 62 (0.55/0.896DP) to reference
Initial Leak @ 15.0 "Hg = 0.004 cfm
Final Leak @ 4.0 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter CF500	"Pitot" H2O (ΔP)	Orifice ΔH, "H2O Desired	Orifice ΔH, "H2O Actual	Pump Vacuum "Hg Guage (Pm)	Stack Temp °F (Ts)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (Tm)	Dry Gas Temp °F Outlet	Aux Temp °F	(0.398) Remarks
A-4	1250	672 +02	0.94	0.58	0.58	0.0	325	236	247	43	51	51	—	Integrated
3	1255	674.85	0.87	0.53	0.53	0.0	330	229	245	39	52	51	—	Grab
2	1300	677.07	0.77	0.47	0.47	0.0	328	244	246	37	53	51	—	
1	1305	679.37	0.42	0.26	0.26	0.0	327	244	246	38	53	51	—	
End	1310	680.903	—	—	—	—	—	—	—	—	—	—	—	
B-4	1313	681.500	1.20	0.74	0.74	0.0	338	238	248	37	54	52	—	Port change: 0.597
3	1318	684.15	1.20	0.74	0.74	0.0	335	239	250	38	56	52	—	
2	1323	686.71	1.00	0.62	0.62	0.0	332	244	252	38	56	52	—	
1	1328	689.10	0.72	0.44	0.44	0.0	331	249	245	38	56	52	—	
End	1333	691.155	—	—	—	—	—	—	—	—	—	—	—	
C-4	1334	691.400	0.89	0.55	0.55	0.0	332	242	247	40	57	53	—	Port change: 0.245
3	1339	693.67	1.00	0.62	0.62	0.0	338	236	247	39	57	53	—	
2	1344	696.06	1.00	0.62	0.62	0.0	339	242	248	39	57	54	—	
1	1349	698.45	0.72	0.44	0.44	0.0	335	245	248	40	57	54	—	
End	1354	700.551	—	—	—	—	—	—	—	—	—	—	—	
														NH3 Value 55%

Pitot Tube Calibration Factor C_p 0.821
Volume Collected V_m 26.502 ft^3
Water Collected V_w 62.5 ml
Time of Test T_t 60 min
Stack Pressure P_s -16.7 "H_2O

Pitot Tip No. 3-4
Baro. Press. P_b 27.11 "Hg
Probe Tip Dia. D_n 0.193 in.
% CO_2 14.2 % CO 0.0
% O_2 5.3 % N_2 80.5

Barometer No. ADA
Nozzle No. 7-2
Total Volume of Leak Checks After Start (0.842) ✓ Ft^3
V_m X Dry Gas Meter Calibration Factor 27.209 X 0.974 ✓
Area Stack A_s 20,235 in^2

Version 2 April 4 2008

Impinger Bpx No. 2-3

Impinger 1	Final Weight	792.8
	Initial Weight	745.3
	Increase	47.5
Impinger 2	Final Weight	765.0
	Initial Weight	758.4
	Increase	6.6
Impinger 3	Final Weight	745.5
	Initial Weight	743.9
	Increase	1.6
Impinger 4	Final Weight	764.4
	Initial Weight	763.2
	Increase	1.2
Impinger 5	Final Weight	635.4
	Initial Weight	635.3
	Increase	0.1
Impinger 6	Final Weight	984.1
	Initial Weight	978.6
	Increase	5.5
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	47.5
Impinger 2	6.6
Impinger 3	1.6
Impinger 4	1.2
Impinger 5	0.1
Impinger 6	5.5
Impinger 7	
Impinger 8	
Total	62.5 = V_w

Filter No. Thimble

P_b =	27.11	$\%CO_2$ =	14.2
V_m =	26.502	$\%O_2$ =	5.3
V_w =	62.5	%CO =	0.0
P_m =	0.551	$\%N_2$ =	80.5
Avg ΔP =	0.894	A_s =	20,235
Avg $\sqrt{\Delta P}$ =	0.938	D_n =	0.193
C_p =	0.821	T_t =	60
P_s =	-16.70 "H_2O		25.88 "Hg
T_m =	54 °F		514 °R
T_s =	333 °F		793 °R

Moisture Content: %M = 10.67 M_d = 0.8933 MW_d = 30.484 MW = 29.15

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 26.502 \left[\frac{27.11 + \frac{0.551}{13.6}}{54 + 460}\right] = 24.708 \text{ sft}^3 = 0.412 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 62.5 = 2.950 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{2.950}{24.708 + 2.950} \times 100 = 10.67 \%$$

$$V_s = 5123.8 \times 0.821 \sqrt{\frac{793}{25.88 \times 29.15}} \times 0.938 = 4046 \text{ fpm}$$

$$\%I = \frac{1039 \times 24.708 \times 793}{0.8933 \times 25.88 \times 4046 \times 60 \times (0.193)^2} = 97.4 \%$$

ACFM: 568,479
SCFM: 293,577
WSCFH: 19,718,594
%EA: 33.1

Checked by: P. Sela
Date: 9/26/08

Job Number 08-026
Job Name ADA-ES (Hardin, MT)
Run Number 3
Unit SDA Inlet Duct
Date 9/23/08
Operator Selakovich/Hart
Impinger Box No. 2-3
Meter Box No. 2-2

EPA 17/26A/CTM027 Field Data

Read and Record at the start of each point

Purge to: –
Purge time: –
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 52
Assumed Moisture % 11
Probe length 5'
C Factor 6.2 to reference
Initial Leak @ 15.0 "Hg = 0.005 cfm
Final Leak @ 4.0 "Hg = 0.001 cfm

Point	Clock Time	725.200 Dry Gas Meter, CF	ΔP "Pitot" H_2O	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	P_m Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp °F Inlet	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
A-4	1744	~~724.823~~	1.00	0.62	0.62	0.0	337	245	255	39	53	53	—	
3	1749	727.58	0.97	0.60	0.60	0.0	336	237	252	35	53	53	—	chlorinated
2	1754	729.94	0.80	0.49	0.49	0.0	337	240	255	35	54	53	—	aroat
1	1759	732.08	0.48	0.29	0.29	0.0	330	245	254	34	55	53	—	
END	1804	733.827	—	—	—	—	—	—	—	—	—	—	—	NH_3 VAVG: 45%
B-4	1806	734.100	1.20	0.74	0.74	0.0	331	242	255	35	55	53	—	
3	1811	736.40	1.20	0.74	0.74	0.0	330	244	255	34	57	53	—	Port change: 0.273
2	1816	739.31	1.05	0.65	0.65	0.0	329	245	257	33	57	53	—	
1	1821	741.76	0.73	0.45	0.45	0.0	326	244	256	34	58	54	—	
END	1826	743.842	—	—	—	—	—	—	—	—	—	—	—	
C-4	1828	744.200	0.85	0.52	0.52	0.0	326	246	254	35	58	55	—	
3	1833	746.40	1.00	0.62	0.62	0.0	328	241	255	35	59	54	—	Port change: 0.358
2	1838	748.79	0.97	0.60	0.60	0.0	327	245	255	35	59	55	—	
1	1843	751.10	0.64	0.40	0.40	0.0	317	245	254	35	59	56	—	
END	1848	753.279	—	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p 0.821
Volume Collected V_m 26.734 ft^3
Water Collected V_w 67.0 ml
Time of Test T_t 60 min
Stack Pressure P_s -12.0 "H_2O

Pitot Tip No. 1-4
Baro. Press. P_b 22.10 "Hg
Probe Tip Dia. D_n 0.193 in.
% CO_2 14.1 % CO 0.0
% O_2 5.6 % N_2 80.3

Barometer No. ADA-ES Nozzle No. 1-2
Total Volume of Leak Checks After Start ~~0~~ (0.631) Ft^3
V_m X Dry Gas Meter Calibration Factor 27.448 X 0.974
Area Stack A_s 20.235 in^2

Version 2. April 4, 2008

Impinger Bpx No. 2-3

Impinger 1	Final Weight	798.5
	Initial Weight	746.3
	Increase	52.2
Impinger 2	Final Weight	768.6
	Initial Weight	762.7
	Increase	5.9
Impinger 3	Final Weight	754.2
	Initial Weight	752.4
	Increase	1.8
Impinger 4	Final Weight	754.8
	Initial Weight	753.7
	Increase	1.1
Impinger 5	Final Weight	635.9
	Initial Weight	635.4
	Increase	0.5
Impinger 6	Final Weight	989.4
	Initial Weight	983.9
	Increase	5.5
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	52.2
Impinger 2	5.9
Impinger 3	1.8
Impinger 4	1.1
Impinger 5	0.5
Impinger 6	5.5
Impinger 7	
Impinger 8	
Total	67.0 = V_w

Thimble ~~Filter~~ No. 96

P_b =	27.10	$\%CO_2$ =	14.1
V_m =	26.734	$\%O_2$ =	5.6
V_w =	67.0	%CO =	0.0
P_m =	0.560	$\%N_2$ =	80.3
Avg ΔP =	0.908	A_s =	20,235
		D_n =	0.193
Avg $\sqrt{\Delta P}$ =	0.946	T_t =	60
C_p =	0.821		
P_s =	-17.0 "H_2O		25.85 "Hg
T_m =	55 °F		515 °R
T_s =	330 °F		790 °R

Moisture Content: %M = 11.28 M_d = 0.8872 MW_d = 30.480 MW = 28.07

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 26.734 \left[\frac{27.10 + \frac{0.560}{13.6}}{55 + 460}\right] = 24.867 \text{ sft}^3 = 0.414 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 67.0 = 3.162 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{3.162}{24.867 + 3.162} \times 100 = 11.28 \%$$

$$V_s = 5123.8 \times 0.821 \sqrt{\frac{790}{25.85 \times 28.07}} \times 0.946 = 4080 \text{ fpm}$$

$$\%I = \frac{1039 \times 24.867 \times 790}{0.8872 \times 25.85 \times 4080 \times 60 \times (0.193)^2} = 97.6 \%$$

ACFM: 573,361
SCFM: 294,797
WSCFH: 19,936,677
%EA: 35.7

Checked by: P. Salatino
Date: 9/26/08

Job Number 08-026 ✓ (CCT) 8A Condensate Field Data

Job Name ADA-Hardin, MT ✓

Run Number 1 ✓

Unit 50A Inlet Duct ✓

Date 9/23/08 ✓

Operator Selakovich/Bert ✓

Impinger Box No. 3-1 ✓

Meter Box No. 2-2 ✓

Read and Record at the start of each point

Purge to: 724.523

Purge time: 1632-1647

Pitot Leak Check Initial — Final —

Ambient Temp. °F 50

Assumed Moisture % 11

Probe length 9.1

C Factor — to reference

Initial Leak @ 15.0 "Hg = 0.008 cfm

Final Leak @ 5.0 "Hg = 0.004 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Water Outlet ~~Stack~~ Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Outlet ~~Aux~~ Temp °F	Remarks
D-3	1530 ✓	700.669	—	0.30	0.30	3.0	152	500	500	49	52	52	100	
	1535	702.35	—	0.30	0.30	2.0	146	501	500	40	52	52	110	
	1540	704.06	—	0.30	0.30	2.0	140	500	500	39	53	52	107	
	1545	705.79	—	0.30	0.30	2.5	135	500	500	39	53	52	109	
	1550	707.45	—	0.30	0.30	2.5	136	500	500	38	53	52	106	
	1555	709.14	—	0.30	0.30	2.5	138	500	500	37	54	52	108	
	1600	710.83	—	0.30	0.30	2.5	137	500	500	38	54	52	113	
	1605	712.54	—	0.30	0.30	3.0	136	500	500	37	54	52	118	
	1610	714.24	—	0.30	0.30	3.0	136	500	500	38	55	53	118	
	1615	715.94	—	0.30	0.30	3.0	141	500	500	37	55	53	124	
	1620	717.64	—	0.30	0.30	3.0	147	500	500	38	55	53	127	
END	1625 ✓	719.331	—	—	—	—	—	—	—	—	—	—	—	
~~END~~	~~1630~~	—	—	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p —

Volume Collected V_m 18.177 ft^3

Water Collected V_w 41.8 ml

Time of Test T_t ~~60~~ 55 min

Stack Pressure P_s -17.0 "H_2O

Pitot Tip No. —

Baro. Press. P_b 27.11 "Hg

Probe Tip Dia. D_n — in.

% CO_2 — % CO 0.0

% O_2 — % N_2 —

Barometer No. ADA-65 Nozzle No. —

Total Volume of Leak Checks After Start Ø Ft^3

V_m X Dry Gas Meter Calibration Factor 18.662 X 0.974 ✓

Area Stack A_s 20.235 in^2

Version 2 April 4 2008

Impinger Bpx No. 3-1 (CCT-1)

Impinger 1	Final Weight	754.9
	Initial Weight	719.8
	Increase	35.1
Impinger 2	Final Weight	737.6
	Initial Weight	736.5
	Increase	1.1
Impinger 3	Final Weight	627.6
	Initial Weight	626.8
	Increase	0.8
Impinger 4	Final Weight	942.3
	Initial Weight	937.5
	Increase	4.8
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	35.1
Impinger 2	1.1
Impinger 3	0.8
Impinger 4	4.8
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	41.8 = V_w

Filter No. —

P_b = 27.11
V_m = 18.177
V_w = 41.8
P_m = 0.300
Avg ΔP = —

Avg $\sqrt{\Delta P}$ = —
C_p = —
P_s = -17.0 "H_2O
T_m = 53 °F
T_s = — °F

$\%CO_2$ = —
$\%O_2$ = —
%CO = —
$\%N_2$ = —
A_s = 20.235
D_n = —
T_t = 55

25.86 "Hg
513 °R
— °R

Moisture Content: %M = 10.42 M_d = 0.8958 MW_d = — MW = —

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 18.177 \left[\frac{27.11 + \frac{0.300}{13.6}}{53 + 460}\right] = 16.968 \text{ sft}^3 = 0.309 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 41.8 = 1.973 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{1.973}{16.968 + 1.973} \times 100 = 10.42 \%$$

$$V_s = 5123.8 \times ___ \sqrt{\frac{___}{___}} \times ___ = ___ \text{ fpm}$$

$$\%I = \frac{1039 \times ___ \times ___}{___ \times ___ \times ___ \times (___)^2} = ___ \%$$

ACFM: —
SCFM: —
WSCFH: —
%EA: —

Checked by: P. Solet
Date: 9/26/08

Job Number 08-026
Job Name ADA-ES - Hardin, MT
Run Number 2
Unit SDA Inlet Duct
Date 9/24/08
Operator Selakovich / Bert
Impinger Box No. 3-1
Meter Box No. 2-2

CCT Field Data

Read and Record at the start of each point

Purge to: 786.945
Purge time: 0847-0902
Pitot Leak Check Initial — Final —

Ambient Temp. °F 32
Assumed Moisture % —
Probe length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.006 cfm
Final Leak @ 5.0 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O	Orifice ΔH, "H_2O Desired (ΔP)	Orifice ΔH, "H_2O Actual (ΔP)	Pump Vacuum "Hg Guage (P_m)	Water Bath ~~Stack~~ Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet (T_m)	Outlet Aux Temp °F	Remarks
D-3	0745	761.730	—	0.300	0.300	4.0	146	500	550	25	34	33	93	
	0750	763.43	—	0.300	0.300	2.0	146	515	550	23	34	33	93	
	0755	765.08	—	0.300	0.300	1.5	143	527	548	23	35	33	94	
	0800	766.73	—	0.300	0.300	2.0	141	538	550	23	36	34	93	
	0805	768.40	—	0.300	0.300	2.0	140	546	549	23	37	34	94	
	0810	770.07	—	0.300	0.300	2.0	139	554	549	23	37	35	93	
	0815	771.72	—	0.300	0.300	2.0	139	560	550	24	38	35	90	
	0820	773.39	—	0.300	0.300	2.0	140	567	550	24	38	35	91	
	0825	775.06	—	0.30	0.30	2.0	141	571	550	24	39	35	91	
	0830	776.71	—	0.30	0.30	2.5	141	577	551	24	39	36	92	
	0835	778.38	—	0.30	0.30	2.5	139	580	551	24	40	36	91	
	0840	780.06	—	0.30	0.30	3.0	141	584	550	24	40	37	93	
GND	0845	781.726	—	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p —
Volume Collected V_m 19.476 ft^3
Water Collected V_w 48.3 ml
Time of Test T_t 60 min
Stack Pressure P_s — "H_2O

Pitot Tip No. —
Baro. Press. P_b 27.10 "Hg
Probe Tip Dia. D_n — in.
% CO_2 — % CO 0.0
% O_2 — % N_2 —

Barometer No. ADAES Nozzle No. —
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 19.996 X 0.974
Area Stack A_s 20,235 in^2

Version 2. April 4, 2008

Impinger Bpx No. 3-1 (CCT-1)

Impinger 1	Final Weight	765.7
	Initial Weight	723.7
	Increase	42.0
Impinger 2	Final Weight	746.3
	Initial Weight	745.0
	Increase	1.3
Impinger 3	Final Weight	627.7
	Initial Weight	627.4
	Increase	0.3
Impinger 4	Final Weight	947.0
	Initial Weight	942.3
	Increase	4.7
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	42.0
Impinger 2	1.3
Impinger 3	0.3
Impinger 4	4.7
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	48.3 = V_w

Filter No. —

P_b = 27.10
V_m = 19.476
V_w = 48.3
P_m = 0.300
Avg ΔP = —
Avg $\sqrt{\Delta P}$ = —
C_p = —
P_s = — "H_2O
T_m = 76 °F
T_s = — °F

$\%CO_2$ = —
$\%O_2$ = —
%CO = —
$\%N_2$ = —
A_s = 20,235
D_n = —
T_t = 60

— "Hg
496 °R
— °R

Moisture Content: %M = 10.82 M_d = 0.8918 MW_d = — MW = —

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 19.476 \left[\frac{27.10 + \frac{0.300}{13.6}}{76 + 460}\right] = \frac{18.797}{0.313} \text{ sft}^3 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 48.3 = 2.280 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{2.280}{18.797 + 2.280} \times 100 = 10.82 \%$$

$$V_s = 5123.8 \times ___ \sqrt{\frac{___}{___}} \times ___ = ___ \text{ fpm}$$

$$\%I = \frac{1039 \times ___ \times ___}{___ \times ___ \times ___ \times (___)^2} = ___ \%$$

ACFM: —
SCFM: —
WSCFH: —
%EA: —

Checked by: P. Solet
Date: 5/26/08

Job Number: 08-026
Job Name: ADA-ES - Hardin, MT
Run Number: 3
Unit: SDA Inlet Duct
Date: 9/24/08
Operator: Se Oakowich
Impinger Box No.: 3-1
Meter Box No.: 2-2

CCT Field Data

Read and Record at the start of each point

Purge to: 813.411
Purge time: 1049-1104
Pitot Leak Check Initial — Final —

Ambient Temp. °F: 40
Assumed Moisture %: —
Probe length: 9'
C Factor: — to reference
Initial Leak @ 15.0 "Hg = 0.003 cfm
Final Leak @ 5.0 "Hg = 0.001 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Water Bath ~~Stack~~ Temp °F (Condenser)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Outlet ~~Aux~~ Temp °F	Remarks
D-3	0947	787.915	—	0.30	0.30	0.5	154	557	550	31	43	42	89	
	0952	789.61	—	0.30	0.30	0.5	152	570	550	29	43	42	98	
	0957	791.31	—	0.30	0.30	0.5	144	580	549	28	44	43	99	
	1002	792.98	—	0.30	0.30	0.5	141	587	549	28	45	43	98	
	1007	794.67	—	0.30	0.30	0.5	139	591	550	28	47	44	97	
	1012	796.34	—	0.30	0.30	0.5	139	596	549	27	48	45	99	
	1017	798.03	—	0.30	0.30	1.0	140	599	549	28	49	45	98	
	1022	799.71	—	0.30	0.30	1.0	140	602	549	27	50	46	99	
	1027	801.40	—	0.30	0.30	1.5	140	601	550	28	50	47	99	
	1032	803.09	—	0.30	0.30	1.5	140	599	549	28	51	47	99	
	1037	804.79	—	0.30	0.30	1.5	140	599	549	29	52	48	98	
	1042	806.47	—	0.30	0.30	2.0	141	599	549	29	52	48	103	
	1047	808.200	—	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p: —
Volume Collected V_m: 19.758 ft^3
Water Collected V_w: 45.3 ml
Time of Test T_t: 60 min
Stack Pressure P_s: — "H_2O

Pitot Tip No.: —
Baro. Press. P_b: 27.10 "Hg
Probe Tip Dia. D_n: — in.
% CO_2: — % CO: —
% O_2: — % N_2: —

Barometer No.: ADA-ES Nozzle No.: —
Total Volume of Leak Checks After Start: 0 Ft^3
V_m X Dry Gas Meter Calibration Factor: 20.285 X 0.974
Area Stack A_s: 20,235 in^2

Version 2. April 4, 2008

Impinger Bpx No. 3-1

Impinger 1	Final Weight	763.2
	Initial Weight	724.6
	Increase	38.6
Impinger 2	Final Weight	743.7
	Initial Weight	742.4
	Increase	1.3
Impinger 3	Final Weight	628.1
	Initial Weight	627.7
	Increase	0.4
Impinger 4	Final Weight	952.0
	Initial Weight	947.0
	Increase	5.0
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	38.6
Impinger 2	1.3
Impinger 3	0.4
Impinger 4	5.0
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	45.3 = V_w

Filter No. —

P_b = 27.10
V_m = 19.758
V_w = 45.3
P_m = 0.300
Avg ΔP = —
Avg $\sqrt{\Delta P}$ = —
C_p = —
P_s = — "H_2O
T_m = 46 °F
T_s = — °F

%CO_2 = —
%O_2 = —
%CO = —
%N_2 = —
A_s = 20,235
D_n = —
T_t = 60

— "Hg
506 °R
— °R

Moisture Content: %M = 10.26 M_d = 0.8974 MW_d = — MW = —

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 19.758 \left[\frac{27.10 + \frac{0.300}{13.6}}{46 + 460}\right] = 18.692 \text{ sft}^3 \quad 0.312 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 45.3 = 2.138 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{2.138}{18.692 + 2.138} \times 100 = 10.26 \%$$

$$V_s = 5123.8 \times ___ \sqrt{\frac{___}{___}} \times ___ = ___ \text{ fpm}$$

$$\%I = \frac{1039 \times ___ \times ___}{___ \times ___ \times ___ \times (___)^2} = ___ \%$$

ACFM: —
SCFM: —
WSCFH: —
%EA: —

Checked by: P. Schlatter
Date: 9/26/08

Job Number 08-026 EPA 5/202 Field Data
Job Name ADA-Hardin, MT
Run Number 1
Unit Stack
Date 23 Sept 2008
Operator Mullins, Stanley
Impinger Box No. 2-2
Meter Box No. 2-1

Read and Record at the start of each point

Purge to: —
Purge time: 1326-1426
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 60
Assumed Moisture % 15.0
Probe length 9'
C Factor 4.8 to reference
Initial Leak @ 15.0 "Hg = 0.009 cfm
Final Leak @ 8.5 "Hg = 0.007 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
D-6	1058	892.825	3.10	1.50	1.50	6.0	200	290	330	58	73	73		
6	1103	896.60	3.00	1.45	1.45	5.0	202	291	336	52	75	73		
5	1108	900.23	3.50	1.65	1.65	5.5	202	290	337	50	78	73		
5	1113	904.00	3.35	1.60	1.60	5.5	203	303	338	50	81	73		
4	1118	907.77	3.40	1.60	1.60	5.5	205	311	337	51	85	76		
4	1123	911.56	3.30	1.55	1.55	5.5	208	316	339	52	87	76		
3	1128	915.29	3.60	1.70	1.70	6.0	210	316	339	52	88	77		
3	1133	919.11	3.50	1.65	1.65	6.0	207	314	323	52	90	79		
9/23/08 2	1138	922.95	3.75	1.80	1.80	6.5	208	311	323	52	90	79		
2	1143	926.88	3.85	1.85	1.85	7.0	207	307	321	52	91	80		
1	1148	930.90	3.50	1.65	1.65	6.0	207	305	320	52	92	82		
1	1153	934.92	3.65	1.75	1.75	6.0	208	303	319	52	93	83		
End	1158	938.603	—	—	—	—	—	—	—	—	—	—		
C-6	1202	938.603	3.20	1.50	1.50	6.0	209	303	322	55	90	84		
6	1207	942.27	2.90	1.35	1.35	5.0	210	304	325	49	91	84		
5	1212	945.77	3.60	1.70	1.70	7.0	209	303	321	50	92	84		
5	1217	949.67	3.45	1.65	1.65	6.5	208	304	323	50	93	84		
4	1222	953.55	3.55	1.70	1.70	6.5	207	303	314	51	94	85		

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 91.120 ft^3
Water Collected V_w 308.4 ml
Time of Test T_t 120 min
Stack Pressure P_s −1.50 "H_2O

Pitot Tip No. 3-3
Baro. Press. P_b 27.11 "Hg
Probe Tip Dia. D_n 0.168 in.
% CO_2 13.4 % CO 0.0
% O_2 6.2 % N_2 80.4

Barometer No. ADA Nozzle No. 3-2
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 0.997 x 91.394
Area Stack A_s 9363 in^2

Version 2 April 4 2008

Impinger Bpx No. Z-2

Impinger 1	Final Weight	980.9
	Initial Weight	752.6
	Increase	228.3
Impinger 2	Final Weight	814.5
	Initial Weight	757.4
	Increase	57.1
Impinger 3	Final Weight	665.5
	Initial Weight	661.0
	Increase	4.5
Impinger 4	Final Weight	976.6
	Initial Weight	958.1
	Increase	18.5
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	228.3
Impinger 2	57.1
Impinger 3	4.5
Impinger 4	18.5
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	308.4 = V_w

Filter No. A-239

P_b =	27.11	%CO_2 =	13.4
V_m =	91.120	%O_2 =	6.2
V_w =	308.4	%CO =	0.0
P_m =	1.633	%N_2 =	80.4
Avg ΔP =	3.444	A_s =	9363
Avg $\sqrt{\Delta P}$ =	1.855	D_n =	0.168
C_p =	0.823	T_t =	120
P_s =	-1.50 "H_2O		27.00 "Hg
T_m =	86 °F		546 °R
T_s =	206 °F		666 °R

Moisture Content: %M = 15.36 M_d = 0.8464 MW_d = 30.392 MW = 28.49

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 91.120 \left[\frac{27.11 + \frac{1.633}{13.6}}{86 + 460}\right] = 80.207 \text{ sft}^3 = 0.668 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 308.4 = 14.556 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{14.556}{80.207 + 14.556} \times 100 = 15.36 \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{666}{27.00 \times 28.49}} \times 1.855 = 7279 \text{ fpm}$$

$$\%I = \frac{1039 \times 80.207 \times 666}{0.8464 \times 27.00 \times 7279 \times 120 \times (0.168)^2} = 98.5 \%$$

ACFM: 473,257
SCFM: 287,645
WSCFH: 20,390,784
%EA: 41.0

Checked by: P. Felt
Date: 9/26/08

Run Number 1

Unit Stack

Date 23 Sept 2008

EPA 5/202 Field Data

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired (P_m)	Orifice ΔH, "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet (T_m)	Aux Temp °F	Remarks
C-4	1227	957.43	3.50	1.65	1.65	6.5	206	304	317	52	94	85		
3	1232	961.27	3.45	1.60	1.60	6.5	205	303	313	53	95	85		
3	1237	965.08	3.60	1.70	1.70	7.0	205	302	319	53	96	86		
2	1242	968.95	3.55	1.65	1.65	7.0	205	301	315	53	96	87		
2	1247	972.81	3.70	1.75	1.75	7.0	205	300	323	53	97	88		
1	1252	976.73	3.25	1.55	1.55	6.0	205	300	313	53	97	88		
1	1257	980.47	3.40	1.65	1.65	6.0	206	300	317	52	97	88		
End	1302	984.219	—	—	—	—	—	—	—	—	—	—	—	
All														

Revision 2. April 4, 2008

Job Number 08-026 ✓ EPA 5/202 Field Data
Job Name ADA-Hardin, MT ✓
Run Number 2 ✓
Unit Stack ✓
Date 23 Sept 2008 ✓
Operator Mullins, Stanley ✓
Impinger Box No. 2-2 ✓
Meter Box No. 2-1 ✓

Read and Record at the start of each point

Purge to: —
Purge time: 1811 – 1911
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 60
Assumed Moisture % 15.5
Probe length 9'
C Factor 4.9 to reference
Initial Leak @ 15.0 "Hg = 0.006 cfm
Final Leak @ 8.0 "Hg = 0.003 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
D-6	1551	26.602	2.85	1.40	1.40	6.5	206	296	309	65	81	82		
6	1556	30.23	2.80	1.40	1.40	5.5	204	295	313	52	83	82		
5	1601	33.84	3.90	1.85	1.85	7.5	207	294	309	49	86	81		
5	1606	37.84	3.25	1.70	1.70	7.0	206	306	317	46	88	81		
4	1611	41.73	3.40	1.65	1.65	7.0	204	314	311	46	89	82		
4	1616	45.60	3.20	1.55	1.55	6.0	203	320	312	47	91	82		
3	1621	49.35	3.60	1.75	1.75	7.5	201	323	307	47	92	83		
3	1626	53.30	3.30	1.60	1.60	7.0	202	324	308	47	93	84		
2	1631	57.10	3.70	1.80	1.80	7.5	203	325	308	48	93	84		
2	1636	61.09	3.50	1.70	1.70	7.5	203	323	308	49	94	85		
1	1641	65.00	3.50	1.70	1.70	7.5	202	323	307	50	94	85		
1	1646	69.00	3.20	1.55	1.55	6.5	203	323	307	48	95	86		
End	1651	72.610	—	—	—	—	—	—	—	—	—	—	—	
C-6	1656	72.610	2.90	1.45	1.45	7.0	203	306	321	52	91	87		
6	1701	76.30	3.00	1.50	1.50	6.5	203	303	323	45	92	86		
5	1706	80.02	3.25	1.60	1.60	7.0	204	301	315	47	93	86		
5	1711	83.81	2.80	1.35	1.35	6.0	205	298	299	48	94	86		
4	1716	87.40	3.30	1.60	1.60	7.0	205	284	286	48	94	87		

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 91.433 ft^3
Water Collected V_w 304.7 ml
Time of Test T_t 120 min
Stack Pressure P_s -1.20 "H_2O

Pitot Tip No. 3-3
Baro. Press. P_b 27.14 "Hg
Probe Tip Dia. D_n 0.168 in.
% CO_2 13.7 % CO 0.0
% O_2 6.0 % N_2 80.3

Barometer No. ADA Nozzle No. 3-2
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 0.997 x 91.708
Area Stack A_s 9363 in^2

Version 2 April 4 2008

Impinger Bpx No. 2-2

Impinger 1	Final Weight	990.5
	Initial Weight	760.9
	Increase	229.6
Impinger 2	Final Weight	815.8
	Initial Weight	764.3
	Increase	51.5
Impinger 3	Final Weight	667.9
	Initial Weight	663.5
	Increase	4.4
Impinger 4	Final Weight	995.6
	Initial Weight	976.4
	Increase	19.2
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	229.6
Impinger 2	51.5
Impinger 3	4.4
Impinger 4	19.2
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	304.7 = V_w

Filter No. A240

P_b =	27.14	$\%CO_2$ =	13.7
V_m =	91.433	$\%O_2$ =	6.0
V_w =	304.7	%CO =	0.0
P_m =	1.617	$\%N_2$ =	80.3
Avg ΔP =	3.304	A_s =	936.3
		D_n =	0.168
Avg $\sqrt{\Delta P}$ =	1.816	T_t =	120
C_p =	0.823		
P_s =	-1.20 "H_2O		27.05 "Hg
T_m =	89 °F		549 °R
T_s =	204 °F		664 °R

Moisture Content: %M = 15.22 M_d = 0.8478 MW_d = 30.432 MW = 28.54

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 91.433 \left[\frac{27.14 + \frac{1.617}{13.6}}{89 + 460}\right] = 80.128 \text{ sft}^3 = 0.668 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 304.7 = 14.382 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{14.382}{80.128 + 14.382} \times 100 = 15.22\%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{664}{27.05 \times 28.54}} \times 1.816 = 7102 \text{ fpm}$$

ACFM: 461,778
SCFM: 282,484
WSCFH: 19,991,708
%EA: 39.3

$$\%I = \frac{1039 \times 80.128 \times 664}{0.8478 \times 27.05 \times 7102 \times 120 \times (0.168)^2} = 100.2\%$$

Checked by: P. Fel
Date: 9/26/08

Run Number 2
Unit Stack
Date 23 Sept 2008

EPA 5/202 Field Data

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
C-4	1721	91.21	3.60	1.75	1.75	7.5	204	282	284	48	95	87		
3	1726	95.16	3.30	1.60	1.60	7.0	202	275	303	49	96	88		
3	1731	99.00	3.35	1.65	1.65	7.0	203	271	303	49	96	88		
2	1736	102.85	3.30	1.60	1.60	7.0	203	271	304	49	96	88		
2	1741	106.70	3.60	1.75	1.75	7.5	205	269	304	50	97	88		
1	1746	110.60	3.25	1.60	1.60	7.0	207	269	303	50	96	88		
1	1751	114.42	3.45	1.70	1.70	7.5	208	268	306	52	96	88		
End	1756	118.310	—	—	—	—	—	—	—	—	—	—	—	
All														

Revision 2. April 4, 2008

Job Number 08-026 ✓ EPA 5/202 Field Data

Job Name ADA-Hardin, MT ✓

Run Number 3 ✓

Unit Stack ✓

Date 24 Sept 2008 ✓

Operator Mullins, Stanley

Impinger Box No. 2-2 ✓

Meter Box No. 2-1 ✓

Read and Record at the start of each point

Purge to: —

Purge time: 0932-1032

Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 39

Assumed Moisture % 15.5

Probe length 9'

C Factor 4.9 to reference

Initial Leak @ 16.0 "Hg = 0.007 cfm

Final Leak @ 9.0 "Hg = 0.002 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
D-6	0710	162.442	2.70	1.35	1.35	4.0	211	295	310	37	57	55		
6	0715	165.87	2.80	1.35	1.35	4.0	211	311	312	36	58	56		
5	0720	169.27	3.20	1.60	1.60	5.0	213	307	312	36	61	57		
5	0725	172.94	3.30	1.60	1.60	5.0	212	308	310	37	63	57		
4	0730	176.66	3.35	1.65	1.65	5.0	210	313	305	38	66	58		
4	0735	180.41	3.40	1.70	1.70	5.5	210	320	316	38	68	59		
3	0740	184.21	3.60	1.80	1.80	6.0	209	320	308	38	70	60		
3	0745	188.12	3.60	1.80	1.80	6.0	209	319	303	39	71	61		
2	0750	192.04	3.70	1.80	1.80	6.0	209	320	305	39	73	63		
2	0755	195.96	3.75	1.85	1.85	6.5	208	320	305	40	74	64		
1	0800	199.90	3.55	1.75	1.75	6.0	207	320	313	41	75	65		
1	0805	204.00	3.55	1.75	1.75	6.0	208	318	310	40	76	66		
End	0810	207.705	—	—	—	—	—	—	—	—	—	—	—	
C-6	0814	207.705	3.10	1.55	1.55	6.0	206	316	328	40	72	68		
6	0819	211.40	3.00	1.50	1.50	5.0	206	308	325	39	74	68		
5	0824	215.09	3.40	1.70	1.70	6.0	208	307	317	39	76	68		
5	0829	218.76	3.30	1.65	1.65	6.0	208	311	317	39	77	68		
4	0834	222.54	3.60	1.80	1.80	7.0	209	318	306	40	78	69		

Pitot Tube Calibration Factor C_p 0.823

Volume Collected V_m 91.612 ft^3

Water Collected V_w 334.1 ml

Time of Test T_t 120 min

Stack Pressure P_s -0.88 "H_2O

Pitot Tip No. 3-3

Baro. Press. P_b 27.14 "Hg

Probe Tip Dia. D_n 0.168 in.

% CO_2 13.4 % CO 0.0

% O_2 6.2 % N_2 80.4

Barometer No. ADA

Nozzle No. 3-2

Total Volume of Leak Checks After Start 0 ✓ Ft^3

V_m X Dry Gas Meter Calibration Factor 0.997 ✓ X 91.888

Area Stack A_s 9363 in^2

Version 2. April 4, 2008

Impinger Bpx No. 2-2

Impinger 1	Final Weight	977.1
	Initial Weight	753.7
	Increase	223.4
Impinger 2	Final Weight	842.9
	Initial Weight	759.9
	Increase	83.0
Impinger 3	Final Weight	669.6
	Initial Weight	663.8
	Increase	5.8
Impinger 4	Final Weight	966.3
	Initial Weight	944.4
	Increase	21.9
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	223.4
Impinger 2	83.0
Impinger 3	5.8
Impinger 4	21.9
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	334.1 = V_w

Filter No. A241

P_b = 27.14
V_m = 91.612
V_w = 334.1
P_m = 1.700
Avg ΔP = 3.442
Avg $\sqrt{\Delta P}$ = 1.853
C_p = 0.823
P_s = -0.88 "H_2O
T_m = 69 °F
T_s = 210 °F

$\%CO_2$ = 13.4
$\%O_2$ = 6.2
%CO = 0.0
$\%N_2$ = 80.4
A_s = 9363
D_n = 0.168
T_t = 120

27.08 "Hg
529 °R
670 °R

Moisture Content: %M = 15.91 M_d = 0.8409 MW_d = 30.392 MW = 28.42

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 91.612 \left[\frac{27.14 + \frac{1.700}{13.6}}{69 + 460}\right] = 83.339 \text{ sft}^3 = 0.694 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 334.1 = 15.770 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{15.770}{83.339 + 15.770} \times 100 = 15.91 \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{670}{27.08 \times 28.42}} \times 1.853 = 7291 \text{ fpm}$$

$$\%I = \frac{1039 \times 83.339 \times 670}{0.8409 \times 27.08 \times 7291 \times 120 \times (0.168)^2} = 103.2 \%$$

ACFM: 474,047
SCFM: 285,381
WSCFH: 20,362,540
%EA: 41.0

Checked by: R. Tilt
Date: 9/26/08

Run Number 3
Unit Stack
Date 24 Sept 2008

EPA 5/202 Field Data

Point	Clock Time	Dry Gas Meter, CF	ΔP "Pitot" H_2O	Orifice ΔH, "H_2O Desired	P_m Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage	T_s Stack Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	T_m Dry Gas Temp °F Inlet	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
C-4	0839	226.50	3.60	1.80	1.80	7.0	209	319	307	41	79	70		
3	0844	230.48	3.70	1.80	1.80	7.0	210	319	310	41	80	70		
3	0849	234.46	3.70	1.80	1.80	7.0	211	319	308	42	80	71		
2	0854	238.42	3.70	1.80	1.80	7.0	213	319	305	43	81	72		
2	0859	242.38	3.90	1.90	1.90	7.5	214	319	304	44	81	72		
1	0904	246.42	3.60	1.80	1.80	7.5	214	319	303	44	82	73		
1	0909	250.44	3.50	1.70	1.70	7.0	211	318	305	44	82	74		
End	0914	254.330	—	—	—	—	—	—	—	—	—	—	—	
All														

Revision 2. April 4, 2008

Job Number 08-026 ✓
Job Name ADA - Hardin, MT ✓
Run Number 1
Unit Stack ✓
Date 23 Sept 2008 ✓
Operator Mullins, Stanley ✓
Impinger Box No. 2-1 ✓
Meter Box No. 2-1 ✓

EPA Method 26A Field Data

Read and Record at the start of each point

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 51
Assumed Moisture % 15.0
Probe length 9'
C Factor 3.45 to reference
Initial Leak @ 16.0 "Hg = 0.002 cfm
Final Leak @ 10.5 "Hg = 0.003 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired (P_m)	Orifice ΔH, "H_2O Actual (P_m)	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F (T_s)	Oven Temp °F (T_s)	Effluent Temp °F (T_s)	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet (T_m)	Aux Temp °F	Remarks
C-5	0910	850.220	4.25	1.50	1.50	8.0	252	252	256	48	61	61		
4	0915	853.86	4.00	1.40	1.40	6.0	208	251	250	42	63	61		
3	0920	857.36	4.20	1.45	1.45	6.0	208	254	247	42	66	61		
2	0925	860.84	4.60	1.60	1.60	7.5	212	253	247	42	68	62		
1	0930	864.47	3.50	1.20	1.20	5.0	208	252	248	42	70	62		
1	0935	867.80	3.60	1.25	1.25	5.0	206	248	248	43	72	63		
End	0940	871.000	—	—	—	—	—	—	—	—	—	—	—	
D-5	0944	871.000	4.15	1.45	1.45	7.5	205	247	246	46	73	65		
4	0949	874.50	3.70	1.30	1.30	6.5	204	247	243	42	75	66		
3	0954	877.94	3.90	1.35	1.35	6.5	203	250	245	40	77	67		
2	0959	881.39	4.00	1.40	1.40	6.5	204	250	243	40	79	68		
1	1004	884.90	3.75	1.30	1.30	6.5	208	248	242	40	80	70		
1	1009	888.45	3.80	1.35	1.35	6.5	205	247	243	41	81	71		
End	1014	891.888	—	—	—	—	—	—	—	—	—	—	—	
All														

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 41.543 ft^3
Water Collected V_w 152.8 ml
Time of Test T_t 60 min
Stack Pressure P_s -1.60 "H_2O

Pitot Tip No. 3-2
Baro. Press. P_b 27.11 "Hg
Probe Tip Dia. D_n 0.155 in.
% CO_2 13.6 % CO 0.0
% O_2 6.1 % N_2 80.3

Barometer No. ADA
Nozzle No. 08-026-1
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 0.997 ✓ x 41.668
Area Stack A_s 9363 in^2

Version 2. April 4, 2008

Impinger Bpx No. 2-1

Impinger 1	Final Weight	862.2
	Initial Weight	~~931.3~~ 736.7
	Increase	125.5
Impinger 2	Final Weight	769.5
	Initial Weight	753.4
	Increase	16.1
Impinger 3	Final Weight	731.1
	Initial Weight	730.4
	Increase	0.7
Impinger 4	Final Weight	740.9
	Initial Weight	740.0
	Increase	0.9
Impinger 5	Final Weight	644.7
	Initial Weight	643.9
	Increase	0.8
Impinger 6	Final Weight	940.1
	Initial Weight	931.3
	Increase	8.8
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	125.5
Impinger 2	16.1
Impinger 3	0.7
Impinger 4	0.9
Impinger 5	0.8
Impinger 6	8.8
Impinger 7	
Impinger 8	
Total	152.8 = V_w

Filter No. A-242

P_b = 27.11
V_m = 41.543
V_w = 152.8
P_m = 1.379
Avg ΔP = 3.954
Avg $v\overline{\Delta P}$ = 1.987
C_p = 0.823
P_s = -1.60 H_2O
T_m = 68 °F
T_s = 207 °F

$\%CO_2$ = 13.6
$\%O_2$ = 6.1
%CO = 0.0
$\%N_2$ = 80.3
A_s = 9363
D_n = 0.155
T_t = 60

26.99 "Hg
528 °R
667 °R

Moisture Content: %M = 16.03 M_d = 0.8397 MW_d = 30.420 MW = 28.43

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 41.543 \left[\frac{27.11 + \frac{1.379}{13.6}}{68 + 460}\right] = 37.788 \text{ sft}^3 = 0.630 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 152.8 = 7.212 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{7.212}{37.788 + 7.212} \times 100 = 16.03 \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{667}{26.99 \times 28.43}} \times 1.987 = 7812 \text{ fpm}$$

ACFM: 50 794
SCFM: 305692
WSCFH: 2184294
%EA: 46.2

$$\%I = \frac{1039 \times 37.788 \times 667}{0.8397 \times 26.99 \times 7812 \times 60 \times (0.155)^2} = 102.6 \%$$

Checked by: R. Selden
Date: 9/26/08

Job Number 08-026
Job Name ADA-Hardin, MT
Run Number 2
Unit stack
Date 23 Sept 2008
Operator Mullins, Stanley
Impinger Box No. 2-1
Meter Box No. 2-1

Method 26A Field Data

Read and Record at the start of each point

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 65
Assumed Moisture % 16.0
Probe length 9'
C Factor 3.40 to reference
Initial Leak @ 15.0 "Hg = 0.004 cfm
Final Leak @ 7.5 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
C-5	1354	984.552	3.80	1.30	1.30	6.5	207	260	262	53	81	82		
4	1359	988.05	3.90	1.35	1.35	6.5	205	261	247	45	83	82		
3	1404	991.56	3.95	1.35	1.35	6.5	206	261	234	44	85	81		
2	1409	995.07	3.95	1.35	1.35	6.5	213	257	252	45	87	81		
1	1414	998.56	3.50	1.20	1.20	6.0	208	253	244	46	89	82		
1	1419	1001.86	3.50	1.20	1.20	6.0	206	254	240	46	90	82		
End	1424	1005.128	—	—	—	—	—	—	—	—	—	—	—	
D-5	1433	1005.128	3.60	1.25	1.25	7.0	210	262	257	55	87	83		
4	1438	1008.49	3.85	1.30	1.30	7.0	210	262	259	46	89	84		
3	1443	1011.95	3.95	1.35	1.35	7.0	210	265	259	46	91	84		
2	1448	1015.45	4.10	1.40	1.40	7.5	209	264	260	46	92	84		
1	1453	1019.01	4.10	1.40	1.40	7.5	209	263	260	46	93	85		
1	1458	1022.57	4.00	1.35	1.35	7.5	207	263	258	46	93	86		
End	1503	1026.201	—	—	—	—	—	—	—	—	—	—	—	
All														

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 41.524 ft^3
Water Collected V_w 144.4 ml
Time of Test T_t 60 min
Stack Pressure P_s -1.50 "H_2O

Pitot Tip No. 3-2
Baro. Press. P_b 27.11 "Hg
Probe Tip Dia. D_n 0.155 in.
% CO_2 13.5 % CO 0.0
% O_2 6.1 % N_2 80.4

Barometer No. ADA Nozzle No. 08-026-1
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 0.997 x 41.649
Area Stack A_s 9363 in^2

Version 2 April 4 2008

Impinger Bpx No. 2-1

Impinger 1	Final Weight	873.3
	Initial Weight	751.5
	Increase	121.8
Impinger 2	Final Weight	777.0
	Initial Weight	765.2
	Increase	11.8
Impinger 3	Final Weight	733.7
	Initial Weight	731.7
	Increase	2.0
Impinger 4	Final Weight	748.8
	Initial Weight	747.9
	Increase	0.9
Impinger 5	Final Weight	644.9
	Initial Weight	644.3
	Increase	0.6
Impinger 6	Final Weight	946.8
	Initial Weight	939.5
	Increase	7.3
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	121.8
Impinger 2	11.8
Impinger 3	2.0
Impinger 4	0.9
Impinger 5	0.6
Impinger 6	7.3
Impinger 7	
Impinger 8	
Total	144.4 = V_w

Filter No. _____

P_b = 27.11
V_m = 41.524
V_w = 144.4
P_m = 1.317
Avg ΔP = ~~0.~~3.850

Avg $\sqrt{\Delta P}$ = 1.961
C_p = 0.823
P_s = -1.50 "H_2O
T_m = 86 °F
T_s = 208 °F

%CO_2 = 13.5
%O_2 = 6.1
%CO = 0.0
%N_2 = 80.4
A_s = 9363
D_n = 0.155
T_t = 60

27.00 "Hg
546 °R
668 °R

Moisture Content: %M = 15.73 M_d = 0.8427 MW_d = 30.404 MW = 28.45

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 41.524 \left[\frac{27.11 + \frac{1.317}{13.6}}{86 + 460}\right] = 36.520 \text{ sft}^3 = 0.609 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 144.4 = 6.816 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{6.816}{36.520 + 6.816} \times 100 = 15.73 \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{668}{27.00 \times 28.45}} \times 1.961 = 7711 \text{ fpm}$$

$$\%I = \frac{1039 \times 36.520 \times 668}{0.8427 \times 27.00 \times 7711 \times 60 \times (0.155)^2} = 100.2 \%$$

ACFM: 501,403
SCFM: 302,476
WSCFH: 21,536,205
%EA: 40.1

Checked by: P. Sel[illegible]
Date: 9/26/08

Job Number 08-026 EPA 26A Field Data
Job Name ADA - Hardin, MT
Run Number 3
Unit Stack
Date 23 Sept 2008
Operator Mullins, Stanley
Impinger Box No. 2-1
Meter Box No. 2-1

Read and Record at the start of each point

Purge to: —
Purge time: —
Pitot Leak Check Initial ✓ Final ✓

Ambient Temp. °F 64
Assumed Moisture % 15.5
Probe length 9'
C Factor 3.40 to reference
Initial Leak @ 15.0 "Hg = 0.002 cfm
Final Leak @ 8.5 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
C-5	1823	118.719	3.90	1.30	1.30	7.0	206	260	253	47	84	85		
4	1828	122.25	3.80	1.30	1.30	6.0	205	271	251	41	86	84		
3	1833	125.74	4.00	1.35	1.35	6.0	206	262	250	41	87	84		
2	1838	129.23	4.05	1.40	1.40	6.5	207	261	253	42	89	84		
1	1843	132.77	3.95	1.35	1.35	6.5	206	260	249	43	90	84		
1	1848	136.32	3.95	1.35	1.35	6.5	207	259	254	43	91	84		
End	1853	139.843	—	—	—	—	—	—	—	—	—	—	—	
D-5	1856	139.843	3.70	1.25	1.25	6.0	207	263	260	47	89	85		
4	1901	143.22	3.70	1.25	1.25	6.0	207	263	256	43	90	84		
3	1906	146.64	3.60	1.25	1.25	6.0	207	265	242	43	91	84		
2	1911	150.10	3.40	1.15	1.15	5.5	208	262	253	43	92	85		
1	1916	153.36	3.60	1.25	1.25	6.0	207	262	247	44	93	85		
1	1921	156.74	3.50	1.20	1.20	6.0	207	260	252	44	93	85		
End	1926	160.104	—	—	—	—	—	—	—	—	—	—	—	
All														

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 41.261 ft^3
Water Collected V_w 133.5 ml
Time of Test T_t 60 min
Stack Pressure P_s -1.30 "H_2O

Pitot Tip No. 3-2
Baro. Press. P_b 27.14 "Hg
Probe Tip Dia. D_n 0.155 in.
% CO_2 13.6 % CO 0.0
% O_2 6.0 % N_2 80.4

Barometer No. ADA Nozzle No. 08-026-1
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 0.997 x 41.385
Area Stack A_s 9363 in^2

Version 2. April 4, 2008

Impinger Bpx No. 2-1

Impinger 1	Final Weight	856.5
	Initial Weight	744.4
	Increase	112.1
Impinger 2	Final Weight	780.8
	Initial Weight	768.5
	Increase	12.3
Impinger 3	Final Weight	737.0
	Initial Weight	734.7
	Increase	2.3
Impinger 4	Final Weight	741.2
	Initial Weight	740.3
	Increase	0.9
Impinger 5	Final Weight	645.0
	Initial Weight	644.9
	Increase	0.1
Impinger 6	Final Weight	952.6
	Initial Weight	946.8
	Increase	5.8
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	112.1
Impinger 2	12.3
Impinger 3	2.3
Impinger 4	0.9
Impinger 5	0.1
Impinger 6	5.8
Impinger 7	
Impinger 8	
Total	133.5 = V_w

Filter No. _____

P_b =	27.14		
V_m =	41.261	$\%CO_2$ =	13.6
V_w =	133.5	$\%O_2$ =	6.0
P_m =	1.283	%CO =	0.0
Avg ΔP =	3.763	$\%N_2$ =	80.4
		A_s =	9363
		D_n =	0.155
Avg $\sqrt{\Delta P}$ =	1.939	T_t =	60
C_p =	0.823		
P_s =	−1.30 "H_2O		27.04 "Hg
T_m =	87 °F		547 °R
T_s =	207 °F		667 °R

Moisture Content: %M = 14.81 M_d = 0.8519 MW_d = 30.416 MW = 28.58

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 41.261 \left[\frac{27.14 + \frac{1.283}{13.6}}{87 + 460}\right] = 36.259 \text{ sft}^3 = 0.604 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 133.5 = 6.301 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{6.301}{36.259 + 6.301} \times 100 = 14.81\%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{667}{27.04 \times 28.58}} \times 1.939 = 7596 \text{ fpm}$$

$$\%I = \frac{1039 \times 36.259 \times 667}{0.8519 \times 27.04 \times 7596 \times 60 \times (0.155)^2} = 99.6\%$$

ACFM: 493,913
SCFM: 302,117
WSCFH: 21,278,310
%EA: 39.2

Checked by: P. Sebo
Date: 9/26/08

Job Number 08-026
Job Name ADA-ES (Hardin, MT)
Run Number 1
Unit Stack
Date 9/24/08
Operator Selakovich/Hart
Impinger Box No. 3-1 (CCT-1)
Meter Box No. 2-2

CCT Field Data

Read and Record at the start of each point

Purge to: 839 703
Purge time: 1508-1523
Pitot Leak Check Initial — Final —

Ambient Temp. °F 57
Assumed Moisture % —
Probe length 9'
C Factor ✓ to reference
Initial Leak @ 15.0 "Hg = 0.008 cfm
Final Leak @ 5.0 "Hg = 0.004 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Condenser Outlet ~~Stack~~ Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
A-3	1407	813.627	—	0.30	0.30	0.5	142	376	547	55	62	61	107	
	1412	815.39	—	0.30	0.30	0.5	143	400	546	44	62	61	108	
	1417	817.11	—	0.30	0.30	0.5	142	418	547	41	67	62	113	
	1422	818.83	—	0.30	0.30	0.5	149	433	547	40	64	62	118	
	1427	820.55	—	0.30	0.30	0.5	147	447	547	40	65	63	117	
	1432	822.27	—	0.30	0.30	0.5	148	459	547	40	66	63	113	
	1437	823.99	—	0.30	0.30	0.5	144	467	548	41	67	64	112	
	1442	825.71	—	0.30	0.30	0.5	141	474	547	41	67	64	112	
	1447	827.45	—	0.30	0.30	0.5	140	481	547	41	68	64	111	
	1452	829.18	—	0.30	0.30	0.5	139	488	547	41	68	64	112	
	1457	830.92	—	0.30	0.30	0.5	141	495	548	41	69	65	114	
	1502	832.64	—	0.30	0.30	0.5	142	503	548	41	69	65	115	
END	1507	834.375	—	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p —
Volume Collected V_m 20.209 ft^3
Water Collected V_w 71.4 ml
Time of Test T_t 60 min
Stack Pressure P_s — "H_2O

Pitot Tip No. —
Baro. Press. P_b 27.08 "Hg
Probe Tip Dia. D_n — in.
% CO_2 — % CO —
% O_2 — % N_2 —

Barometer No. ADA-ES Nozzle No. —
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 20.748 x 0.974
Area Stack A_s 9363 in^2

Version 2. April 4, 2008

Impinger Bpx No. 3-1 (CCT-1)

Impinger 1	Final Weight	790.9
	Initial Weight	724.7
	Increase	66.2
Impinger 2	Final Weight	740.9
	Initial Weight	739.4
	Increase	1.5
Impinger 3	Final Weight	628.2
	Initial Weight	628.1
	Increase	0.1
Impinger 4	Final Weight	955.6
	Initial Weight	952.0
	Increase	3.6
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	66.2
Impinger 2	1.5
Impinger 3	0.1
Impinger 4	3.6
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	71.4 = V_w

Filter No. —

P_b =	27.08		
V_m =	20.209		
V_w =	71.4		
P_m =	0.300		
Avg ΔP =	—		
Avg $\sqrt{\Delta P}$ =	—		
C_p =	—		
P_s =	—	"H_2O	— "Hg
T_m =	65	°F	525 °R
T_s =	—	°F	— °R

%CO_2 =	—
%O_2 =	—
%CO =	—
%N_2 =	—
A_s =	9363
D_n =	—
T_t =	60

Moisture Content: %M = 15.47 M_d = 0.8453 MW_d = — MW = —

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 20.209 \left[\frac{27.08 + \frac{0.300}{13.6}}{65 + 460}\right] = \frac{18.413}{0.307} \text{ sft}^3 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 71.4 = 3.370 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{3.370}{18.413 + 3.370} \times 100 = 15.47 \%$$

$$V_s = 5123.8 \times ___ \sqrt{\frac{___}{___}} \times ___ = ___ \text{ fpm}$$

$$\%I = \frac{1039 \times ___ \times ___}{___ \times ___ \times ___ \times (___)^2} = ___ \%$$

ACFM: —
SCFM: —
WSCFH: —
%EA: —

Checked by: [signature]
Date: 9/26/08

Job Number 08-076
Job Name ADA-ES (Hardin, MT)
Run Number 2
Unit Stack
Date 9/24/08
Operator Selakovich/Bart
Impinger Box No. 3-1
Meter Box No. 2-2

CCT Field Data

Read and Record at the start of each point

Purge to: 866.766
Purge time: 1701-1716
Pitot Leak Check Initial — Final —

Ambient Temp. °F 60
Assumed Moisture % —
Probe length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.002 cfm
Final Leak @ 5.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O	Orifice ΔH, "H_2O Desired (ΔP)	Orifice ΔH, "H_2O Actual (ΔP)	Pump Vacuum "Hg Guage (P_m)	Condenser ~~Stack~~ Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Outlet ~~Aux~~ Temp °F	Remarks
A-3	1600	840.405	—	0.30	0.30	0.0	144	470	547	64	70	69	110	
	1605	842.17	—	0.30	0.30	0.0	147	495	546	58	71	70	107	
	1610	843.92	—	0.30	0.30	0.0	145	511	547	51	71	70	109	
	1615	845.67	—	0.30	0.30	0.0	141	519	548	45	71	70	114	
	1620	847.38	—	0.30	0.30	0.0	139	523	546	42	72	69	113	
	1625	849.13	—	0.30	0.30	0.0	140	527	548	42	72	70	111	
	1630	850.86	—	0.30	0.30	0.0	141	529	547	42	73	69	113	
	1635	852.60	—	0.30	0.30	0.0	141	533	546	42	73	70	114	
	1640	854.35	—	0.30	0.30	0.0	142	534	547	45	73	69	114	
	1645	856.08	—	0.30	0.30	0.0	142	537	546	46	73	70	117	
	1650	857.82	—	0.30	0.30	0.0	141	539	547	45	74	70	115	
	1655	859.60	—	0.30	0.30	0.0	140	542	546	45	74	70	114	
END	1700	861.268	—	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p —
Volume Collected V_m 20.321 ft^3
Water Collected V_w 70.4 ml
Time of Test T_t 60 min
Stack Pressure P_s — "H_2O

Pitot Tip No. —
Baro. Press. P_b 27.02 "Hg
Probe Tip Dia. D_n — in.
% CO_2 — % CO —
% O_2 — % N_2 —

Barometer No. ADA-ES Nozzle No. —
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 20.863 X 0.974
Area Stack A_s 9363 in^2

Version 2. April 4, 2008

Impinger Bpx No. 3-1

Impinger 1	Final Weight	788.4
	Initial Weight	723.5
	Increase	64.9
Impinger 2	Final Weight	742.7
	Initial Weight	741.9
	Increase	0.8
Impinger 3	Final Weight	628.5
	Initial Weight	628.2
	Increase	0.3
Impinger 4	Final Weight	928.7
	Initial Weight	~~955.6~~ 924.3
	Increase	4.4
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	64.9
Impinger 2	0.8
Impinger 3	0.3
Impinger 4	4.4
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	70.4 = V_w

Filter No. —

P_b =	27.02		
V_m =	20.321	$\%CO_2$ =	—
V_w =	70.4	$\%O_2$ =	—
P_m =	0.300	%CO =	—
Avg ΔP =	—	$\%N_2$ =	—
Avg $v\overline{\Delta P}$ =	—	A_s =	9363
C_p =	—	D_n =	—
P_s =	— "H_2O	T_t =	60
T_m =	71 °F		— "Hg
T_s =	— °F		531 °R
			— °R

Moisture Content: %M = 15.39 M_d = 0.8461 MW_d = — MW = —

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 20.321 \left[\frac{27.02 + \frac{0.300}{13.6}}{71 + 460}\right] = 18.266 \text{ sft}^3 = 0.304 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 70.4 = 3.323 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{3.323}{18.266 + 3.323} \times 100 = 15.39 \%$$

$$V_s = 5123.8 \times ___ \sqrt{\frac{___}{___}} \times ___ = ___ \text{ fpm}$$

$$\%I = \frac{1039 \times ___ \times ___}{___ \times ___ \times ___ \times (___)^2} = ___ \%$$

ACFM: —
SCFM: —
WSCFH: —
%EA: —

Checked by: P. Selat
Date: 9/26/08

Job Number 08-026
Job Name ADAES (Harding, MT)
Run Number 3
Unit Stack
Date 9/24/08
Operator Selakovich/Bert
Impinger Box No. 3-1
Meter Box No. 2-2

CCT Field Data

Read and Record at the start of each point

Purge to: 893 / 179
Purge time: 1846 - 1901
Pitot Leak Check Initial — Final —

Ambient Temp. °F 67
Assumed Moisture % —
Probe length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.002 cfm
Final Leak @ 5.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage	Condenser ~~Stack~~ Temp °F	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet	Dry Gas Temp °F Outlet	Outlet ~~Aux~~ Temp °F	Remarks
		ΔP			P_m		T_s				T_m			
A-3	1745	867.000	—	0.30	0.30	0.0	141	477	546	63	69	68	103	
	1750	868.75	—	0.30	0.30	0.0	140	507	549	49	69	68	111	
	1755	870.48	—	0.30	0.30	0.0	141	518	546	46	69	67	113	
	1800	872.22	—	0.30	0.30	0.0	140	525	546	45	69	68	110	
	1805	873.96	—	0.30	0.30	0.0	140	529	548	44	70	67	113	
	1810	875.69	—	0.30	0.30	0.0	140	533	546	43	70	67	111	
	1815	877.43	—	0.30	0.30	0.0	141	534	546	42	70	67	110	
	1820	879.14	—	0.30	0.30	0.0	140	536	548	41	70	67	113	
	1825	880.88	—	0.30	0.30	0.0	141	538	547	41	71	67	113	
	1830	882.61	—	0.30	0.30	0.0	141	541	547	40	71	67	112	
	1835	884.34	—	0.30	0.30	0.0	140	543	548	40	71	67	113	
	1840	886.08	—	0.30	0.30	0.0	140	546	547	40	71	67	114	
END	1845	887.807	—	—	—	—	—	—	—	—	—	—	—	

Pitot Tube Calibration Factor C_p —
Volume Collected V_m 20.266 ft^3
Water Collected V_w 74.3 ml
Time of Test T_t 60 min
Stack Pressure P_s — "H_2O

Pitot Tip No. —
Baro. Press. P_b 26.99 "Hg
Probe Tip Dia. D_n — in.
% CO_2 — % CO —
% O_2 — % N_2 —

Barometer No. ADA-ES Nozzle No. —
Total Volume of Leak Checks After Start ∅ Ft^3
V_m X Dry Gas Meter Calibration Factor 20.807 x 0.974
Area Stack A_s 9363 in^2

Version 2. April 4, 2008

Impinger Bpx No. 3-1

Impinger 1	Final Weight	791.7
	Initial Weight	723.7
	Increase	68.0
Impinger 2	Final Weight	746.9
	Initial Weight	740.5
	Increase	1.4
Impinger 3	Final Weight	628.8
	Initial Weight	628.5
	Increase	0.3
Impinger 4	Final Weight	933.3
	Initial Weight	928.7
	Increase	4.6
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	68.0
Impinger 2	1.4
Impinger 3	0.3
Impinger 4	4.6
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	74.3 = V_w

Filter No. —

P_b = 26.99
V_m = 20.266
V_w = 74.3
P_m = 0.300
Avg ΔP = —
Avg $\sqrt{\Delta P}$ = —
C_p = —
P_s = — "H_2O
T_m = 69 °F
T_s = — °F

%CO_2 = —
%O_2 = —
%CO = —
%N_2 = —
A_s = 9363
D_n = —
T_t = 60

— "Hg
529 °R
— °R

Moisture Content: %M = 16.11 M_d = 0.8389 MW_d = — MW = —

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 20.266 \left[\frac{26.99 + \frac{0.300}{13.6}}{69 + 460}\right] = \frac{18.265}{0.304} \text{ sft}^3 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 74.3 = 3.507 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{3.507}{(18.265 + 3.507)} \times 100 = 16.11 \%$$

$$V_s = 5123.8 \times ___ \sqrt{\frac{___}{___}} \times ___ = ___ \text{ fpm}$$

$$\%I = \frac{1039 \times ___ \times ___}{___ \times ___ \times ___ \times (___)^2} = ___ \%$$

ACFM: —
SCFM: —
WSCFH: —
%EA: —

Checked by: [signature]
Date: 9/26/08

Job Number 08-026
Job Name ADA-Hardin, MT
Run Number
Unit Stack
Date 24 Sept 2008
Operator Mullins, Stanley
Impinger Box No. 2-1
Meter Box No. 2-1

EPA 201A/202 Field Data

Read and Record at the start of each point

Purge to: —
Purge time: 1213-1313
Pitot Leak Check Initial — Final —

Ambient Temp. °F 60
Assumed Moisture % 15.9
Probe length 9'
C Factor — to reference
Initial Leak @ 16.0 "Hg = 0.002 cfm
Final Leak @ 5.0 "Hg = 0.003 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
C-6	0	255.018	3.05	0.41	0.41	3.0	207	261	238	52	65	67		1030-1101
5	4:48	257.00	3.35	0.41	0.41	2.5	207	269	249	45	66	67		
4	9:50	258.98	3.60	0.41	0.41	2.5	207	259	250	44	67	67		
3	15:03	261.03	3.70	0.41	0.41	2.5	213	259	257	44	69	67		
2	20:21	263.11	3.80	0.41	0.41	2.5	211	259	258	45	71	67		
1	25:43	265.23	3.55	0.41	0.41	2.5	210	259	256	46	72	68		
End	30:54	267.259	—	—	—	—	—	—	—	—	—	—	—	
D-6	0	267.259	2.75	0.41	0.41	4.5	210	259	256	53	71	68		1105-1135
5	4:34	269.21	3.25	0.41	0.41	3.0	209	259	256	49	73	69		
4	9:32	271.14	3.35	0.41	0.41	3.0	210	259	257	50	74	69		
3	14:34	273.13	3.60	0.41	0.41	3.0	214	259	257	49	75	70		
2	19:47	275.20	3.75	0.41	0.41	3.0	210	259	257	49	76	70		
1	25:07	277.32	3.55	0.41	0.41	3.0	210	258	257	49	77	71		
End	30:18	279.388	—	—	—	—	—	—	—	—	—	—	—	
All														

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 24.297 ft^3
Water Collected V_w 89.6 ml
Time of Test T_t 61:12 min
Stack Pressure P_s -1.20 "H_2O

Pitot Tip No. 3-3
Baro. Press. P_b 27.14 "Hg
Probe Tip Dia. D_n 0.160 in.
% CO_2 13.4 % CO 0.0
% O_2 6.2 % N_2 80.4

Barometer No. ADA
Nozzle No (3) 08-026-2
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 0.997 x 24.370
Area Stack A_s 9363 in^2

Version 2. April 4, 2008

Impinger Bpx No. 2-1

Impinger 1	Final Weight	812.2
	Initial Weight	738.3
	Increase	73.9
Impinger 2	Final Weight	764.0
	Initial Weight	759.6
	Increase	4.4
Impinger 3	Final Weight	633.7
	Initial Weight	634.1
	Increase	-0.4
Impinger 4	Final Weight	957.1
	Initial Weight	945.4
	Increase	11.7
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	73.9
Impinger 2	4.4
Impinger 3	-0.4
Impinger 4	11.7
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	89.6 = V_w

Filter No. 21

P_b =	27.14	%CO_2 =	13.4
V_m =	24.297	%O_2 =	6.2
V_w =	89.6	%CO =	0.0
P_m =	0.410	%N_2 =	80.4
Avg ΔP =	~~0.343~~ .442 BSM 6/24/08	A_s =	9363
		D_n =	0.160
Avg $\sqrt{\Delta P}$ =	1.853	T_t =	61.2
C_p =	0.823		
P_s =	-1.20 "H_2O		27.05 "Hg
T_m =	70 °F		530 °R
T_s =	210 °F		670 °R

Moisture Content: %M = 16.13 M_d = 0.8387 MW_d = 30.372 MW = 28.39

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 24.297 \left[\frac{27.14 + \frac{0.410}{13.6}}{70 + 460}\right] = 21.984 \text{ sft}^3 = 0.359 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 89.6 = 4.229 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{4.229}{21.984 + 4.229} \times 100 = 16.13 \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{670}{27.05 \times 28.39}} \times 1.853 = 7299 \text{ fpm}$$

$$\%I = \frac{1039 \times 21.984 \times 670}{0.8387 \times 27.05 \times 7299 \times 61.2 \times (0.160)^2} = 59.0 \%$$

ACFM: 474,560
SCFM: 284,631
WSCFH: 20,362,315,299
%EA: 41.0

Checked by: BSM
Date: 11/9/08

Job Number 08-026
Job Name ADA-Hardin, MT
Run Number 2
Unit Stack
Date 24 Sept 2008
Operator Mullins, Stanley
Impinger Box No. 2-2
Meter Box No. 2-1

EPA 201A/202 Field Data

Read and Record at the start of each point

Purge to: —
Purge time: 1424-1524
Pitot Leak Check Initial — Final —

Ambient Temp. °F 72
Assumed Moisture % 16.0
Probe length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.002 cfm
Final Leak @ 2.0 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
D-6	0	279.808	2.75	0.37	~~0.75~~ 0.37	1.0	214	268	251	66	71	71		1308-1338
5	4:34	281.61	3.25	0.37	0.37	0.5	214	268	250	54	72	71		
4	9:32	283.47	3.35	0.37	0.37	0.5	212	267	260	53	73	71		
3	14:34	285.37	3.60	0.37	0.37	0.5	211	267	252	53	74	72		
2	19:47	287.35	3.75	0.37	0.37	0.5	209	267	255	53	76	72		
1	25.07	289.36	3.55	0.37	0.37	0.5	209	268	254	54	77	72		
End	30:18	291.328	—	—	—	—	—	—	—	—	—	—	—	
C-6	0	291.328	3.05	0.37	0.37	0.5	208	269	256	59	76	73		1341-1412
5	4:48	293.11	3.35	0.37	0.37	0.5	211	266	254	54	78	75		
4	9:50	295.02	3.60	0.37	0.37	0.5	211	265	250	54	78	74		
3	15:03	297.00	3.70	0.37	0.37	0.5	212	265	255	54	79	74		
2	20.21	299.01	3.80	0.37	0.37	0.5	212	265	254	54	80	75		
1	25:43	301.05	3.55	0.37	0.37	0.5	211	264	252	55	81	75		
End	30:54	303.089	—	—	—	—	—	—	—	—	—	—	—	
All														

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 23.211 ft^3
Water Collected V_w 79.2 ml
Time of Test T_t 61:12 min
Stack Pressure P_s -1.50 "H_2O

Pitot Tip No. 3-3
Baro. Press. P_b 27.08 "Hg
Probe Tip Dia. D_n 0.131 in.
% CO_2 13.4 % CO 0.0
% O_2 6.2 % N_2 80.4

Barometer No. ADA
Nozzle No. (1) 08-026-3
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 0.997 x 23.281
Area Stack A_s 9363 in^2

Version 2. April 4, 2008

Impinger Bpx No. 2-2

Impinger 1	Final Weight	822.0
	Initial Weight	753.8
	Increase	68.2
Impinger 2	Final Weight	760.3
	Initial Weight	755.4
	Increase	4.9
Impinger 3	Final Weight	665.2
	Initial Weight	664.8
	Increase	0.4
Impinger 4	Final Weight	971.5
	Initial Weight	965.8
	Increase	5.7
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	68.2
Impinger 2	4.9
Impinger 3	0.4
Impinger 4	5.7
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	79.2 = V_w

Filter No. 22

P_b =	27.08	$\%CO_2$ =	13.4
V_m =	23.211	$\%O_2$ =	6.2
V_w =	79.2	%CO =	0.0
P_m =	0.370	$\%N_2$ =	80.4
Avg ΔP =	3.442	A_s =	9363
		D_n =	0.131
Avg $\sqrt{\Delta P}$ =	1.853	T_t =	61.2
C_p =	0.823		
P_s =	-1.50 "H_2O		26.97 "Hg
T_m =	75 °F		535 °R
T_s =	211 °F		671 °R

Moisture Content: %M = 15.26 M_d = 0.8474 MW_d = 30.392 MW = 28.50

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 23.211 \left[\frac{27.08 + \frac{0.370}{13.6}}{75 + 460}\right] = 20.757 \text{ sft}^3 = 0.339 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 79.2 = 3.738 \text{ sft}^3$$

$$\%\ Moisture = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{3.738}{20.757 + 3.738} \times 100 = 15.26\ \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{671}{26.97 \times 28.50}} \times 1.853 = 7301 \text{ fpm}$$

$$\%I = \frac{1039 \times 20.757 \times 671}{0.8474 \times 26.97 \times 7301 \times 61.2 \times (0.131)^2} = 82.6\ \%$$

ACFM: 474,699
SCFM: 286,384
WSCFH: 20,277,393.66
%EA: 41.0

Checked by: BJM
Date: 11/09/08

Job Number 08-026
Job Name ADA - Hardin, MT
Run Number 3
Unit Stack
Date 24 Sept 2008
Operator Mullins, Stanley
Impinger Box No. 2-1
Meter Box No. 2-1

EPA 201A / 202 Field Data

Read and Record at the start of each point

Purge to: —
Purge time: 1654 - 1754
Pitot Leak Check Initial — Final —

Ambient Temp. °F 76
Assumed Moisture % 16.0
Probe length 91
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.008 cfm
Final Leak @ 5.5 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual	Pump Vacuum "Hg Guage (P_m)	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
C-6	0	303.448	3.05	0.37	0.37	3.5	213	259	256	65	76	76		1505 - 1536
5	4:48	305.35	3.35	0.37	0.37	3.0	213	259	254	51	76	76		
4	9:50	307.26	3.60	0.37	0.37	3.0	214	259	246	51	77	76		
3	15:03	309.23	3.70	0.37	0.37	3.0	214	258	256	51	79	76		
2	20:21	311.23	3.80	0.37	0.37	3.0	216	258	253	51	80	76		
1	25:43	313.26	3.55	0.37	0.37	3.0	214	259	251	51	82	77		
End	30:54	315.232	—	—	—	—	—	—	—	—	—	—	—	
D-6	0	315.232	2.75	0.37	0.37	3.0	214	259	251	63	83	78		1540 - 1610
5	4:34	317.07	3.25	0.37	0.37	3.5	214	259	253	56	85	78		
4	9:32	318.95	3.35	0.37	0.37	3.5	215	259	254	56	86	79		
3	14:34	320.86	3.66	0.37	0.37	4.0	214	258	253	57	87	80		
2	19:47	322.85	3.75	0.37	0.37	4.0	214	258	253	57	88	82		
1	25:07	324.89	3.55	0.37	0.37	4.0	213	256	253	58	88	83		
End	30:18	326.883	—	—	—	—	—	—	—	—	—	—	—	
All														

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 23.365 ft^3
Water Collected V_w 77.3 ml
Time of Test T_t 61:12 min
Stack Pressure P_s -1.60 "H_2O

Pitot Tip No. 3-3
Baro. Press. P_b 27.02 "Hg
Probe Tip Dia. D_n 0.131 in.
% CO_2 13.4 % CO 0.0
% O_2 6.2 % N_2 80.4

Barometer No. ADA
Nozzle No. (1) 08-026-3
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 0.997 x 23.435
Area Stack A_s 9363 in^2

Version 2. April 4, 2008

Impinger Bpx No. 2-1

Impinger 1	Final Weight	813.8
	Initial Weight	746.1
	Increase	67.7
Impinger 2	Final Weight	760.0
	Initial Weight	756.2
	Increase	3.8
Impinger 3	Final Weight	633.6
	Initial Weight	632.9
	Increase	0.7
Impinger 4	Final Weight	961.9
	Initial Weight	956.8
	Increase	5.1
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	67.7
Impinger 2	3.8
Impinger 3	0.7
Impinger 4	5.1
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	77.3 = V_w

Filter No. 23

P_b = 27.02
V_m = 23.365
V_w = 77.3
P_m = 0.370
Avg ΔP = 3.442
Avg $\sqrt{\Delta P}$ = 1.853
C_p = 0.823
P_s = -1.60 "H_2O
T_m = 80 °F
T_s = 214 °F

$\%CO_2$ = 13.4
$\%O_2$ = 6.2
%CO = 0.0
$\%N_2$ = 80.4
A_s = 9363
D_n = 0.131
T_I = 61.2
26.90 "Hg
540 °R
674 °R

Moisture Content: %M = 15.01 M_d = 0.8499 MW_d = 30.392 MW = 28.53

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 23.365 \left[\frac{27.02 + \frac{0.370}{13.6}}{80 + 460}\right] = 20.656 \text{ sft}^3 = 0.338 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 77.3 = 3.649 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{3.649}{20.656 + 3.649} \times 100 = 15.01 \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{674}{26.90 \times 28.53}} \times 1.853 = 7323 \text{ fpm}$$

ACFM: 476,127
SCFM: 286,068
WSCFH: 20,195,414
%EA: 41.0

$$\%I = \frac{1039 \times 20.656 \times 674}{0.8499 \times 26.90 \times 7323 \times 61.2 \times (0.131)^2} = 82.3 \%$$

Checked by: KJM
Date: 11/09/08

Job Number 08-026
Job Name ADA-Hardin, MT
Run Number 4
Unit Stack
Date 24 Sept 2008
Operator Mullins, Stanley
Impinger Box No. 2-2
Meter Box No. 2-1

EPA 201A / 202 Field Data

Read and Record at the start of each point

Purge to: —
Purge time: 1826-1926
Pitot Leak Check Initial — Final —

Ambient Temp. °F 73
Assumed Moisture % 16.0
Probe length 9'
C Factor — to reference
Initial Leak @ 15.0 "Hg = 0.003 cfm
Final Leak @ 2.5 "Hg = 0.000 cfm

Point	Clock Time	Dry Gas Meter, CF	"Pitot" H_2O (ΔP)	Orifice ΔH, "H_2O Desired	Orifice ΔH, "H_2O Actual (P_m)	Pump Vacuum "Hg Guage	Stack Temp °F (T_s)	Probe Temp °F	Oven Temp °F	Effluent Temp °F	Dry Gas Temp °F Inlet (T_m)	Dry Gas Temp °F Outlet	Aux Temp °F	Remarks
D-6	0	327.500	2.75	0.37	0.37	1.0	208	260	235	64	76	79		
5	4:34	329.27	3.25	0.37	0.37	1.0	210	260	249	54	76	78		1700-1730
4	9:32	331.13	3.35	0.37	0.37	1.0	209	260	253	55	77	78		
3	14:34	333.01	3.60	0.37	0.37	1.0	211	259	249	57	78	77		
2	19:47	334.96	3.75	0.37	0.37	1.0	211	259	251	54	79	77		
1	25:07	336.95	3.55	0.37	0.37	1.0	211	260	252	54	79	77		
End	30:18	338.883	—	—	—	—	—	—	—	—	—	—	—	
C-6	0	338.883	3.05	0.37	0.37	1.0	212	260	253	58	79	77		
5	4:48	340.73	3.35	0.37	0.37	1.0	213	259	254	54	79	77		1733-1804
4	9:50	342.63	3.60	0.37	0.37	1.0	212	258	241	53	80	77		
3	15:03	344.60	3.70	0.37	0.37	1.0	212	257	260	53	80	77		
2	20:21	346.59	3.80	0.37	0.37	1.0	210	257	255	54	80	77		
1	25:43	348.60	3.55	0.37	0.37	1.0	210	257	251	54	80	77		
End	30:54	350.573	—	—	—	—	—	—	—	—	—	—	—	
All														

Pitot Tube Calibration Factor C_p 0.823
Volume Collected V_m 23.004 ft^3
Water Collected V_w 79.0 ml
Time of Test T_t 61:12 min
Stack Pressure P_s -1.10 "H_2O

Pitot Tip No. 3-3
Baro. Press. P_b 26.99 "Hg
Probe Tip Dia. D_n 0.131 in.
% CO_2 13.4 % CO 0.0
% O_2 6.2 % N_2 80.4

Barometer No. ADA
Nozzle No. (1) 08-026-3
Total Volume of Leak Checks After Start 0 Ft^3
V_m X Dry Gas Meter Calibration Factor 0.997 X 23.073
Area Stack A_s 9363 in^2

Version 2. April 4, 2008

Impinger Bpx No. 2-2

Impinger 1	Final Weight	828.6
	Initial Weight	758.4
	Increase	70.2
Impinger 2	Final Weight	766.5
	Initial Weight	763.5
	Increase	3.0
Impinger 3	Final Weight	665.2
	Initial Weight	664.5
	Increase	0.7
Impinger 4	Final Weight	976.5
	Initial Weight	971.4
	Increase	5.1
Impinger 5	Final Weight	
	Initial Weight	
	Increase	
Impinger 6	Final Weight	
	Initial Weight	
	Increase	
Impinger 7	Final Weight	
	Initial Weight	
	Increase	
Impinger 8	Final Weight	
	Initial Weight	
	Increase	

Water Weight Gain

Impinger 1	70.2
Impinger 2	3.0
Impinger 3	0.7
Impinger 4	5.1
Impinger 5	
Impinger 6	
Impinger 7	
Impinger 8	
Total	79.0 = V_w

Filter No. 24

P_b = 26.99
V_m = 23.004
V_w = 79.0
P_m = 0.370
Avg ΔP = 3.442
Avg $v\overline{\Delta P}$ = 1.853
C_p = 0.823
P_s = -1.10 "H_2O
T_m = 78 °F
T_s = 211 °F

$\%CO_2$ = 13.4
$\%O_2$ = 6.2
%CO = 0.0
$\%N_2$ = 80.4
A_s = 93.63
D_n = 0.131
T_l = 61.2

26.91 "Hg
538 °R
671 °R

Moisture Content: %M = 15.46 M_d = 0.8454 MW_d = 30.392 MW = 28.48

$$Vm_{std} = 17.65 \times Vm \left[\frac{P_b + \frac{P_m}{13.6}}{T_m + 460}\right] = 17.65 \times 23.004 \left[\frac{26.99 + \frac{0.370}{13.6}}{78 + 460}\right] = 20.389 \text{ sft}^3 = 0.333 \text{ scfm}$$

$$Vw_{gas} = 0.0472 \times Vw = 0.0472 \times 79.0 = 3.729 \text{ sft}^3$$

$$\% \text{ Moisture} = \frac{Vw_{gas}}{Vm_{std} + Vw_{gas}} \times 100 = \frac{3.729}{20.389 + 3.729} \times 100 = 15.46 \%$$

$$V_s = 5123.8 \times 0.823 \sqrt{\frac{671}{26.91 \times 28.48}} \times 1.853 = 7311 \text{ fpm}$$

$$\%I = \frac{1039 \times 20.389 \times 671}{0.8454 \times 26.91 \times 7311 \times 61.2 \times (0.131)^2} = 81.4 \%$$

ACFM: 475,395
SCFM: 285,463
WSCFH: 20,259,994.72
%EA: 41.0

Checked by: KJM
Date: 11/09/08

Appendix E:

EPA Test Methods 5B and 202 (Particulate Matter) Analytical Data - Stack

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

EPA Method 5/202

Project Number: 08-026

Date Analysis Completed: 10-13-08

Project Name: ADA-ES

Unit Tested: Stack

Project Location: Hardin, MT

Run Number:	1	2	3
Particulate Matter on Filter (mg):	19.7 ✓	19.6 ✓	21.3 ✓
Particulate Matter in Front Wash (mg):	18.2 ✓	21.7 ✓	29.7 ✓
Total Particulate Matter in "Front-Half" – MF (mg):	37.9 ✓	41.3 ✓	51.0 ✓
Particulate Matter in "Back-Half" (mg):	365.7 ✓	373.8 ✓	352.5 ✓
Total Particulate Matter in Sample – MT (mg):	403.6 ✓	415.1 ✓	403.5 ✓

Jeff C Stanley
Analyst

Billy J. Mullendore Jr. **Date:** 11/9/08
Data Checked By

Version No. 1 5/30/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 5/202

Stack Filters

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	10-1 0900	10-3 0908			
Desiccator Time Out	10-3 0900	10-6 0900			

Run No. 1		Filter No. A239	Sample I.D.	
Filter & Particulate (g)	0.3955	0.3954 ✓		

Filter & Particulate Average (g) 0.3954 ✓
Initial Filter Weight (g) 0.3757 ✓
Total Particulate (mg) 19.7 ✓

Run No. 2		Filter No. A240	Sample I.D.	
Filter & Particulate (g)	0.3956	0.3956 ✓		

Filter & Particulate Average (g) 0.3956 ✓
Initial Filter Weight (g) 0.3760 ✓
Total Particulate (mg) 19.6 ✓

Run No. 3		Filter No. A241	Sample I.D.	
Filter & Particulate (g)	0.3946	0.3951 ✓		

Filter & Particulate Average (g) 0.3951 ✓
Initial Filter Weight (g) 0.3738 ✓
Total Particulate (mg) 21.3 ✓

Job Stanley 10/6/08
Analyst

Version No. 2 2/13/07

AIR SAMPLING ASSOCIATES, INC.

Thimble Tare Weight Log
EPA Method 5

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
A 226		0.3433	0.3436 ✓				0.3436
	10/1/07	12/7/07	12/7/07				
	0800	1030	1645				
A 227		0.3489	0.3490 ✓				0.3490
	10/1/07	12/7/07	12/7/07				
	0800	1041	1645				
A 228		0.3461	0.3462 ✓				0.3462
	10/1/07	12/7/07	12/7/07				
	0800	1040	1646				
A 229		0.3630	0.3630 ✓				0.3630
	10/1/07	12/7/07	12/7/07				
	0800	1040	1647				
A 230		0.3711	0.3710 ✓				0.3710
	10/1/07	12/7/07	12/7/07				
	0800	1040	1645				
A 231		0.3701	0.3700 ✓				0.3700
	10/1/07	12/7/07	12/7/07				
	0800	1039	1648				
A 232		0.3706	0.3706 ✓				0.3706
	10/1/07	12/7/07	12/7/07				
	0800	1038	1645				
A 233		0.3631	0.3629 ✓				0.3629
	10/1/07	12/7/07	12/7/07				
	0800	1035	1648				
A 234		0.3774	0.3773 ✓				0.3773
	10/1/07	12/7/07	12/7/07				
	0800	1035	1649				
A 235		0.3800	0.3800 ✓				0.3800
	10/1/07	12/7/07	12/7/07				
	0800	1035	1650				
A 236		0.3796	0.3798 ✓				0.3798
	10/1/07	12/7/07	12/7/07				
	0800	1030	1651				
A 237		0.3790	0.3793 ✓				0.3793
	10/1/07	12/7/07	12/7/07				
	0800	1030	1652				
A 238		0.3739	0.3739 ✓				0.3739
	02/20/08	02/21/08	02/21/08				
	0900	0950	1650				
A 239		0.3757	0.3757 ✓				0.3757 ✓
	02/20/08	02/21/08	02/21/08				
	0900	0950	1656				
A 240		~~0.3760~~	~~0.3706~~ ✓	0.3760	0.3760 ✓		~~0.3706~~ 0.3760 ✓
	02/20/08	02/21/08	02/21/08	02/21/08	02/21/08		BJM 2/21/08
	0900	0950	1651	0950	1658		
		0.3760					

AIR SAMPLING ASSOCIATES, INC.

Thimble Tare Weight Log
EPA Method 5

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
A 241	02/20/08 0900	0.3739 02/21/08 0952	0.3738 02/21/08 1655				0.3738
A 242	02/20/08 0900	0.3707 02/21/08 0953	0.3706 02/21/08 1655				0.3706
A 243	02/20/08 0900	0.3737 02/21/08 0954	0.3739 02/21/08 1655				0.3739
A 244	02/20/08 0900	0.3766 02/21/08 0955	0.3765 02/21/08 1655				0.3765
A 245	(5) 02/20/08 ~~1230~~ 0900	0.3794 5/29/08 1300	0.3792 5/30/08 1059				
A 246	02/20/08 0900	0.3714 5/29/08 1300	0.3713 5/30/08 1059				
A 247	02/20/08 0900	0.3758 5/29/08 1301	0.3756 5/30/08 1058				
A 248	02/20/08 0900	0.3780 5/29/08 1302	0.3778 5/30/08 1057				
A 249	02/20/08 0900	0.3777 5/29/08 1303	0.3775 5/30/08 1056				
A 250	02/20/08 0900	0.3763 5/29/08 1305	0.3760 5/30/08 1055				
A 251	02/20/08 0900	0.3736 5/29/08 1306	0.3732 5/30/08 1104				
A 252	02/20/08 0900	0.3751 5/29/08 1307	0.3749 5/30/08 1103				
A 253	02/20/08 0900	0.3784 5/29/08 1308	0.3780 5/30/08 1102				
A 254	02/20/08 0900	0.3758 5/29/08 1310	0.3755 5/30/08 1101				
A 255	02/20/08 0900	0.3806 5/29/08 1313	0.3803 5/30/08 1100				

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 5/202

Front Wash

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	1600 10/8/08	10-10-08 1015			
Desiccator Time Out	10-10-08 930	10-13-08 1350			

Run No. 1		Volume (ml)	83	Sample I.D.	
Final Weight (g)	103.4265	103.4267			
Initial Weight (g)		103.4082			
Particulate Weight (g)		0.0185			

Particulate Average (mg) 18.5
Less Acetone Blank (mg) 0.3
Total Particulate (mg) 18.2

Run No. 2		Volume (ml)	108	Sample I.D.	
Final Weight (g)	113.7187	113.7189			
Initial Weight (g)		113.6967			
Particulate Weight (g)		0.0222			

Particulate Average (mg) 22.2
Less Acetone Blank (mg) 0.5
Total Particulate (mg) 21.7

Run No. 3		Volume (ml)	86	Sample I.D.	
Final Weight (g)	103.6238	103.6238			
Initial Weight (g)		103.5937			
Particulate Weight (g)		0.0301			

Particulate Average (mg) 30.1
Less Acetone Blank (mg) 0.4
Total Particulate (mg) 29.7

Acetone Blank		Volume (ml)	190	Sample I.D.	
Final Weight (g)	113.7708	113.7706			
Initial Weight (g)		113.7698			
Particulate Weight (g)		0.0008			

Average (mg) 0.8
* mg/l 4.2

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

Jol Stanley
Analyst

Date: 10/13/08

Version No.2 10/22/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 5/202

Front Half Tare Weights

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	10-1 0845	10-2 1043	10-3 840	10-6 0915	
Desiccator Time Out	10-2 1039	10-3 835	10-6 0900	10-7 0830	

Run No. 1					Sample I.D.
Weight (g)	103.4079	103.4082 ✓			

Run No. 2					Sample I.D.
Weight (g)	113.6958	113.6975	113.6962	113.6967 ✓	

Run No. 3					Sample I.D.
Weight (g)	103.5934	103.5937 ✓			

Acetone Blank					Sample I.D.
Weight (g)	113.7694	113.7698 ✓			

Jeb Starly 10/7/08
Analyst

Version No. 1 07/06/06

Methylene Chloride Rinse

Job Number	**08-4117**	**Run Date**	9/23-24/08
Client Name	**Air Sampling Associates- Hardin MT**		
Unit Name	**Stack-Impingers 1 & 2**	Method:	202

RUN 1 9/23/2008	**BEAKER**	A 2372	**VOLUME**	ml	234	**AVERAGE**
Beaker + Particulate (g)		109.3843	109.3845			109.3844
Beaker Tare (g)		109.3776	109.3779			109.3778
Particulate Weight (g)		0.0067	0.0066			0.0066

RUN 2 9/23/2008	**BEAKER**	A 2374	**VOLUME**	ml	230	**AVERAGE**
Beaker + Particulate (g)		96.5967	96.5966			96.5967
Beaker Tare (g)		96.5957	96.5957			96.5957
Particulate Weight (g)		0.0010	0.0009			0.0010

RUN 3 9/24/2008	**BEAKER**	A 2376	**VOLUME**	ml	240	**AVERAGE**
Beaker + Particulate (g)		104.2502	104.2503			104.2503
Beaker Tare (g)		104.2492	104.2492			104.2492
Particulate Weight (g)		0.0010	0.0011			0.0011

Analyst KP

FINAL REPORT

Started 9/25/2008
Completed 10/12/2008

Methylene Chloride Rinse

Job Number	**08-4117**	**Run Date**	9/24/2008
Client Name	**Air Sampling Associates- Hardin, MT**		
Unit Name	**Stack-Reagent Blank**	Method: 202	

BLANK	**BEAKER**	A 2386	**VOLUME**	ml	230	**AVERAGE**
Beaker + Particulate (g)		112.7456	112.7457			112.7457
Beaker Tare (g)		112.7449	112.7448			112.7449
Particulate Weight (g)		0.0007	0.0009			0.0008

Analyst KP

FINAL REPORT

Started 9/25/2008
Completed 10/12/2008

DI Water Analysis (Back)

Job Number	**08-4117**	**Run Date**	9/23-24/08
Client Name	**Air Sampling Associates- Hardin, MT**		
Unit Name	**Impingers 1 & 2**	Method:	202

RUN 1 9/23/2008	**BEAKER**	A 2371	**VOLUME**	ml	670	**AVERAGE**
Beaker + Particulate (g)		98.4312	98.4315			98.4314
Beaker Tare (g)		97.9389	97.9392			97.9391
Particulate Weight (g)		0.4923	0.4923			0.4923

RUN 2 9/23/2008	**BEAKER**	A 2373	**VOLUME**	ml	670	**AVERAGE**
Beaker + Particulate (g)		120.5584	120.5585			120.5585
Beaker Tare (g)		120.0696	120.0699			120.0698
Particulate Weight (g)		0.4888	0.4886			0.4887

RUN 3 9/24/2008	**BEAKER**	A 2375	**VOLUME**	ml	660	**AVERAGE**
Beaker + Particulate (g)		113.3545	113.3548			113.3547
Beaker Tare (g)		112.8614	112.8614			112.8614
Particulate Weight (g)		0.4931	0.4934			0.4933

Analyst KP

FINAL REPORT

Started 9/25/2008
Completed 10/12/2008

DI Water Analysis (Back)

Job Number	**08-4117**	**Run Date**	9/24/2008
Client Name	**Air Sampling Associates- Hardin, MT**		
Unit Name	**Stack-Reagent Blank**	Method: 202	

BLANK	**BEAKER**	A 2385	**VOLUME**	ml	580	**AVERAGE**
Beaker + Particulate (g)		100.2991	100.2995			100.2993
Beaker Tare (g)		100.2874	100.2875			100.2875
Particulate Weight (g)		0.0117	0.0120			0.0118

Analyst KP

FINAL REPORT

Started 9/25/2008
Completed 10/12/2008

Sulfate

08-4117

				Sample Volume, ml	Lab Volume, ml	Lab Results, mg/l	Final Results, mg
ADA-ES	9/23-24/2008	5B/202	Sample No.				
	Run 1	Stack	4117-1	590	20	569	118.841
	Run 2	Stack	4117-2	590	20	486	101.506
	Run 3	Stack	4117-3	580	20	622	127.709
ADA-ES	9/24/2008	201A/202	Sample No.				
	Run 1	Stack	4117-4	320	20	243	27.527
	Run 2	Stack	4117-5	320	20	252	28.547
	Run 3	Stack	4117-6	320	20	307	34.777
	Run 4	Stack	4117-7	320	20	204	23.109

Chloride **08-4117**

				Lab Results, mg	Final Results, mg Corrected to NH4Cl
ADA-ES	9/23-24/2008 5B/202				
	Run 1	Stack	A2371	0.58	0.001
	Run 2	Stack	A2473	ND	ND
	Run 3	Stack	A2375	ND	ND
ADA-ES	9/24/2008 ~~200~~ 201A/202				
	Run 1	Stack	A2377	ND	ND
	Run 2	Stack	A2379	ND	ND
	Run 3	Stack	A2381	ND	ND
	Run 4	Stack	A2383	ND	ND

ENERGY LABORATORIES, INC. · 2393 Salt Creek Highway (82601) · P.O. Box 3258 · Casper, WY 82602
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ANALYTICAL SUMMARY REPORT

October 20, 2008

Western Environmental
913 Foster Rd
Casper, WY 82601

Workorder No.: C08100503

Project Name: 08-4117

Energy Laboratories, Inc. received the following 8 samples from Western Environmental on 10/10/2008 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C08100503-001	08-4117-1 Stack Impringers 1&2	09/23/08 00:00	10/10/08	Aqueous	E300.0 Anions
C08100503-002	08-4117-2 Stack-Impringers 1&2	09/23/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-003	08-4117-3 Stack Impringers 1&2	09/24/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-004	08-4117-4 Stack Impringers 1&2 &BH	09/24/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-005	08-4117-5 Stack Impringers 1&2 &BH	09/24/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-006	08-4117-6 Stack Impringers 1&2 &BH	09/24/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-007	08-4117-7 Stack Impringers 1&2 &BH	09/24/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-008	08-4117-8 Blank	09/24/08 00:00	10/10/08	Aqueous	Same As Above

As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By: Stephanie Waldrop

ENERGY LABORATORIES, INC. · 2393 Salt Creek Highway (82601) · P.O. Box 3258 · Casper, WY 82602
Toll Free 888.235.0515 · 307.235.0515 · Fax 307.234.1639 · casper@energylab.com · www.energylab.com

LABORATORY ANALYTICAL REPORT

Client: Western Environmental
Site Name: 08-4117
Report Date: 10/20/08

Lab ID: C08100503-001
Client Sample ID: 08-4117-1 Stack Impringers 1&2
Matrix: Aqueous
Collection Date: 09/23/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	569	mg/L		1		E300.0	10/14/08 17:28 / ljl

Lab ID: C08100503-002
Client Sample ID: 08-4117-2 Stack-Impringers 1&2
Matrix: Aqueous
Collection Date: 09/23/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	486	mg/L		1		E300.0	10/14/08 17:42 / ljl

Lab ID: C08100503-003
Client Sample ID: 08-4117-3 Stack Impringers 1&2
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	622	mg/L		1		E300.0	10/14/08 17:56 / ljl

Lab ID: C08100503-004
Client Sample ID: 08-4117-4 Stack Impringers 1&2 &BH
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	243	mg/L		1		E300.0	10/14/08 18:11 / ljl

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: Western Environmental
Site Name: 08-4117
Report Date: 10/20/08

Lab ID: C08100503-005
Client Sample ID: 08-4117-5 Stack Impringers 1&2 &BH
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	252	mg/L		1		E300.0	10/14/08 18:25 / ljl

Lab ID: C08100503-006
Client Sample ID: 08-4117-6 Stack Impringers 1&2 &BH
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	307	mg/L		1		E300.0	10/14/08 18:40 / ljl

Lab ID: C08100503-007
Client Sample ID: 08-4117-7 Stack Impringers 1&2 &BH
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	204	mg/L		1		E300.0	10/14/08 18:54 / ljl

Lab ID: C08100503-008
Client Sample ID: 08-4117-8 Blank
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	ND	mg/L		1		E300.0	10/14/08 19:08 / ljl

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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QA/QC Summary Report

Client: Western Environmental
Project: 08-4117

Report Date: 10/20/08
Work Order: C08100503

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Batch: R109332
Sample ID: LCS	Laboratory Control Sample				Run: IC1-C_081014B				10/14/08 16:44
Sulfate	40.7	mg/L	1.0	102	90	110			
Sample ID: MBLK	Method Blank				Run: IC1-C_081014B				10/14/08 16:59
Sulfate	ND	mg/L	0.06						
Sample ID: C08100507-001AMS	Sample Matrix Spike				Run: IC1-C_081014B				10/14/08 19:37
Sulfate	73.0	mg/L	1.0	97	90	110			
Sample ID: C08100507-001AMSD	Sample Matrix Spike Duplicate				Run: IC1-C_081014B				10/14/08 19:52
Sulfate	74.4	mg/L	1.0	100	90	110	1.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

WESTERN ENVIRONMENTAL SERVICES AND TESTING, INC.

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(307)234-5511 FAX (307)234-8324

☐ PO Box 754, Evanston, WY 82935
(307)789-6420 FAX (307)789-6446

CHAIN OF CUSTODY RECORD

PROJECT NO.: 08-4117 CONTACT NAME Alan Roylance TELEPHONE NO. 307)234-5511

Recovered By: Print Name | Signature

SAMPLE ID	SAMPLE LOCATION	RUN	RECOVERY DATE	RECOVERY TIME	SOLUTION / FILTER #	No. of Containers	ANALYSIS: Sulfates								REMARKS
08-4117-1	Stack - Impingers 1+2	1	9/23/08		DI H_2O										20 ml Aliquot
-2	↓	2	↓		↓										↓
-3	↓	3	9/24/08		↓										↓
-4	Stack Impingers 1+2 + BH	1	9/24/08		↓										↓
-5		2	↓		↓										↓
-6		3	↓		↓										↓
-7		4	↓		↓										↓
-8	Blank	B	↓		↓										↓

COMMENTS:

Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
[signature]	WEST	10/10/08	11:49	[signature]	ELL-C	10/10/08	11:49
Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
Dispatched by: (Signature)	Company	Date	Time	Received for Laboratory by:	Company	Date	Time
Method of Shipment:							

WHITE COPY—WEST YELLOW COPY—CUSTOMER PINK COPY—COPY

9 HAN

08100503

M00953 7/06

Energy Laboratories Inc
Workorder Receipt Checklist

Western Environmental

C08100503

Login completed by: Edith McPike

Reviewed by:

Reviewed Date:

Date and Time Received: 10/10/2008 11:49 AM

Received by: em

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature:	9°C		
Water - VOA vials have zero headspace?	Yes ☐	No ☑	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Contact and Corrective Action Comments:

Headspace in vials; but not pertinant for this analysis

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CLIENT: Western Environmental
Project: 08-4117
Sample Delivery Group: C08100503

Date: 20-Oct-08

CASE NARRATIVE

The following Case Narrative contains exceptions or comments pertaining to the analysis of samples submitted by Western Environmental on 10/10/2008 11:49:00. These samples were assigned ELI Workorder Number C08100503.

ORIGINAL SAMPLE SUBMITTAL(S)
All original sample submittals have been returned with the data package.

SAMPLE TEMPERATURE COMPLIANCE: 4°C (±2°C)
Temperature of samples received may not be considered properly preserved by accepted standards. Samples that are hand delivered immediately after collection shall be considered acceptable if there is evidence that the chilling process has begun.

GROSS ALPHA ANALYSIS
Method 900.0 for gross alpha and gross beta is intended as a drinking water method for low TDS waters. Data provided by this method for non potable waters should be viewed as inconsistent.

RADON IN AIR ANALYSIS
The desired exposure time is 48 hours (2 days). The time delay in returning the canister to the laboratory for processing should be as short as possible to avoid excessive decay. Maximum recommended delay between end of exposure to beginning of counting should not exceed 8 days.

SOIL/SOLID SAMPLES
All samples reported on an as received basis unless otherwise indicated.

ATRAZINE, SIMAZINE AND PCB ANALYSIS USING EPA 505
Data for Atrazine and Simazine are reported from EPA 525.2, not from EPA 505. Data reported by ELI using EPA method 505 reflects the results for seven individual Aroclors. When the results for all seven are ND (not detected), the sample meets EPA compliance criteria for PCB monitoring.

SUBCONTRACTING ANALYSIS
Subcontracting of sample analyses to an outside laboratory may be required. If so, ENERGY LABORATORIES will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

BRANCH LABORATORY LOCATIONS
eli-b - Energy Laboratories, Inc. - Billings, MT
eli-g - Energy Laboratories, Inc. - Gillette, WY
eli-h - Energy Laboratories, Inc. - Helena, MT
eli-r - Energy Laboratories, Inc. - Rapid City, SD
eli-t - Energy Laboratories, Inc. - College Station, TX

CERTFICATIONS:
USEPA: WY00002; FL-DOH NELAC: E87641; California: 02118CA
Oregon: WY200001; Utah: 3072350515; Virginia: 00057; Washington: C1903

ISO 17025 DISCLAIMER:
The results of this Analytical Report relate only to the items submitted for analysis.

ENERGY LABORATORIES, INC. - CASPER,WY certifies that certain method selections contained in this report meet requirements as set forth by the above accrediting authorities. Some results requested by the client may not be covered under these certifications. All analysis data to be submitted for regulatory enforcement should be certified in the sample state of origin. Please verify ELI's certification coverage by visiting www.energylab.com

ELI appreciates the opportunity to provide you with this analytical service. For additional information and services visit our web page www.energylab.com.

THIS IS THE FINAL PAGE OF THE LABORATORY ANALYTICAL REPORT

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ANALYTICAL SUMMARY REPORT

October 24, 2008

Western Environmental
913 Foster Rd
Casper, WY 82601

Workorder No.: C08100558 Quote ID: C2258 - Chlorides

Project Name: Not Indicated

Energy Laboratories, Inc. received the following 8 samples from Western Environmental on 10/13/2008 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C08100558-001	08-4117-A2371	09/23/08 00:00	10/13/08	Solid	E300.0 Anions DI Water Soil Extract
C08100558-002	08-4117-A2373	09/23/08 00:00	10/13/08	Solid	Same As Above
C08100558-003	08-4117-A2375	09/24/08 00:00	10/13/08	Solid	Same As Above
C08100558-004	08-4117-A2377	09/24/08 00:00	10/13/08	Solid	Same As Above
C08100558-005	08-4117-A2379	09/24/08 00:00	10/13/08	Solid	Same As Above
C08100558-006	08-4117-A2381	09/24/08 00:00	10/13/08	Solid	Same As Above
C08100558-007	08-4117-A2383	09/24/08 00:00	10/13/08	Solid	Same As Above
C08100558-008	08-4117-A2385	09/24/08 00:00	10/13/08	Solid	Same As Above

As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By: David Falsto

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LABORATORY ANALYTICAL REPORT

Client: Western Environmental
Site Name: Not Indicated
Report Date: 10/24/08

Lab ID: C08100558-001
Client Sample ID: 08-4117-A2371
Matrix: Solid
Collection Date: 09/23/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	0.58	mg/beaker		0.05		E300.0	10/15/08 01:52 / ijl

Lab ID: C08100558-002
Client Sample ID: 08-4117-A2373
Matrix: Solid
Collection Date: 09/23/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 02:06 / ijl

Lab ID: C08100558-003
Client Sample ID: 08-4117-A2375
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 02:21 / ijl

Lab ID: C08100558-004
Client Sample ID: 08-4117-A2377
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 02:35 / ijl

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Client: Western Environmental
Site Name: Not Indicated
Report Date: 10/24/08

Lab ID: C08100558-005
Client Sample ID: 08-4117-A2379
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 02:50 / ljl

Lab ID: C08100558-006
Client Sample ID: 08-4117-A2381
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 03:33 / ljl

Lab ID: C08100558-007
Client Sample ID: 08-4117-A2383
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 03:47 / ljl

Lab ID: C08100558-008
Client Sample ID: 08-4117-A2385
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	0.16	mg/beaker		0.05		E300.0	10/15/08 04:16 / ljl

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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QA/QC Summary Report

Client: Western Environmental
Project: Not Indicated

Report Date: 10/24/08
Work Order: C08100558

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Batch: R109332
Sample ID: LCS	Laboratory Control Sample				Run: IC1-C_081014B				10/14/08 16:44
Chloride	10.0	mg/L	1.0	100	90	110			
Sample ID: MBLK	Method Blank				Run: IC1-C_081014B				10/14/08 16:59
Chloride	ND	mg/L	0.02						
Sample ID: C08100534-001AMS	Sample Matrix Spike				Run: IC1-C_081014B				10/15/08 01:09
Chloride	85.4	mg/L	1.0	101	90	110			
Sample ID: C08100534-001AMSD	Sample Matrix Spike Duplicate				Run: IC1-C_081014B				10/15/08 01:23
Chloride	86.2	mg/L	1.0	103	90	110	0.9	20	
Sample ID: C08100558-007ADUP	Sample Duplicate				Run: IC1-C_081014B				10/15/08 04:02
Chloride	0.00581	mg/beaker	0.050				0	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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☐ PO Box 754, Evanston, WY 82935
(307)789-6420 FAX (307)789-6446

CHAIN OF CUSTODY RECORD

PROJECT NO.: 08-4117 CONTACT NAME Alan Roylance TELEPHONE NO. 307)234-5511

Recovered By: Print Name | Signature

SAMPLE ID	SAMPLE LOCATION	RUN	RECOVERY DATE	RECOVERY TIME	SOLUTION / FILTER #	No. of Containers	ANALYSIS: Chloride							REMARKS
08-4117-A2371	STACK - impingers 1+2	1	9/23/08		DI		X							
-A2373	↓	2	9/23/08		↓		X							
-A2375	↓	3	9/24/08		↓		X							
-A2377	STACK - impingers 1+2 + B1+	1	9/24/08		↓		X							
-A2379	↓	2	↓		↓		X							
-A2381	↓	3	↓		↓		X							
-A2383	↓	4	↓		↓		X							
-A2385	BLANK	B	↓		↓		X							C08100558

COMMENTS: ☆ use Quote 2258 for chloride

Hand

Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
[signature]	WEST	10/13/08	1235	[signature]	ELI-C	10/13/08	10:35
Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
Dispatched by: (Signature)	Company	Date	Time	Received for Laboratory by:	Company	Date	Time
Method of Shipment:							

WHITE COPY—WEST YELLOW COPY—CUSTOMER PINK COPY—COPY

M00953 7/06

Energy Laboratories Inc
Workorder Receipt Checklist

Western Environmental

C08100558

Login completed by: Kimberly Humiston

Reviewed by:

Reviewed Date:

Date and Time Received: 10/13/2008 12:35 PM

Received by: kh

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature:	N/A°C		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Contact and Corrective Action Comments:

None

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Toll Free 888.235.0515 · 307.235.0515 · Fax 307.234.1639 · casper@energylab.com · www.energylab.com

CLIENT: Western Environmental
Project: Not Indicated
Sample Delivery Group: C08100558

Date: 24-Oct-08

CASE NARRATIVE

The following Case Narrative contains exceptions or comments pertaining to the analysis of samples submitted by Western Environmental on 10/13/2008 12:35:00. These samples were assigned ELI Workorder Number C08100558.

ORIGINAL SAMPLE SUBMITTAL(S)
All original sample submittals have been returned with the data package.

SAMPLE TEMPERATURE COMPLIANCE: 4°C (±2°C)
Temperature of samples received may not be considered properly preserved by accepted standards. Samples that are hand delivered immediately after collection shall be considered acceptable if there is evidence that the chilling process has begun.

GROSS ALPHA ANALYSIS
Method 900.0 for gross alpha and gross beta is intended as a drinking water method for low TDS waters. Data provided by this method for non potable waters should be viewed as inconsistent.

RADON IN AIR ANALYSIS
The desired exposure time is 48 hours (2 days). The time delay in returning the canister to the laboratory for processing should be as short as possible to avoid excessive decay. Maximum recommended delay between end of exposure to beginning of counting should not exceed 8 days.

SOIL/SOLID SAMPLES
All samples reported on an as received basis unless otherwise indicated.

ATRAZINE, SIMAZINE AND PCB ANALYSIS USING EPA 505
Data for Atrazine and Simazine are reported from EPA 525.2, not from EPA 505. Data reported by ELI using EPA method 505 reflects the results for seven individual Aroclors. When the results for all seven are ND (not detected), the sample meets EPA compliance criteria for PCB monitoring.

SUBCONTRACTING ANALYSIS
Subcontracting of sample analyses to an outside laboratory may be required. If so, ENERGY LABORATORIES will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

BRANCH LABORATORY LOCATIONS
eli-b - Energy Laboratories, Inc. - Billings, MT
eli-g - Energy Laboratories, Inc. - Gillette, WY
eli-h - Energy Laboratories, Inc. - Helena, MT
eli-r - Energy Laboratories, Inc. - Rapid City, SD
eli-t - Energy Laboratories, Inc. - College Station, TX

CERTFICATIONS:
USEPA: WY00002; FL-DOH NELAC: E87641; California: 02118CA
Oregon: WY200001; Utah: 3072350515; Virginia: 00057; Washington: C1903

ISO 17025 DISCLAIMER:
The results of this Analytical Report relate only to the items submitted for analysis.

ENERGY LABORATORIES, INC. - CASPER,WY certifies that certain method selections contained in this report meet requirements as set forth by the above accrediting authorities. Some results requested by the client may not be covered under these certifications. All analysis data to be submitted for regulatory enforcement should be certified in the sample state of origin. Please verify ELI's certification coverage by visiting www.energylab.com

ELI appreciates the opportunity to provide you with this analytical service. For additional information and services visit our web page www.energylab.com.

THIS IS THE FINAL PAGE OF THE LABORATORY ANALYTICAL REPORT

AIR SAMPLING ASSOCIATES, INC.

Appendix F:

EPA Test Methods 8A, 26A, and CTM027 (Sulfur Trioxide, Hydrogen Halides & Halogens, and Ammonia) Analytical Data – SDA Inlet Duct and Stack

Air Sampling Associates

407-2B Holford's Prairie Rd
Lewisville, TX 75056-9582

ADA - ES

Client # 08-026

Analytical Report
(1008-22)

EPA CTM-027

Ammonia

EPA Method 26A

Hydrogen bromide, Hydrogen chloride, Hydrogen fluoride
Bromide, Chloride

NCASI Method 8A-Type (HPLC)

Sulfate

Enthalpy Analytical, Inc.
Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
2202 Ellis Road Durham, NC 27703 - 5518

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)
- This analytical report was prepared in Portable Document Format (.PDF) and contains 267 pages.

QA Review performed by: Steven J. Eckard

Summary of Results

Company	Air Sampling Associates
Analyst	MDS
Parameters	EPA Method 26A: H2SO4
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

Compound	Sample ID / Catch Weight (ug)		
		SDA Inlet Duct	
	In R1 C3	***In R2 C3***	***In R3 C3***
Hydrogen Fluoride	12.3 ND	13.4 ND	55.2 J
Hydrogen Chloride	1118	317	592
Hydrogen Bromide	22.4 ND	24.4 ND	26.7 ND
		Stack	
	Stk R1 C3	***Stk R2 C3***	***Stk R3 C3***
Hydrogen Fluoride	16.6 ND	18.1 ND	17.3 ND
Hydrogen Chloride	761	116 J	31.5 ND
Hydrogen Bromide	30.3 ND	33.1 ND	31.5 ND
		Blanks	
	In C6	***Stk C6***	
Hydrogen Fluoride	13.9 ND	20.8 ND	
Hydrogen Chloride	25.3 ND	37.9 ND	
Hydrogen Bromide	25.3 ND	37.9 ND	

Company	Air Sampling Associates
Analyst	MDS
Parameters	EPA Method 26A: NaOH
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

Compound	Sample ID / Catch Weight (ug)		
		SDA Duct Inlet	
	In R1 C4	***In R2 C4***	***In R3 C4***
Chloride	790	126 J	918
Bromide	76.8 ND	80.7 ND	80.7 ND
		Stack	
	Stk R1 C4	***Stk R2 C4***	***Stack R3 C4***
Chloride	514 J	507 J	464 J
Bromide	87.0 ND	84.2 ND	75.8 ND
		Blanks	
	In C7	***Stk C7***	
Chloride	209 J	80.0 J	
Bromide	82.4 ND	76.9 ND	

Company	Air Sampling Associates
Analyst	KEH
Parameters	EPA CTM-027
# Samples	3 runs and 1 blank

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

Compound	Sample ID / Catch Weight (ug)		
		SDA Inlet Duct Container 3	
	Run 1	***Run 2***	***Run 3***
Ammonia	52,431	23,750	13,939
	H2SO4 Blank		
Ammonia	7.99 ND		

Company	Air Sampling Associates
Analyst	MDS
Parameters	NCASI Method 8A-Type
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

Compound	Sample ID / Catch Weight (ug)		
		SDA Inlet Duct	
	In R1 C2	***In R2 C2***	***In R3 C2***
Sulfate	5,606	22,952	2,606
		Stack	
	Stk R1 C2	***Stk R2 C2***	***Stk R3 C2***
Sulfate	2,233	1,490	2,561
		Blanks	
	In C4	***Stk C4***	
Sulfate	13.7 ND	13.7 ND	

Results

Company	Air Sampling Associates
Analyst	MDS
Parameters	EPA Method 26A: H2SO4
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

MDL 0.0384 (ug/mL)
LOQ 0.230 (ug/mL)
Compound Hydrogen Fluoride

Lower Curve Limit 0.230 (ug/mL)
Upper Curve Limit 6.87 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
In R1 C3	011-1001.D	011-1002.D	1008-22Y.M	NA	NA	NA	0.0384	0.0384	0.0	0.0384	1.0009	320	12.3	ND
In R2 C3	012-1101.D	012-1102.D	1008-22Y.M	NA	NA	NA	0.0384	0.0384	0.0	0.0384	1.0397	335	13.4	ND
In R3 C3	013-1201.D	013-1202.D	1008-22Y.M	2.881	2.863	0.629	0.154	0.136	6.2	0.1450	1.0577	360	55.2	J
Stk R1 C3	014-1301.D	014-1302.D	1008-22Y.M	NA	NA	NA	0.0384	0.0384	0.0	0.0384	1.0126	427	16.6	ND
Stk R2 C3	015-1401.D	015-1402.D	1008-22Y.M	NA	NA	NA	0.0384	0.0384	0.0	0.0384	1.038	455	18.1	ND
Stk R3 C3	016-1501.D	016-1502.D	1008-22Y.M	NA	NA	NA	0.0384	0.0384	0.0	0.0384	1.0471	430	17.3	ND
In C6	017-1601.D	017-1602.D	1008-22Y.M	NA	NA	NA	0.0384	0.0384	0.0	0.0384	1.061	340	13.9	ND
Stk C6	018-1701.D	018-1702.D	1008-22Y.M	NA	NA	NA	0.0384	0.0384	0.0	0.0384	1.0399	520	20.8	ND
H2SO4 Lab Blank	008-0801.D	008-0802.D	1008-22Y.M	NA	NA	NA	0.0384	0.0384	0.0	0.0384	1.00	1.00	0.0384	ND
DI H2O Lab Blank	009-0901.D	009-0902.D	1008-22Y.M	NA	NA	NA	0.0384	0.0384	0.0	0.0384	1.00	1.00	0.0384	ND
MS/In R1 C3	019-1801.D	019-1802.D	1008-22Y.M	2.95	2.91	1.1	1.07	1.09	0.7	1.08	1.00	0.525	0.566	

Spike Amount (ug)	0.663
Native Amount (ug)	0.00
Spike Recovery (%)	85.4%

Company	Air Sampling Associates
Analyst	MDS
Parameters	EPA Method 26A: H2SO4
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

MDL 0.0700 (ug/mL)
LOQ 0.446 (ug/mL)
Compound Hydrogen Chloride

Lower Curve Limit 0.446 (ug/mL)
Upper Curve Limit 13.30 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
In R1 C3	011-1001.D	011-1002.D	1008-22Y.M	4.24	4.19	1.4	3.44	3.54	1.4	3.49	1.0009	320	1,118	
In R2 C3	012-1101.D	012-1102.D	1008-22Y.M	4.17	4.13	0.8	0.899	0.920	1.2	0.909	1.0397	335	317	
In R3 C3	013-1201.D	013-1202.D	1008-22Y.M	3.91	3.89	0.5	1.49	1.62	4.0	1.55	1.0577	360	592	
Stk R1 C3	014-1301.D	014-1302.D	1008-22Y.M	4.21	4.15	1.3	1.70	1.82	3.6	1.76	1.0126	427	761	
Stk R2 C3	015-1401.D	015-1402.D	1008-22Y.M	4.20	4.15	1.3	0.227	0.265	7.6	0.246	1.038	455	116	J
Stk R3 C3	016-1501.D	016-1502.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.0471	430	31.5	ND
In C6	017-1601.D	017-1602.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.061	340	25.3	ND
Stk C6	018-1701.D	018-1702.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.0399	520	37.9	ND
H2SO4 Lab Blank	008-0801.D	008-0802.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.00	1.00	0.0700	ND
DI H2O Lab Blank	009-0901.D	009-0902.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.00	1.00	0.0700	ND
MS/In R1 C3	019-1801.D	019-1802.D	1008-22Y.M	4.29	4.28	0.4	5.73	5.98	2.2	5.85	1.00	0.525	3.07	
												Spike Amount (ug)	1.29	
												Native Amount (ug)	1.75	
												Spike Recovery (%)	103.4%	

Company	Air Sampling Associates
Analyst	MDS
Parameters	EPA Method 26A: H2SO4
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

MDL 0.0700 (ug/mL)
LOQ 0.439 (ug/mL)
Compound Hydrogen Bromide

Lower Curve Limit 0.439 (ug/mL)
Upper Curve Limit 13.10 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
In R1 C3	011-1001.D	011-1002.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.0009	320	22.4	ND
In R2 C3	012-1101.D	012-1102.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.0397	335	24.4	ND
In R3 C3	013-1201.D	013-1202.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.0577	360	26.7	ND
Stk R1 C3	014-1301.D	014-1302.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.0126	427	30.3	ND
Stk R2 C3	015-1401.D	015-1402.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.038	455	33.1	ND
Stk R3 C3	016-1501.D	016-1502.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.0471	430	31.5	ND
In C6	017-1601.D	017-1602.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.061	340	25.3	ND
Stk C6	018-1701.D	018-1702.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.0399	520	37.9	ND
H2SO4 Lab Blank	008-0801.D	008-0802.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.00	1.00	0.0700	ND
DI H2O Lab Blank	009-0901.D	009-0902.D	1008-22Y.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.00	1.00	0.0700	ND
MS/In R1 C3	019-1801.D	019-1802.D	1008-22Y.M	6.22	6.22	0.1	2.02	2.13	2.7	2.08	1.00	0.525	1.09	

Spike Amount (ug)	1.27
Native Amount (ug)	0.00
Spike Recovery (%)	86.2%

Company	Air Sampling Associates
Analyst	MDS
Parameters	EPA Method 26A: NaOH
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

MDL 0.070 (ug/mL)
LOQ 0.434 (ug/mL)
Compound Chloride

Lower Curve Limit 0.434 (ug/mL)
Upper Curve Limit 13.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
In R1 C4	031-4501.D	031-4502.D	1008-22W.M	3.90	3.87	0.7	0.694	0.746	3.6	0.720	4.018	273	790	
In R2 C4	032-4601.D	032-4602.D	1008-22W.M	NA	3.87	NA	0.0700	0.149	36.0	0.109	4.018	287	126	J
In R3 C4	033-4701.D	033-4702.D	1008-22W.M	3.90	3.88	0.5	0.781	0.811	1.9	0.796	4.018	287	918	
Stk R1 C4	034-4801.D	034-4802.D	1008-22W.M	4.16	4.12	1.0	0.409	0.418	1.2	0.414	4.01	310	514	J
Stk R2 C4	035-4901.D	035-4902.D	1008-22W.M	4.15	4.11	1.1	0.424	0.420	0.5	0.422	4.01	300	507	J
Stack R3 C4	036-5001.D	036-5002.D	1008-22W.M	4.16	4.12	0.9	0.436	0.422	1.6	0.429	4.01	270	464	J
In C7	037-5101.D	037-5102.D	1008-22W.M	4.21	4.17	1.0	0.187	0.169	4.8	0.178	4.1	287	209	J
Stk C7	038-5201.D	038-5202.D	1008-22W.M	NA	4.16	NA	0.0700	0.0756	3.8	0.0728	4.1	268	80.0	J
NaOH Lab Blank	008-4301.D	008-4302.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.00	1.00	0.0700	ND
DI H2O Lab Blank	009-4401.D	009-4402.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.00	1.00	0.0700	ND
MS/In R1 C4	039-5301.D	039-5302.D	1008-22W.M	4.09	4.08	0.3	3.07	3.28	3.4	3.18	1.00	0.525	1.67	
												Spike Amount (ug)	1.25	
												Native Amount (ug)	0.360	
												Spike Recovery (%)	105%	

Company	Air Sampling Associates
Analyst	MDS
Parameters	EPA Method 26A: NaOH
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

MDL 0.070 (ug/mL)
LOQ 0.434 (ug/mL)
Compound Bromide

Lower Curve Limit 0.434 (ug/mL)
Upper Curve Limit 13.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
In R1 C4	031-4501.D	031-4502.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	4.02	273	76.8	ND
In R2 C4	032-4601.D	032-4602.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	4.02	287	80.7	ND
In R3 C4	033-4701.D	033-4702.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	4.02	287	80.7	ND
Stk R1 C4	034-4801.D	034-4802.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	4.01	310	87.0	ND
Stk R2 C4	035-4901.D	035-4902.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	4.01	300	84.2	ND
Stack R3 C4	036-5001.D	036-5002.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	4.01	270	75.8	ND
In C7	037-5101.D	037-5102.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	4.1	287	82.4	ND
Stk C7	038-5201.D	038-5202.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	4.1	268	76.9	ND
NaOH Lab Blank	008-4301.D	008-4302.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.00	1.00	0.0700	ND
DI H2O Lab Blank	009-4401.D	009-4402.D	1008-22W.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1.00	1.00	0.0700	ND
MS/In R1 C4	039-5301.D	039-5302.D	1008-22W.M	6.00	6.02	0.3	2.27	2.31	0.8	2.29	1.00	0.525	1.20	
												Spike Amount (ug)	1.25	
												Native Amount (ug)	0.00	
												Spike Recovery (%)	96.2%	

Company	Air Sampling Associates
Analyst	KEH
Parameters	EPA CTM-027
# Samples	3 runs and 1 blank

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

MDL 0.0235 (ug/mL)
LOQ 0.235 (ug/mL)
Compound Ammonia

Lower Curve Limit 0.235 (ug/mL)
Upper Curve Limit 10.5 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
Run 1	011-1101.D	011-1102.D	1008-22R.M	4.24	4.24	0.1	8.17	8.22	0.3	8.19	20	320	52,431	
Run 2	012-1201.D	012-1202.D	1008-22R.M	4.22	4.26	0.9	7.08	7.10	0.2	7.09	10	335	23,750	
Run 3	013-1301.D	013-1302.D	1008-22R.M	4.23	4.22	0.3	3.87	3.87	0.0	3.87	10	360	13,939	
H2SO4 Blank	014-1401.D	014-1402.D	1008-22R.M	NA	NA	NA	0.0235	0.0235	0.0	0.0235	1	340	7.99	ND
0.04N H2SO4	009-0901.D	009-0902.D	1008-22R.M	NA	NA	NA	0.0235	0.0235	0.0	0.0235	1	1.00	0.0235	ND
DI H2O	010-1001.D	010-1002.D	1008-22R.M	NA	NA	NA	0.0235	0.0235	0.0	0.0235	1	1.00	0.0235	ND
MS/Run 3	015-1501.D	015-1502.D	1008-22R.M	4.22	4.22	0.0	6.24	6.30	0.4	6.27	1	1.025	6.43	

Spike Amount (ug)	2.36
Native Amount (ug)	3.87
Spike Recovery (%)	108%

Company	Air Sampling Associates
Analyst	MDS
Parameters	NCASI Method 8A-Type
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	10/18/2008

MDL 0.070 (ug/mL)
LOQ 0.434 (ug/mL)
Compound Sulfate

Lower Curve Limit 0.434 (ug/mL)
Upper Curve Limit 13.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
In R1 C2	015-1301.D	015-1302.D	1008-21C.M	10.4	10.4	0.3	5.45	5.33	1.2	5.39	20	52.0	5,606	
In R2 C2	016-1401.D	016-1402.D	1008-21C.M	10.4	10.4	0.1	4.23	4.51	3.2	4.37	100	52.5	22,952	
In R3 C2	017-1501.D	017-1502.D	1008-21C.M	10.4	10.4	0.2	2.47	2.23	5.1	2.35	10	111	2,606	
Stk R1 C2	018-1601.D	018-1602.D	1008-21C.M	10.4	10.4	0.3	2.47	2.33	2.8	2.40	10	93.0	2,233	
Stk R2 C2	019-1701.D	019-1702.D	1008-21C.M	10.4	10.4	0.1	1.58	1.39	6.4	1.49	10	100	1,490	
Stk R3 C2	020-1801.D	020-1802.D	1008-21C.M	10.4	10.4	0.1	3.51	3.23	4.2	3.37	10	76.0	2,561	
In C4	021-2101.D	021-2102.D	1008-21C.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1	195	13.65	ND
Stk C4	022-2201.D	022-2202.D	1008-21C.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1	195	13.65	ND
DI H2O Lab Blank	008-0801.D	008-0802.D	1008-21C.M	NA	NA	NA	0.0700	0.0700	0.0	0.0700	1	1.00	0.0700	ND
MS/In R3 C2	023-2301.D	023-2302.D	1008-21C.M	10.4	10.4	0.3	4.66	4.48	1.9	4.57	1	0.525	2.40	

Spike Amount (ug)	1.25
Native Amount (ug)	1.17
Spike Recovery (%)	98.0%

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	Air Sampling Associates
Analyst	MDS
Parameters	EPA Method 26A: H2SO4
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	October 18, 2008

Custody

Tara Grayson received the samples on 10/2/08 after being relinquished by Air Sampling Associates. The samples were received at 19.6°C and were in good condition. Prior to and during analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for Hydrogen fluoride, Hydrogen chloride and Hydrogen bromide using the analytical procedures in EPA Method 26A, Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method (40 CFR Part 60, Appendix A).

The samples were analyzed following the procedures in Section 11.0, Analytical Procedures. All samples and standards are prepared, stored, and analyzed using high-density polyethylene containers.

The Agilent Model 1100, High Performance Liquid Chromatograph ("Gonzo") was equipped as follows:

Front: Dionex CD20 Conductivity Detector.
Front: Dionex Ion Pac AS14A, 4 x 250 mm (S/N006255)
Rear: Dionex CD20 Conductivity Detector
Rear: Dionex Ion Pac AS14A, 4 x 250 mm (S/N006256)

Calibration

The calibration curves are located in the back of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method (COLSWTCH.M) is included in the Curve/QA Chromatograms section of this report.

Enthalpy Narrative Summary (Cont.)

QC Notes

As required in Section 7.2.2, Absorbing Solution Blanks, client-provided reagent blanks were analyzed. Additionally, a quality control check sample was analyzed at the same time as the blanks and samples. All method required acceptance criteria were met.

All sample preparation and analytical holding times specified in the method were met. Section. 13.2, Sample Stability, specifies an analytical holding time of four weeks.

Reporting Notes

The H_2SO_4 matrix samples were analyzed for Cl^- and F^- but are reported as HCl and HF. The peaks listed in the "Sample Chromatograms" section are labeled hydrogen chloride and hydrogen fluoride. The additional molecular weight contribution from the H^+ is included in the results listed on each chromatogram and throughout the report.

Enthalpy Analytical, Inc. is accredited to perform this method for compliance purposes by the National Environmental Laboratory Accreditation Conference (NELAC) through the Louisiana Environmental Laboratory Accreditation Program (LELAP), certificate number 04010.

Enthalpy Analytical Narrative Summary

Company	Air Sampling Associates
Analyst	MDS
Parameters	EPA Method 26A: NaOH
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	October 18, 2008

Custody

Tara Grayson received the samples on 10/2/08 after being relinquished by Air Sampling Associates. The samples were received at 19.6°C and were in good condition. Prior to and during analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for Bromide and Chloride using the analytical procedures in EPA Method 26A, Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method (40 CFR Part 60, Appendix A).

The samples were analyzed following the procedures in Section 11.0, Analytical Procedures. All samples and standards are prepared, stored, and analyzed using high-density polyethylene containers.

The Agilent Model 1100, High Performance Liquid Chromatograph ("Gonzo") was equipped as follows:

Front: Dionex CD20 Conductivity Detector.
Front: Dionex Ion Pac AS14A, 4 x 250 mm (S/N006255)
Rear: Dionex CD20 Conductivity Detector
Rear: Dionex Ion Pac AS14A, 4 x 250 mm (S/N006256)

Calibration

The calibration curves are located in the back of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method (CHLSWTCH.M) is included in the Curve/QA Chromatograms section of this report.

Enthalpy Narrative Summary (Cont.)

QC Notes

As required in Section 7.2.2, Absorbing Solution Blanks, client-provided reagent blanks were analyzed. Additionally, a quality control check sample was analyzed at the same time as the blanks and samples. All method required acceptance criteria were met.

All sample preparation and analytical holding times specified in the method were met. Section. 13.2, Sample Stability, specifies an analytical holding time of four weeks.

Reporting Notes

Enthalpy Analytical, Inc. is accredited to perform this method for compliance purposes by the National Environmental Laboratory Accreditation Conference (NELAC) through the Louisiana Environmental Laboratory Accreditation Program (LELAP), certificate number 04010.

Enthalpy Analytical Narrative Summary

Company	Air Sampling Associates
Analyst	KEH
Parameters	EPA CTM-027
# Samples	3 runs and 1 blank

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	October 18, 2008

Custody

Tara Grayson received the samples on 10/2/08 after being relinquished by Air Sampling Associates. The samples were received at 19.6°C and were in good condition. Prior to and during analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for Ammonia using the analytical procedures in EPA Conditional Test Method 027, Procedure for Collection and Analysis of Ammonia in Stationary Sources.

The DIONEX Model 500, High Performance Liquid Chromatograph ("Pugsly") was equipped with DIONEX ED40 Electrochemical Detector and a Dionex Ion Pac CS12, 4 x 250 mm column (S/N 008848).

Calibration

The calibration curve is located in the back of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method (IC2.M) is included in the Curve/QA Chromatograms section of this report.

QC Notes

As required in section 4.2.3, Quality Control and Quality Assurance Enthalpy periodically analyzes independently prepared standards and blank checks reagents.

All sample preparation and analytical holding times specified in the method were met. In Section. 4.1, Sample Preparation, the specified analytical holding time is two weeks from sampling date.

Enthalpy Narrative Summary (Cont.)

Reporting Notes Enthalpy Analytical, Inc. is accredited to perform this method for compliance purposes by the National Environmental Laboratory Accreditation Conference (NELAC) through the Louisiana Environmental Laboratory Accreditation Program (LELAP), certificate number 04010.

Enthalpy Analytical Narrative Summary

Company	Air Sampling Associates
Analyst	MDS
Parameters	NCASI Method 8A-Type
# Samples	6 runs and 2 blanks

Client #	08-026
Job #	1008-22
PO #	Verbal
Report Date	October 18, 2008

Custody

Tara Grayson received the samples on 10/2/08 after being relinquished by Air Sampling Associates. The samples were received at 19.6°C and were in good condition. Prior to and during analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for Sulfate using the analytical procedures in Generic HPLC Sample analysis.

The Agilent Model 1100, High Performance Liquid Chromatograph ("Gonzo") was equipped as follows:

Front: Dionex CD20 Conductivity Detector.
Front: Dionex Ion Pac AS14A, 4 x 250 mm (S/N006255)
Rear: Dionex CD20 Conductivity Detector
Rear: Dionex Ion Pac AS14A, 4 x 250 mm (S/N006256)

Calibration

The calibration curve is located in the back of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method (COLSULF.M) is included in the Curve/QA Chromatograms section of this report.

QC Notes

None

Reporting Notes

Enthalpy Analytical, Inc. is accredited to perform this method for compliance purposes by the National Environmental Laboratory Accreditation Conference (NELAC) through the Louisiana Environmental Laboratory Accreditation Program (LELAP), certificate number 04010.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. reports, unless specifically noted otherwise.

- The symbol ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot confim the presence of the analyte of interest reliably.
- The symbol ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The symbol ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The symbol ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The symbol ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point.
- The symbol ***DF*** represents a Dilution Factor. This number represents dilutions during the extraction and/or laboratory stages of sample treatment. The analytical result taken from a laboratory instrument is multiplied by the DF to get final results.
- The Sample ID ***MS*** represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix prohibits analysis for the analyte(s).
- The Sample ID ***MSD*** represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times. Most methods performed by Enthalpy do not require analysis of an MSD.
- The Sample ID ***BS*** represents a Blind Spike. A member of the Quality Assurance department has created BS samples for many of the analytes Enthalpy tests for, and only QA and the Enthalpy Analytical ownership have access to the actual values of these samples. The laboratory analyzes them without knowledge of the actual value, and the spreadsheets get completed for these samples solely by the QA group.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Whenever spikes are prepared for our clients more spikes are prepared than needed. The extras (randomly chosen) are kept in-house at the appropriate temperature conditions. When the spike samples come back from the client for analysis, the LCSs (usually two are saved) are analyzed to confirm that the analyte could be recovered from the media, separate from the spike samples which were used on the project and which may have had issues caused during collection and/or transport.
- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed (specifically values of 1,000 or greater), the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits reported, but no confidence should be placed on more than three significant digits.

Sample Custody

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 1 of 24	
Address: 1 Sugar Factory Rd	Unit No.: SDA Inlet Duct	Lab: Brian Tyler	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Enthalpy	
Run No.: 1	Test Method: EPA 17/26A/CTM-027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Halogens	Halids	Ammonia
Container No. 1	9/23/08	1147	—	1	Thimble Filter No. 58	X			
Container No. 2	9/23/08	1150	—	1	ACE FW	X			
Container No. 3	9/23/08	1123	0.1N H2SO4	1	Impingers 1 & 2			X	X
Container No. 4	9/23/08	1125	0.1N NaOH	1	Impingers 3 & 4		X		
No 3+4 to Enthalpy									

Did not receive 10/2/08 gs

Special Instructions: Ammonium Thiosulfate not added to the samples.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1150	1. Relinquished By: Bill Mullins	9/24/08	1952
2. Received By: M C Stanley	9/24/08	1952	2. Relinquished By: M C Stanley	10/1/08	800
3. Received By: [illegible]	10/2/08	9.56AM	3. Relinquished By:		

Comments: Temp 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 2 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: SDA Inlet Duct	Lab: Brian Tyler	
City: Hardin / State: MT / Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Enthalpy	
Run No.: 2	Test Method: EPA 17 / 26A / CTM-027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Halogens	Halids	Ammonia
Container No. 1	9/23/08	1648	—	1	Thimble Filter 65	X			
Container No. 2	9/23/08	1650	—	1	ACE FW	X			
Container No. 3	9/23/08	1623	0.1 N H_2SO_4	1	Impingers 1 & 2			X	X
Container No. 4	9/23/08	1625	0.1 N NaOH	1	Impingers 3 & 4		X		
No 3 + 4 to Enthalpy									

DID NOT RECEIVE 10/2/08 TEC

Special Instructions: Ammonium Thiosulfate not added to the Samples

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1650	1. Relinquished By: Bill Mullins	9/24/08	1953
2. Received By: Joel C Stanley	9/24/08	1953	2. Relinquished By: Joel C Stanley	10/1/08	801
3. Received By: [illegible]	10/2/08	9:56AM	3. Relinquished By:		

Comments: Temp = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA - ES	Project No.: 08-026	Page 3 of 24	
Address: 1 Sugar Factory Rd	Unit No.: SDA Inlet Duct	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: 3	Test Method: EPA 17/26A/CTM-027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Halogens	Halids	Ammonia
Container No. 1	9/23/08	2013	—	1	Thimble No. 96	X			
Container No. 2	9/23/08	2012	—	1	ACE FW	X			
Container No. 3	9/23/08	2001	0.1 N H_2SO_4	1	Impingers 1 & 2			X	X
Container No. 4	9/23/08	2004	0.1 N NaOH	1	Impingers 2 & 3		X		
No 3 + 4 + Enthalpy									

DID NOT RECEIVE 10/2/08 AC

Special Instructions: Ammonium Thiosulfate not added to the samples

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	2013	1. Relinquished By: Bill Mullins	9/24/08	1953
2. Received By: Jeff C Stanley	9/24/08	1953	2. Relinquished By: Jeff Stanley	10/1/08	801
3. Received By: [signature]	10/2/08	9:56 AM	3. Relinquished By:		

Comments: Temp = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-0216	Page 4 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: SOA Inlet Duct	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: Reagent Blanks	Test Method: EPA 17/26A/CTM-027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Halogens	Halides	Particulate	NH3 Mania 10/2/08	
Container No. 6	9/24/08	0722	0.1 N H_2SO_4	1	~~100~~ 200 ml volumed to sample vol.		X		X	
Container No. 7	9/24/08	0724	0.1 N NaOH	1	~~100~~ 200 ml volumed to sample vol.	X				
Container No. 8	9/24/08	0719	Acetone	1	200 ml			X		
No 6+7 to Enthalpy										

DID NOT RECEIVE 10/2/08 TR

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By	9/24/08	0724	1. Relinquished By	9/24/08	1953
2. Received By	9/24/08	1953	2. Relinquished By	10/1/08	800
3. Received By	10/2/08	9:56AM	3. Relinquished By		

Comments: Temp= 19.6°C

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Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 5 of 24	Analysis
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: 1	Test Method: EPA 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Halogens	Halids			
Container No. 3	9/23/08	1232	0.1 N H_2SO_4	1	Impingers 1 & 2		X			
Container No. 4	9/23/08	1234	0.1 N NaOH	1	Impingers 3 & 4	X				
to Enthalpy										

Special Instructions: Sodium Thiosulfate not added to the samples

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1234	1. Relinquished By: Bill Mullins	9/24/08	1953
2. Received By: [signature]	9/24/08	1953	2. Relinquished By: [signature]	10/1/08	807
3. Received By: [signature]	10/2/08	9:56 AM	3. Relinquished By:		

Comments: Temp = 19.6°C

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Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 6 of 24	
Address: 1 Sugar Factory Rd	Unit No.: Stack	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: 2	Test Method: EPA 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Halogens	Analysis: Halids
Container No. 3	9/23/08	1608	0.1 N H_2SO_4	1	Impingers 1 & 2		X
Container No. 4	9/23/08	1611	0.1 N NaOH	1	Impingers 3 & 4	X	
to Enthalpy							

Special Instructions: Sodium Thiosulfate not added to the samples

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☑ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1611	1. Relinquished By: Bill Mullins	9/24/08	2000
2. Received By: [signature]	9/24/08	2000	2. Relinquished By: [signature]	10/1/08	803
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By:		

Comments: Temp = 19.6°C

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Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 7 of 24	
Address: 1 Sugar Factory Rd	Unit No.: Stack	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: 3	Test Method: EPA 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Halogens	Halids			
Container No. 3	9/23/08	1954	0.1 N H_2SO_4	1	Impingers 1 & 2		X			
Container No. 4	9/23/08	1956	0.1 N NaOH	1	Impingers 3 & 4	X				
to Enthalpy										

Special Instructions: Sodium Thiosulfate not added to the samples.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1956	1. Relinquished By: Bill Mullins	9/24/08	2000
2. Received By: [signature]	9/24/08	2000	2. Relinquished By: [signature]	10/1/08	804
3. Received By: [signature]	10/2/08	9:36AM	3. Relinquished By:		

Comments: Temp = 19.6°C

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Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 8 of 24	
Address: 1 Sugar Factory Rd	Unit No.: Stack	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mulling	Lab Contact: Brian Tyler	
Run No.: Reagent Blanks	Test Method: EPA 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Halogens	Analysis: Halides			
Container No. 6	9/24/08	0757	0.1 N H_2SO_4	1	200 ml volumed to Sample Vol.		X			
Container No. 7	9/24/08	0759	0.1 N NaOH	1	200 ml volumed to Sample Vol.	X				
to Enthalpy										

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mulling	9/24/08	0759	1. Relinquished By: Bill Mulling	9/24/08	2001
2. Received By: [signature]	9/24/08	2001	2. Relinquished By: [signature]	10/1/08	804
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP= 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 13 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: SDA Inlet Duct	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 1	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3 / H_2SO_4	Analysis: SO_2			
Container No. 2	9/23/08	1725	—	1	Condenser Rinse	X				
Container No. 3	9/23/08	1714	3% H_2O_2	1	Impingers 1 & 2		X			
No 2 to Enthalpy										

Special Instructions:

DID NOT RECEIVE 10/2/08 TRG

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1725	1. Relinquished By: Bill Mullins	9/24/08	2010
2. Received By: C Stanley	9/24/08	2010	2. Relinquished By: C Stanley	10/1/08	865
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP=19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: HDA-ES	Project No.: 08-026	Page 14 of 24	Analysis
Address: 1 Sugar Factory Rd.	Unit No.: SDA Inlet Duct	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 2	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	SO_3 / H_2SO_4	SO_2			
Container No. 2	9/24/08	1024	—	1	Condenser Rinse	X				
Container No. 3	9/24/08	0923	3% H_2O_2	1	Impingers 1 & 2		X			
No 2 to Enthalpy										

DID NOT RECEIVE 10/2/08 JAG

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mulling	9/24/08	1024	1. Relinquished By: Bill Mulling	9/24/08	2010
2. Received By: M C Stanley	9/24/08	2010	2. Relinquished By: M C Stanley	10/2/08	808
3. Received By: [signature]	10/2/08	9:56 AM	3. Relinquished By:		

Comments: Temp = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 15 of 24	
Address: 1 Sugar Factory Rd	Unit No.: SDA Inlet Duct	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 3	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3 / H_2SO_4	Analysis: SO_2			
Container No. 2	9/24/08	1141	—	1	Condenser Rinse	X				
Container No. 3	9/24/08	1139	3% H_2O_2	1	Impingers 1 & 2		X			
No. 2 to Enthalpy										

DID NOT RECEIVE 10/2/08

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mulling	9/24/08	1141	1. Relinquished By: Bill Mulling	9/24/08	2010
2. Received By: Jeff C Stanley	9/24/08	2010	2. Relinquished By: [illegible]	10/1/08	809
3. Received By: [illegible]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP = 19.6°C

P.O. Box 1175 · Lewisville, TX 75067 · Office: (972) 492-1400 · Fax: (972) 492-1402 · Toll-Free: (866) 311-9940

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 16 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: SDA Inlet Duct	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: Reagent Blank	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3 / H_2SO_4	Analysis: SO_2			
Container No. 4	9/24/08	1048	—	1	D.I. Water - 200 ml	X	X			
to Enthalpy										

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/24/08	1048	1. Relinquished By: Bill Mullins	9/24/08	2010
2. Received By: [illegible] C. Stanley	9/24/08	2010	2. Relinquished By: [illegible]	10/1/08	809
3. Received By: [illegible]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 21 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 1	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3 / H_2SO_4	Analysis: SO_2			
Container No. 2	9/24/08	1541	—	1	Condenser Rinse	X				
Container No. 3	9/24/08	1544	3% H_2O_2	1	Impingers 1 & 2		X			
No. 2 to Enthalpy										

DID NOT RECEIVE 10/2/08 TRO

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyry	9/24/08	1544	1. Relinquished By: Bill Hyry	9/24/08	2020
2. Received By: [signature]	9/24/08	2020	2. Relinquished By: [signature]	10/1/08	810
3. Received By: [signature]	10/2/08	9:56 am	3. Relinquished By:		

Comments: Temp 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 22 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin, State: MT, Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 2	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3 / H_2SO_4	Analysis: SO_2			
Container No. 2	9/24/08	1728	—	1	Condenser Rinse	X				
Container No. 3	9/24/08	1731	3% H_2O_2	1	Impingers 1 & 2		X			
No 2 to Enthalpy										

Special Instructions:

Did not receive 10/2/08 JMB

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mulling	9/24/08	1731	1. Relinquished By: Bill Mulling	9/24/08	2020
2. Received By: Jack C Stamp	9/24/08	2020	2. Relinquished By: Jack Stamp	10/1/08	811
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP = 19.6

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 23 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin State: MT Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 3	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3/H_2SO_4	Analysis: SO_2			
Container No. 2	9/24/08	1917	—	1	Condenser Rinse	X				
Container No. 3	9/24/08	1920	3% H_2O_2	1	Impingers 1 & 2		X			
No 2 to Enthalpy										

DID NOT RECEIVE 10/2/08 TMG

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/24/08	1920	1. Relinquished By: Bill Mullins	9/24/08	2020
2. Received By: [signature]	9/24/08	2020	2. Relinquished By: [signature]	10/1/08	915
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP= 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 24 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: Reagent Blank	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3/H_2SO_4	Analysis: SO_2			
Container No. 4	9-24-08	1051	—	1	D.I. Water - 200 ml	X	X			
↓ Enthalpy										

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/24/08	1051	1. Relinquished By: Bill Mullins	9/24/08	2020
2. Received By: [illegible]	9/27/08	2020	2. Relinquished By: [illegible]	10/1/08	812
3. Received By: [illegible]	10/2/08	9:56AM	3. Relinquished By		

Comments: Temp= 19.6°C

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Sample Chromatograms

1008-22

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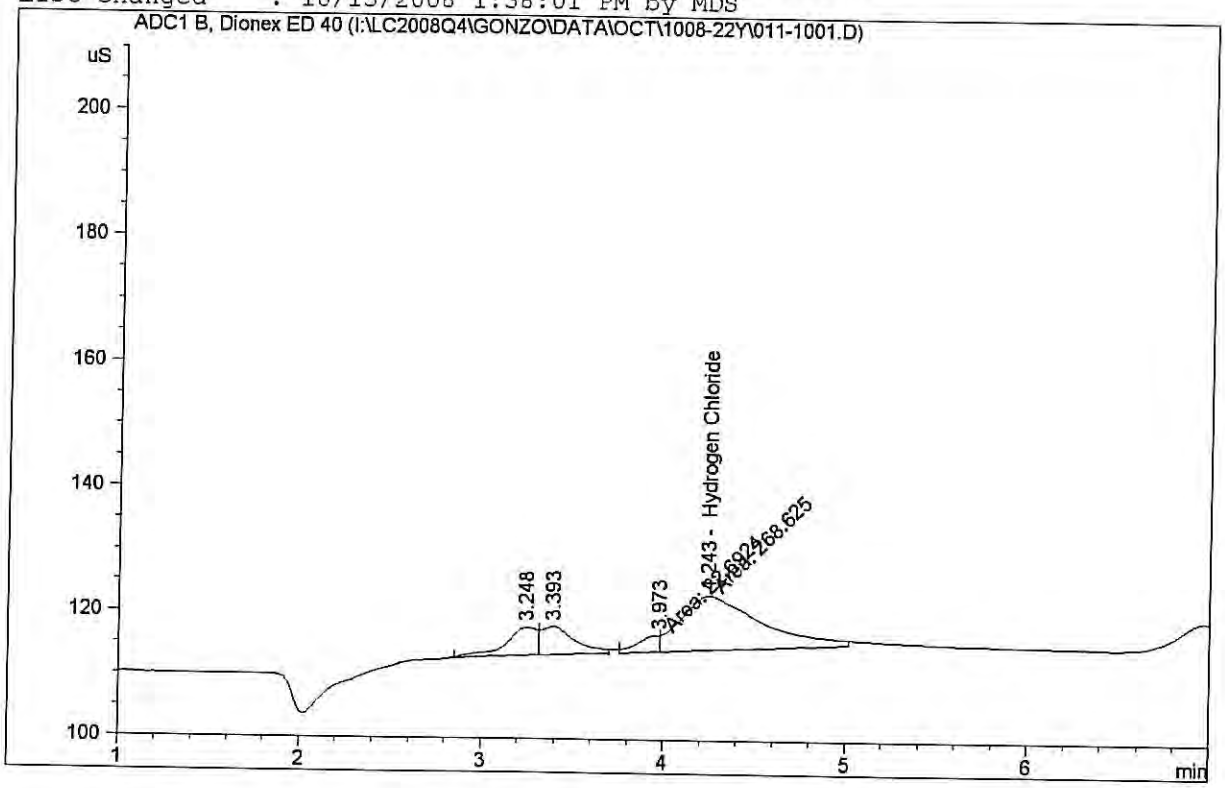
Injection Date : 10/10/2008 3:50:13 PM Seq. Line : 10
Sample Name : In R1 C3*1.0009 Location : Vial 11
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:01 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.243	FM	268.62549	1.28082e-2	3.44061		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 3.44061

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

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1008-22

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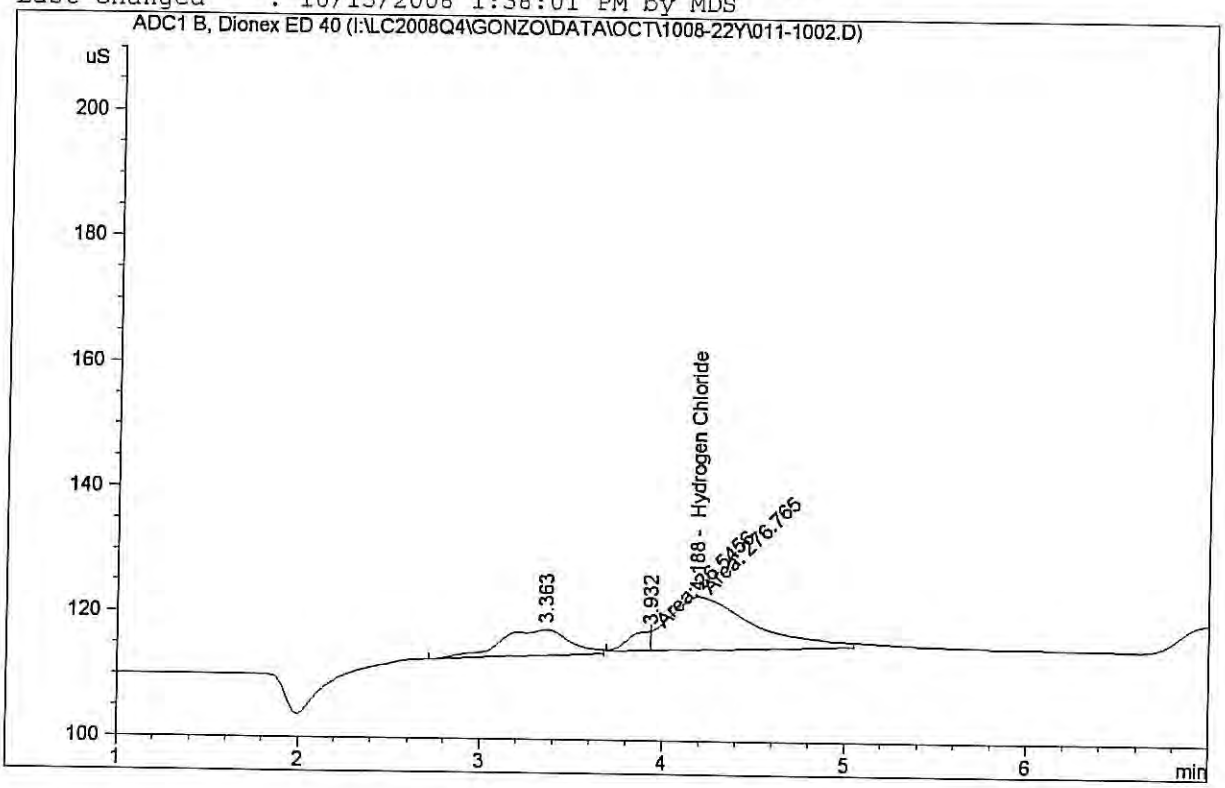
Injection Date : 10/10/2008 3:59:07 PM Seq. Line : 10
Sample Name : In R1 C3*1.0009 Location : Vial 11
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:01 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.188	FM	276.76526	1.28058e-2	3.54419		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 3.54419

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

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1008-22

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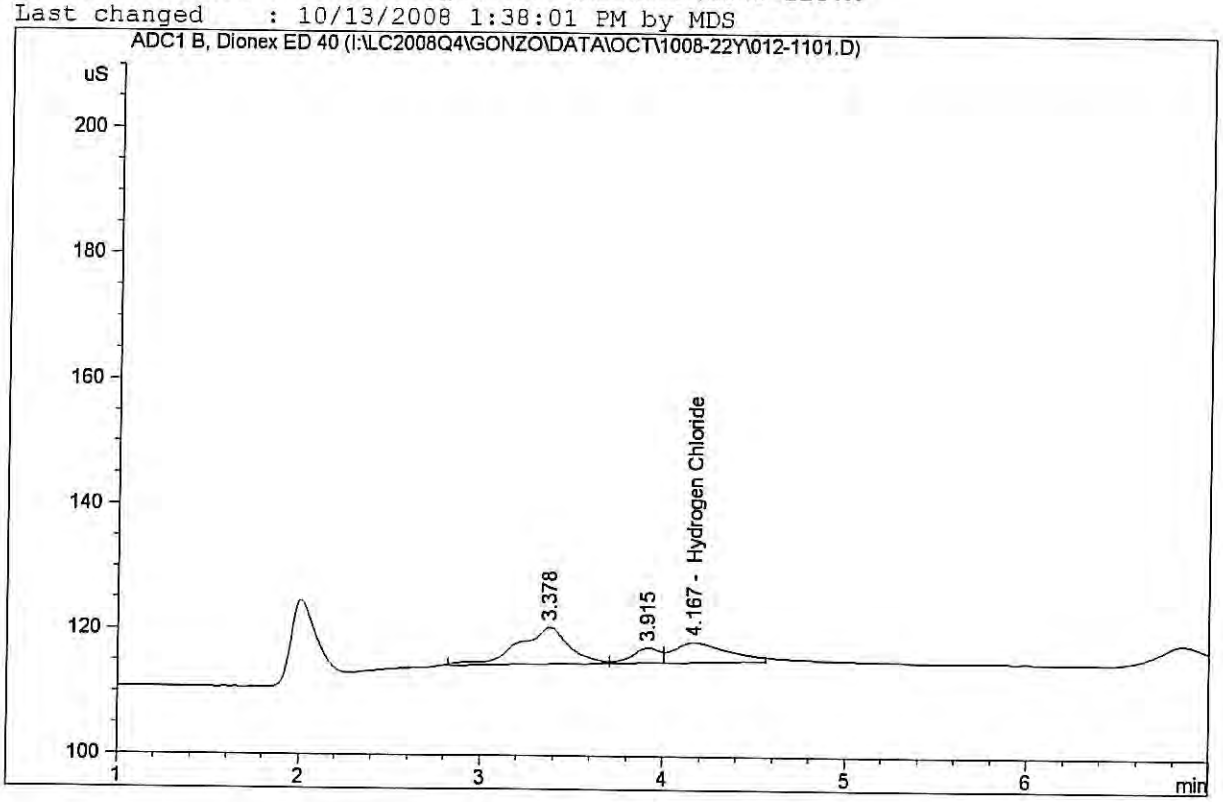
Injection Date : 10/10/2008 4:07:59 PM Seq. Line : 11
Sample Name : In R2 C3*1.0397 Location : Vial 12
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:01 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.167	VB	68.88071	1.30490e-2	8.98826e-1		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 8.98826e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

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1008-22

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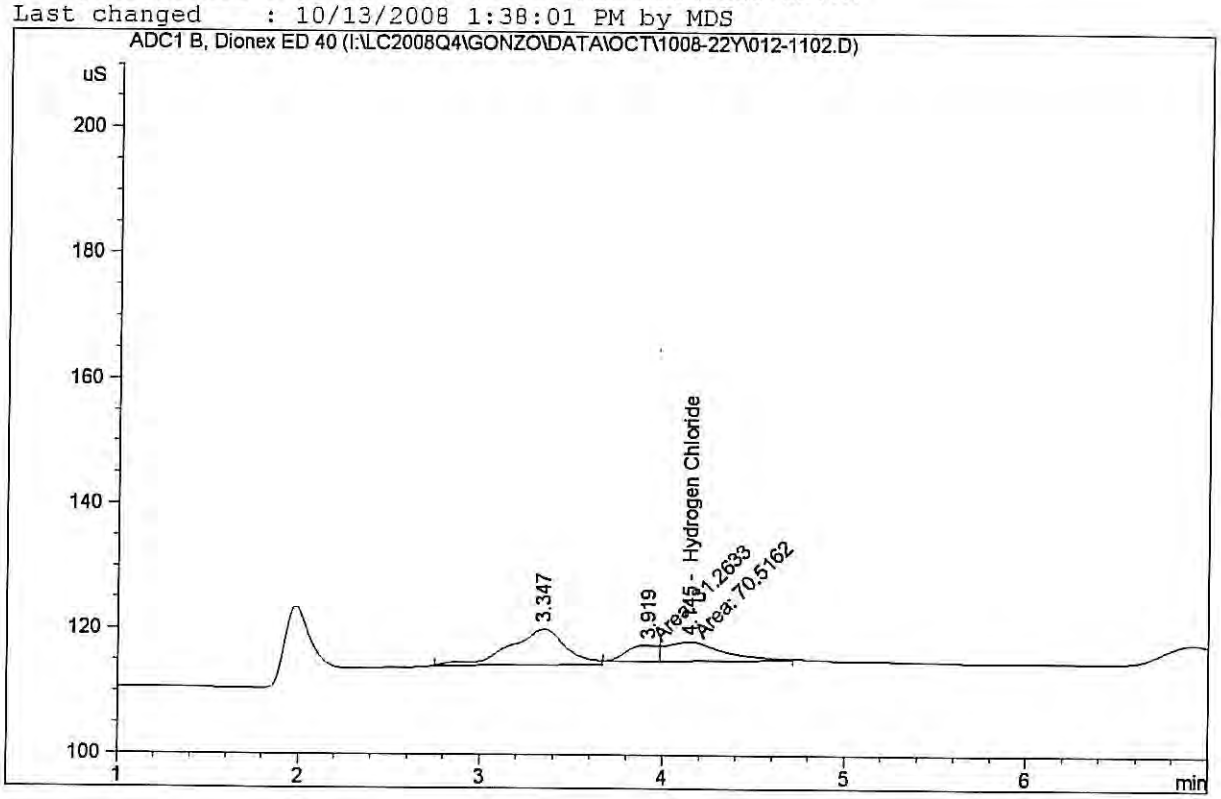
Injection Date : 10/10/2008 4:16:53 PM Seq. Line : 11
Sample Name : In R2 C3*1.0397 Location : Vial 12
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:01 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.145	FM	70.51616	1.30415e-2	9.19638e-1		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 9.19638e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

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1008-22

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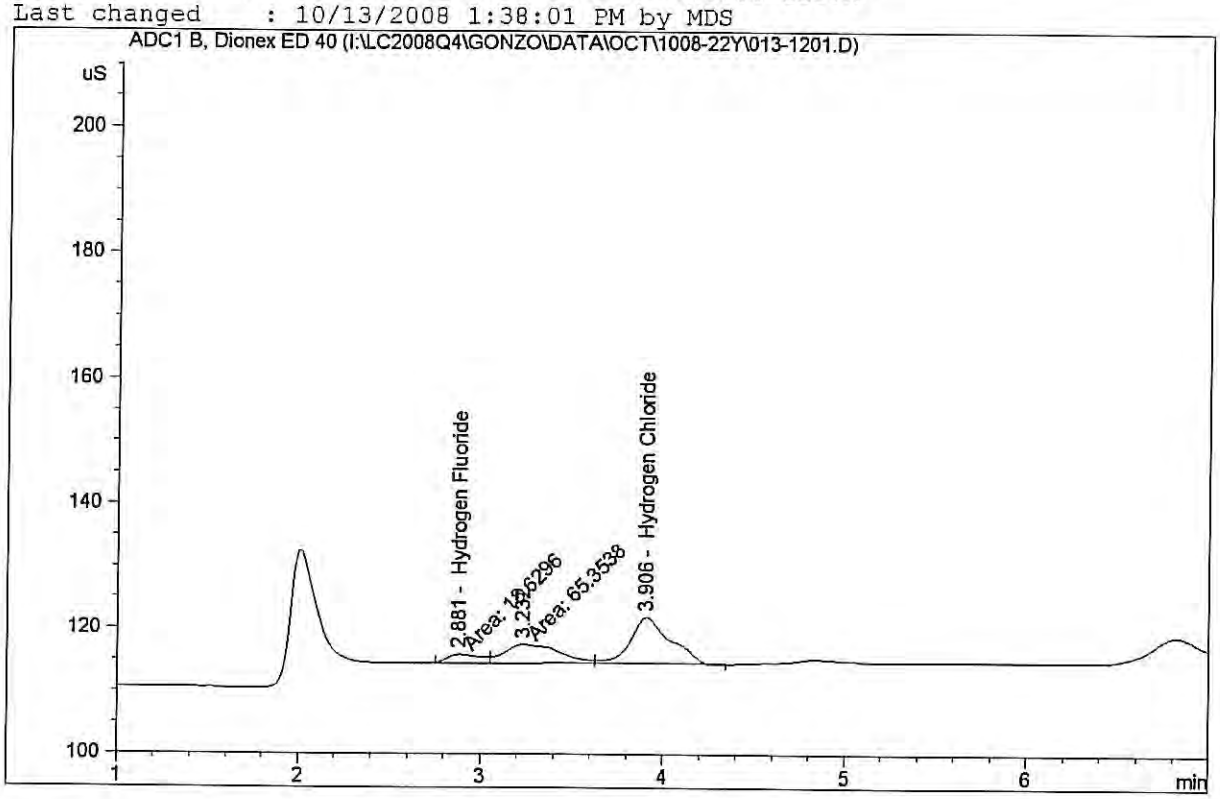
Injection Date : 10/10/2008 4:25:49 PM Seq. Line : 12
Sample Name : In R3 C3*1.0577 Location : Vial 13
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:01 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.881	MF	18.62965	8.26930e-3	1.54054e-1		Hydrogen Fluoride
3.906	VP	115.48500	1.29183e-2	1.49187		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 1.64593

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

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1008-22

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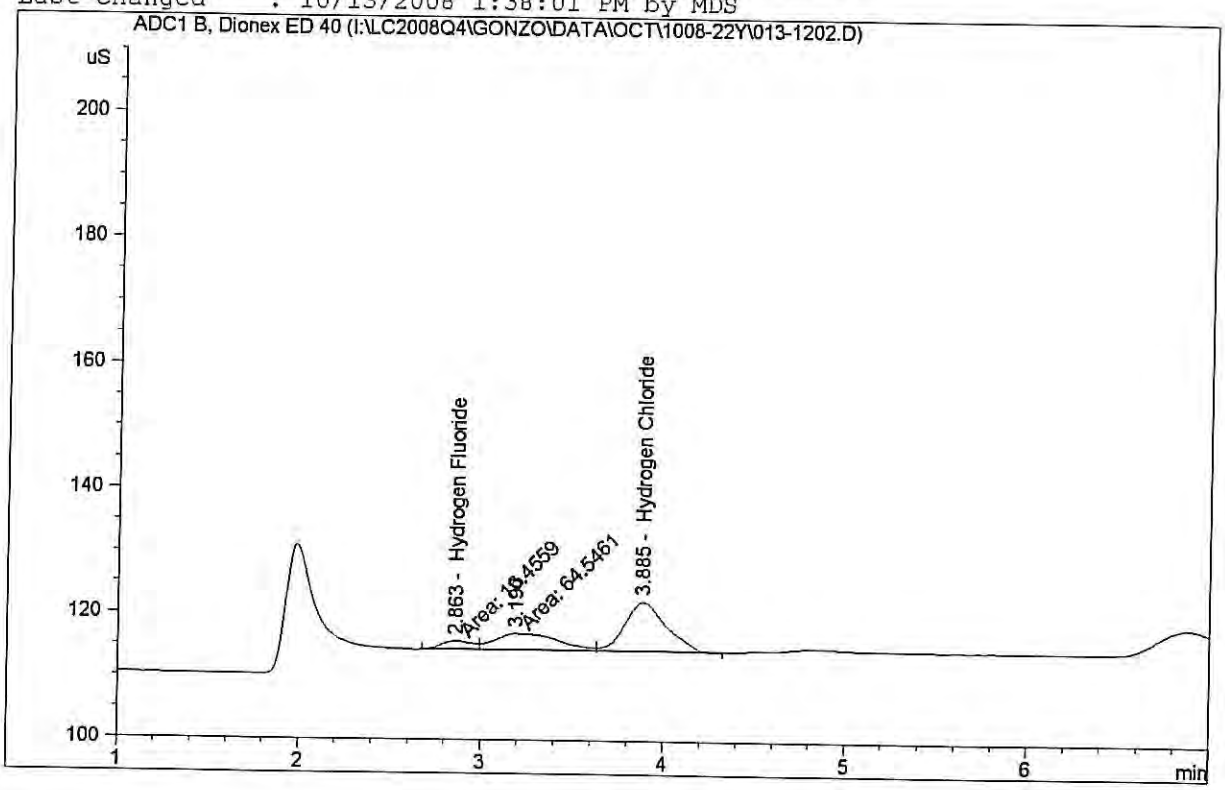
Injection Date : 10/10/2008 4:34:45 PM Seq. Line : 12
Sample Name : In R3 C3*1.0577 Location : Vial 13
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:01 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.863	MF	16.45593	8.26930e-3	1.36079e-1		Hydrogen Fluoride
3.885	VP	125.37299	1.29031e-2	1.61770		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 1.75378

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

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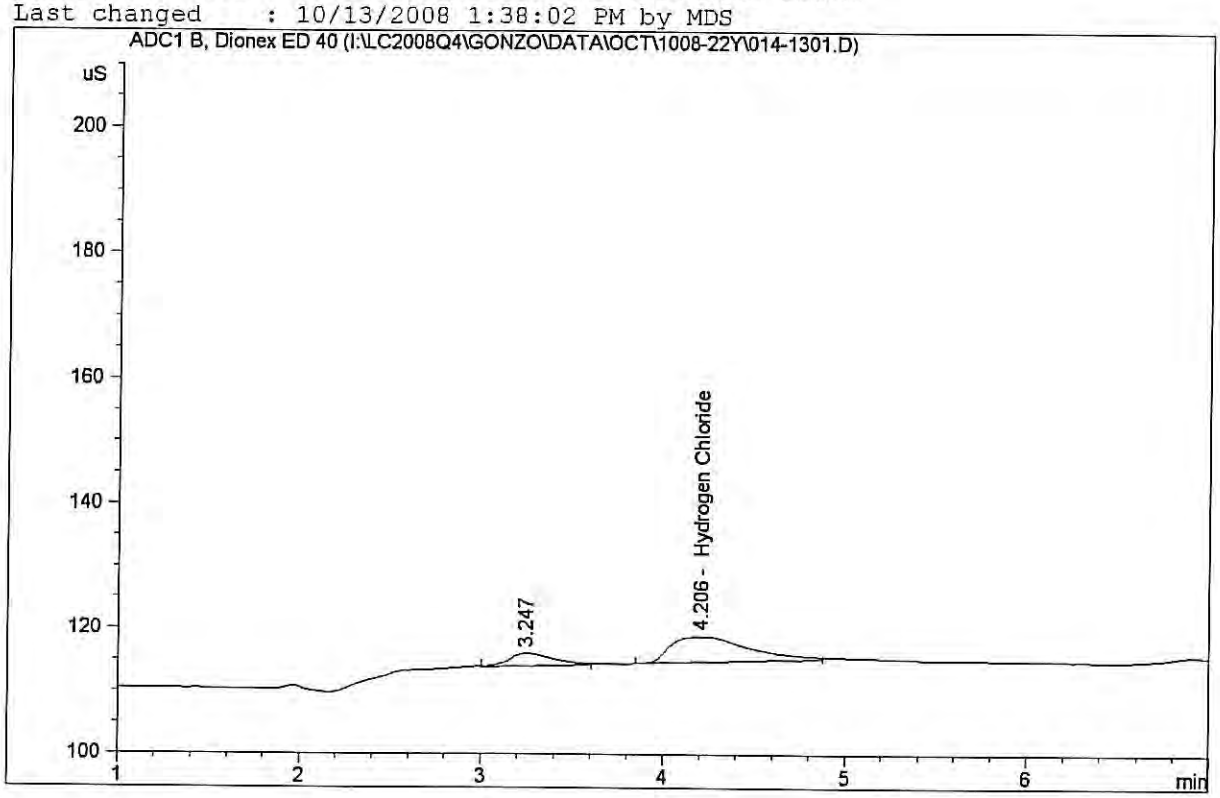
1008-22

==========

Injection Date : 10/10/2008 4:43:39 PM Seq. Line : 13
Sample Name : Stk R1 C3*1.0126 Location : Vial 14
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:02 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.206	BB	131.57516	1.28947e-2	1.69662		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 1.69662

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

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1008-22

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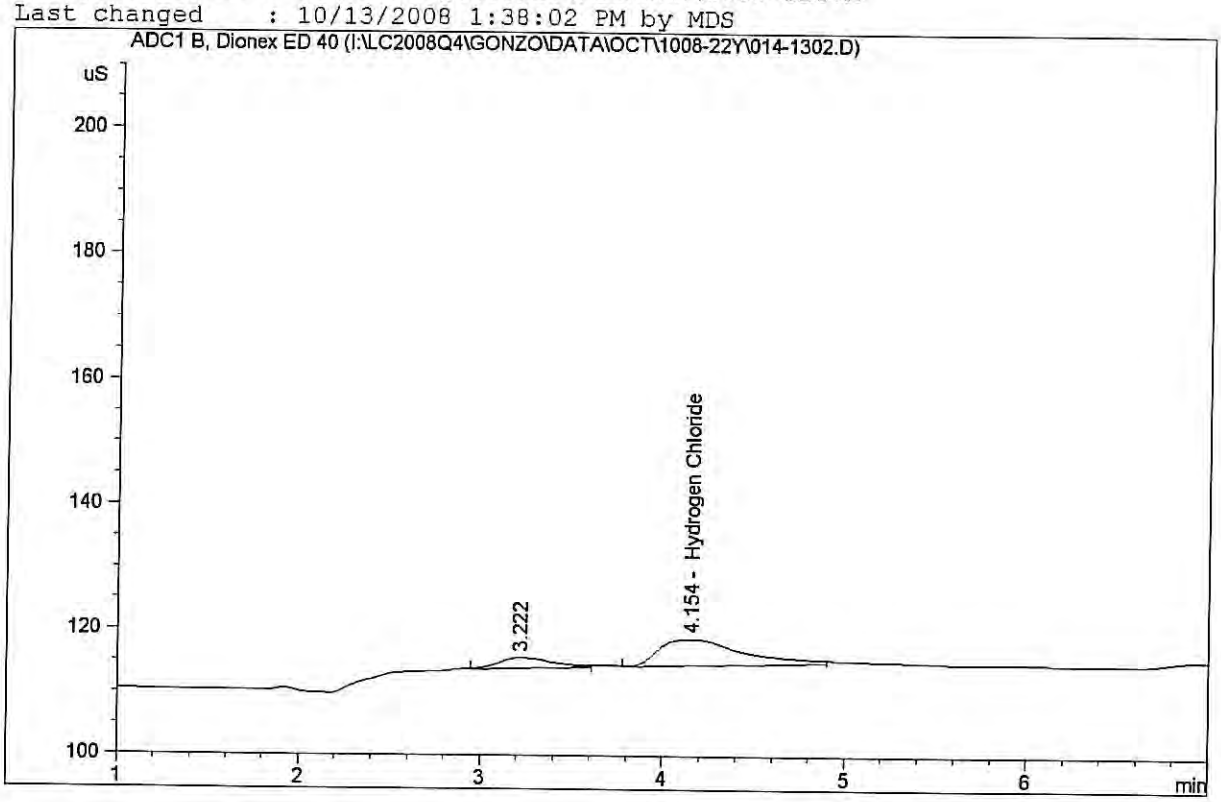
Injection Date : 10/10/2008 4:52:29 PM Seq. Line : 13
Sample Name : Stk R1 C3*1.0126 Location : Vial 14
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:02 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.154	BB	141.45821	1.28829e-2	1.82239		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 1.82239

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

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1008-22

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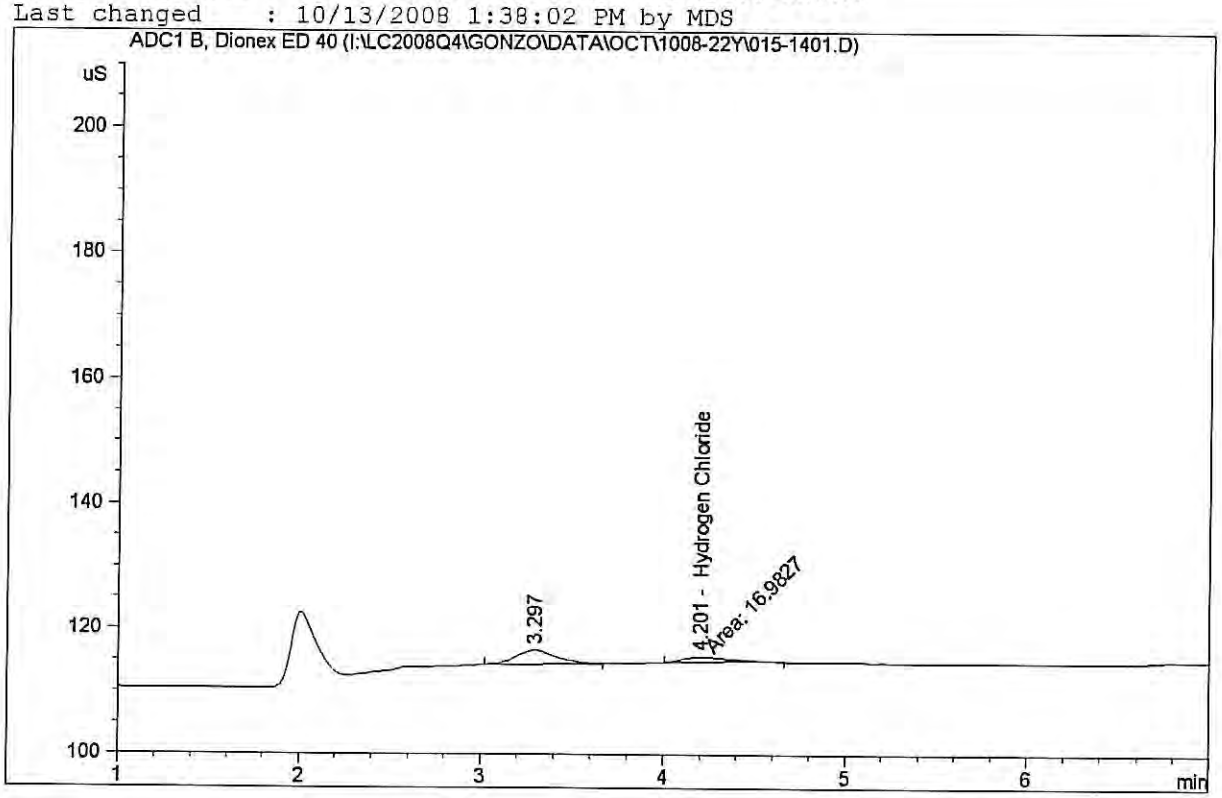
==========================================================================
Injection Date  : 10/10/2008 5:01:21 PM          Seq. Line :  14
Sample Name     : Stk R2 C3*1.038                 Location : Vial 15
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```

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==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.876          -          -          -          Hydrogen Fluoride
  4.201 MM     16.98267 1.33952e-2 2.27486e-1     Hydrogen Chloride
  6.045          -          -          -          Hydrogen Bromide

Totals :                              2.27486e-1

 Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========================================================================
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1008-22

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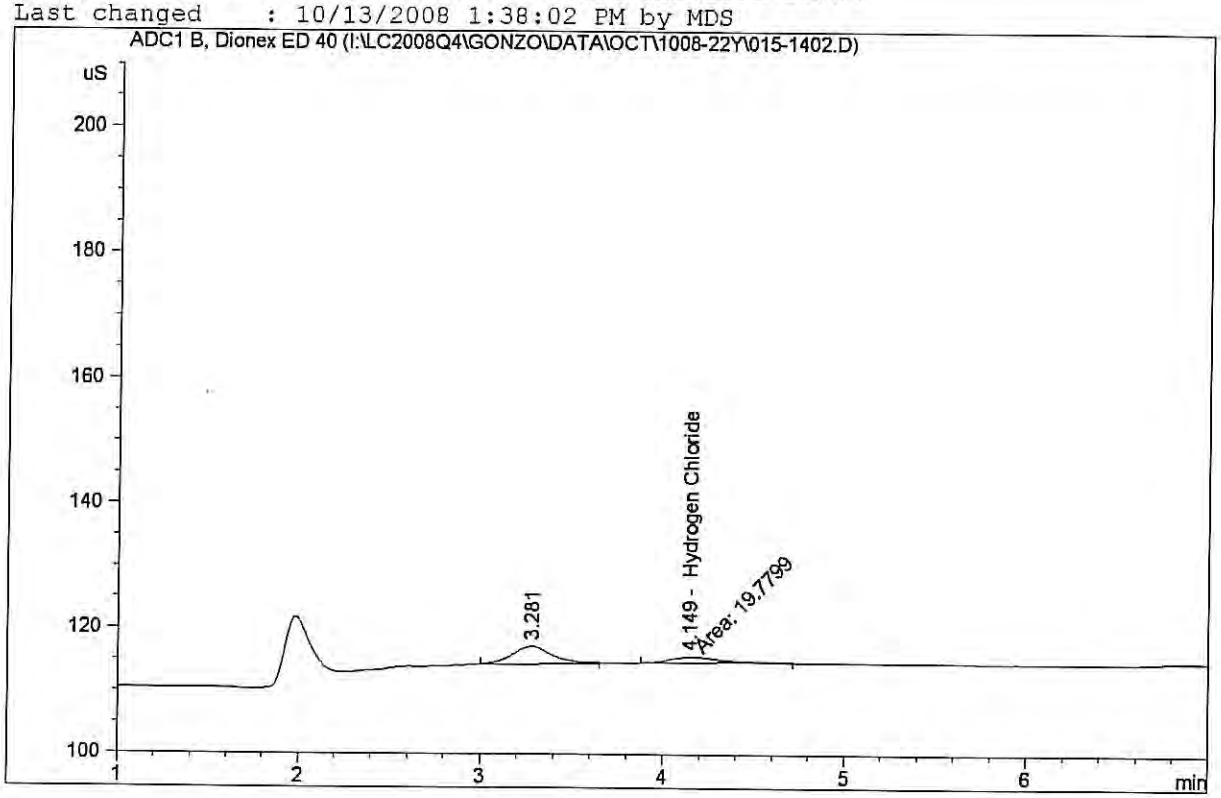
Injection Date : 10/10/2008 5:10:12 PM Seq. Line : 14
Sample Name : Stk R2 C3*1.038 Location : Vial 15
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:02 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.149	MM	19.77990	1.33952e-2	2.64955e-1		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 2.64955e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

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1008-22

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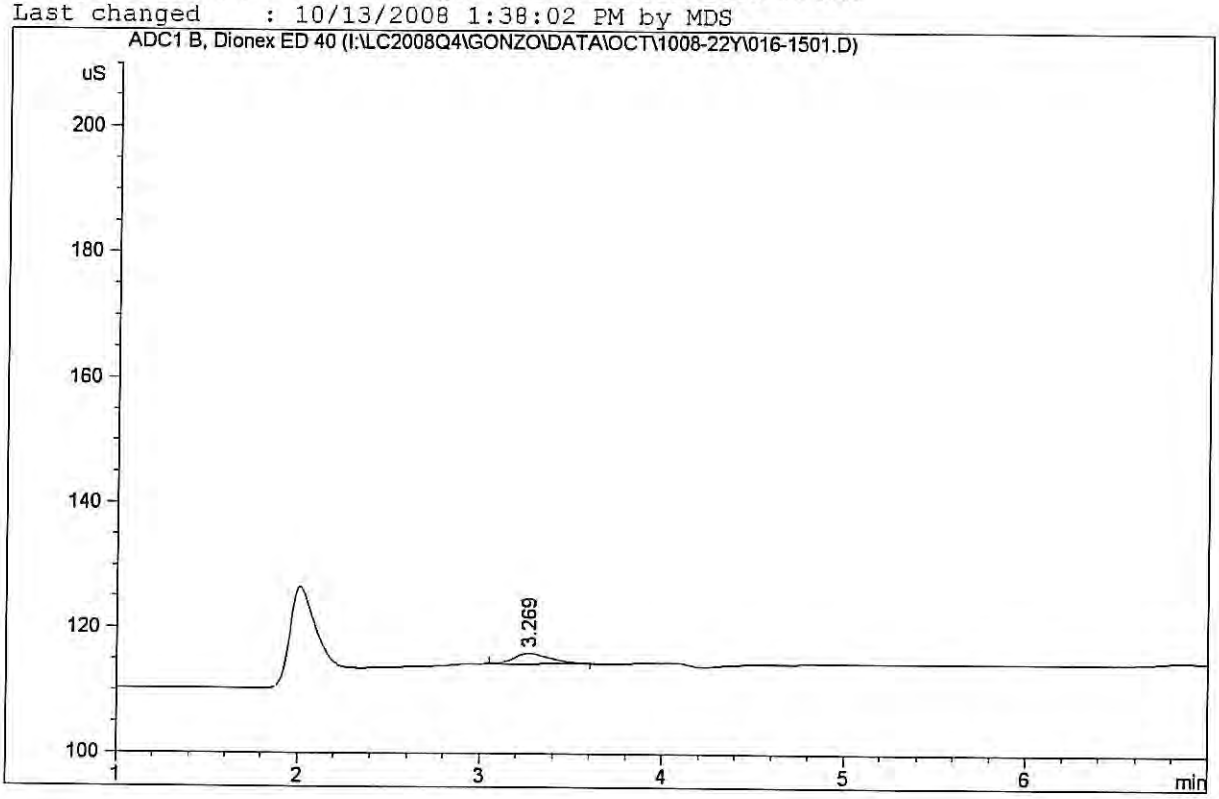
Injection Date : 10/10/2008 5:19:05 PM Seq. Line : 15
Sample Name : Stk R3 C3*1.0471 Location : Vial 16
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:02 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.109		-	-	-		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 0.00000

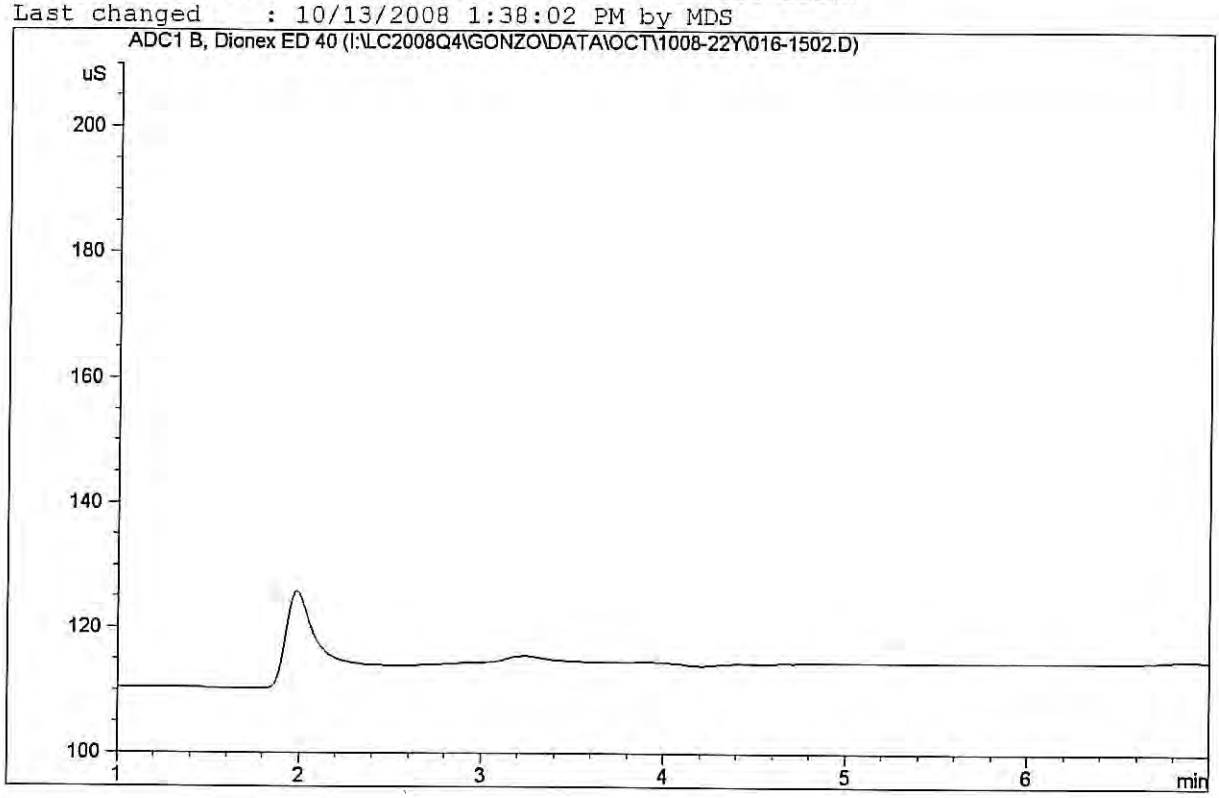
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

1008-22

```
==========================================================================
Injection Date  : 10/10/2008 5:28:02 PM          Seq. Line :  15
Sample Name     : Stk R3 C3*1.0471                Location : Vial 16
Acq. Operator   : MDS                                  Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.876           -          -          -          Hydrogen Fluoride
  4.109           -          -          -          Hydrogen Chloride
  6.045           -          -          -          Hydrogen Bromide

Totals :                                 0.00000

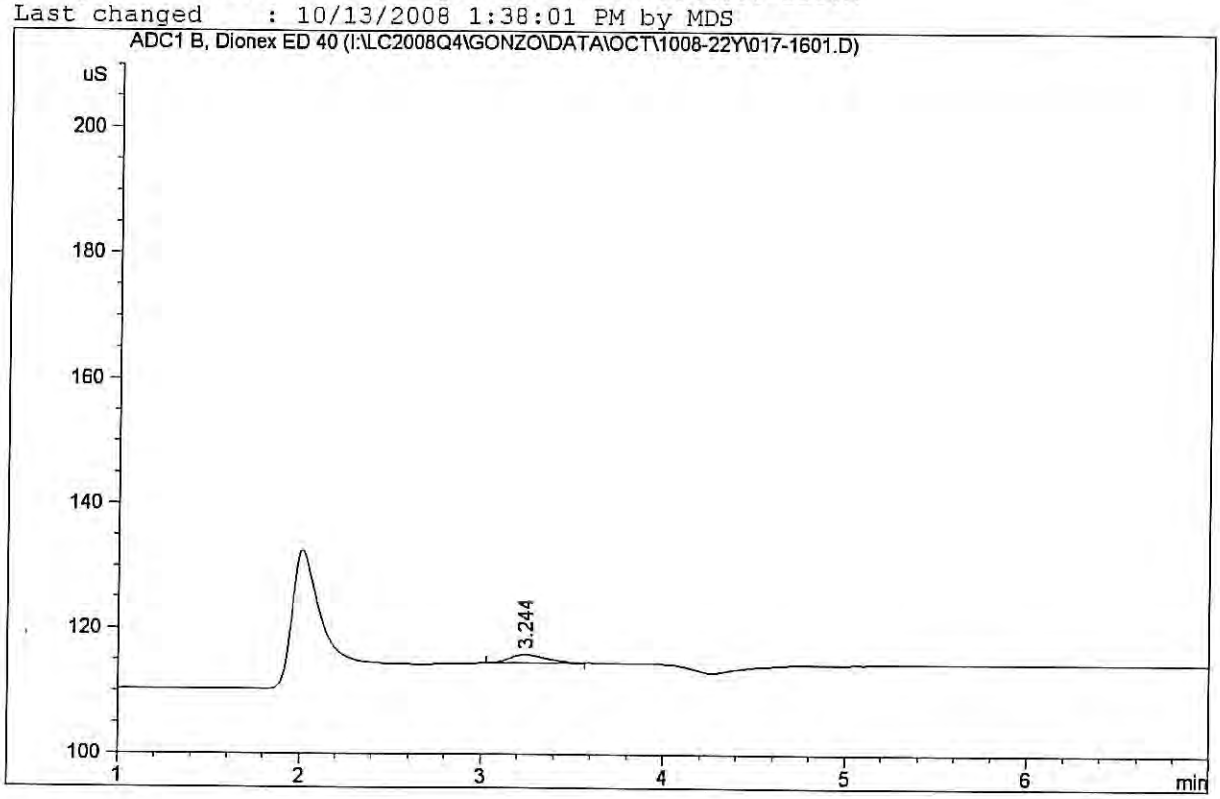
 Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========================================================================
```

1008-22 Sample Blank

Injection Date	: 10/10/2008 5:36:58 PM	Seq. Line :	16
Sample Name	: In C6*1.061	Location :	Vial 17
Acq. Operator	: MDS	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M		
Last changed	: 10/9/2008 1:53:38 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22Y.M		
Last changed	: 10/13/2008 1:38:01 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 1:35:44 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.109		-	-	-		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide
Totals :				0.00000		

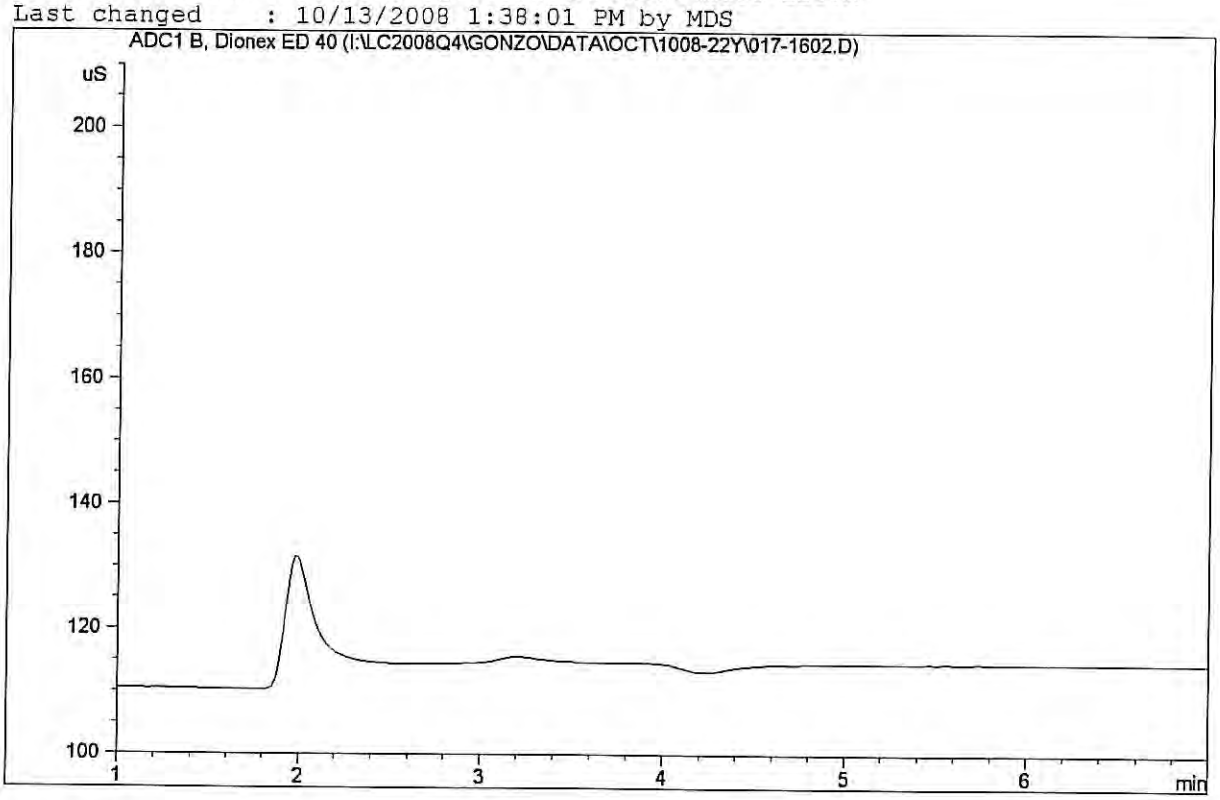
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

1008-22 Sample Blank

==========

Injection Date : 10/10/2008 5:45:54 PM Seq. Line : 16
Sample Name : In C6*1.061 Location : Vial 17
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:01 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.109		-	-	-		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 0.00000

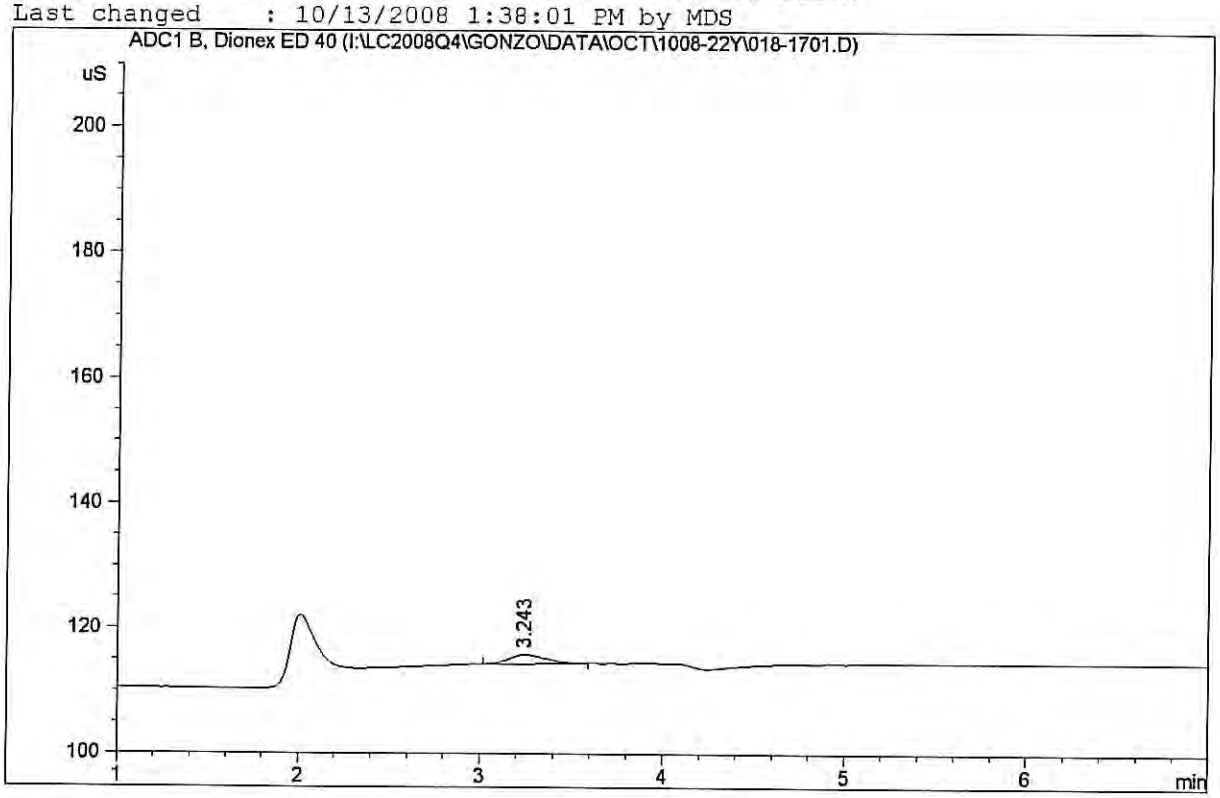
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

1008-22 Sample Blank

```
==========================================================================
Injection Date  : 10/10/2008 5:54:51 PM          Seq. Line :  17
Sample Name     : Stk C6*1.0399                   Location : Vial 18
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:01 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.876           -          -          -          Hydrogen Fluoride
  4.109           -          -          -          Hydrogen Chloride
  6.045           -          -          -          Hydrogen Bromide

Totals :                                 0.00000

 Results obtained with enhanced integrator!
1 Warnings or Errors :

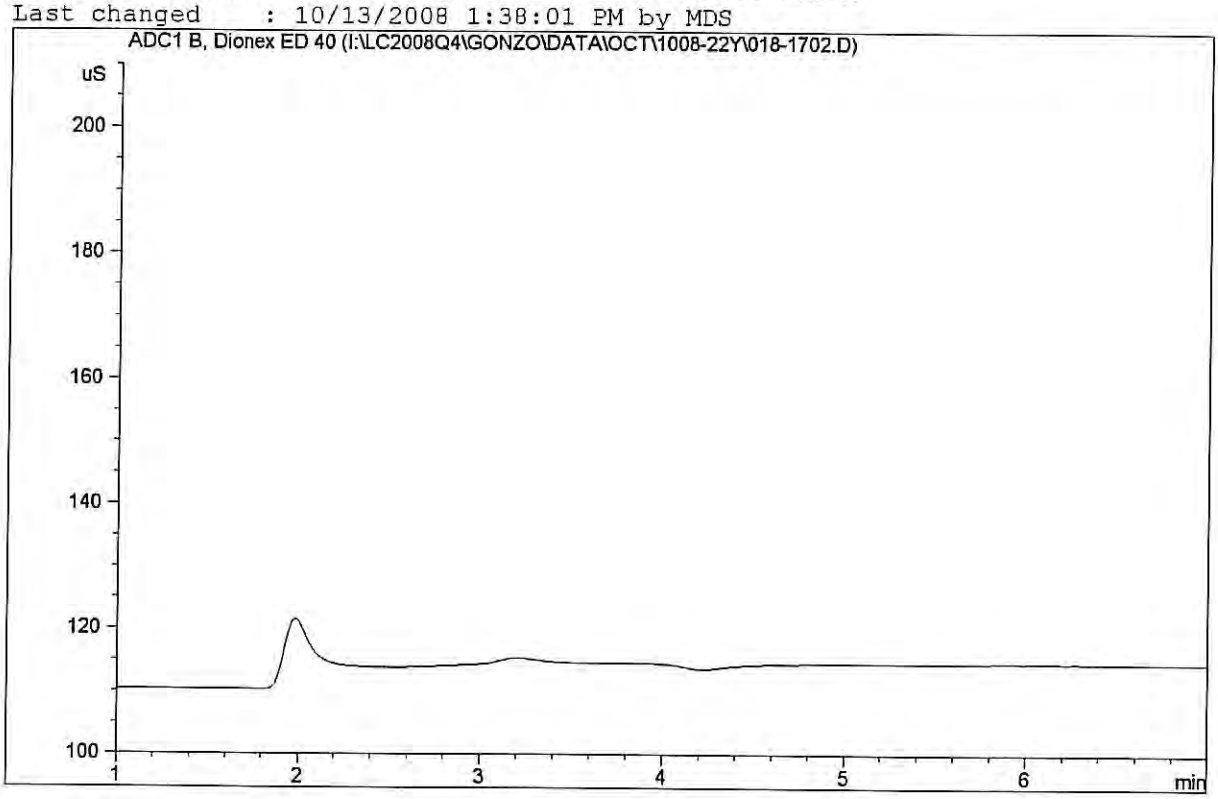
Warning : Calibrated compound(s) not found

==========================================================================
```

1008-22 Sample Blank

==========

Injection Date : 10/10/2008 6:03:49 PM Seq. Line : 17
Sample Name : Stk C6*1.0399 Location : Vial 18
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:01 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.109		-	-	-		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 0.00000

Results obtained with enhanced integrator!
1 Warnings or Errors :

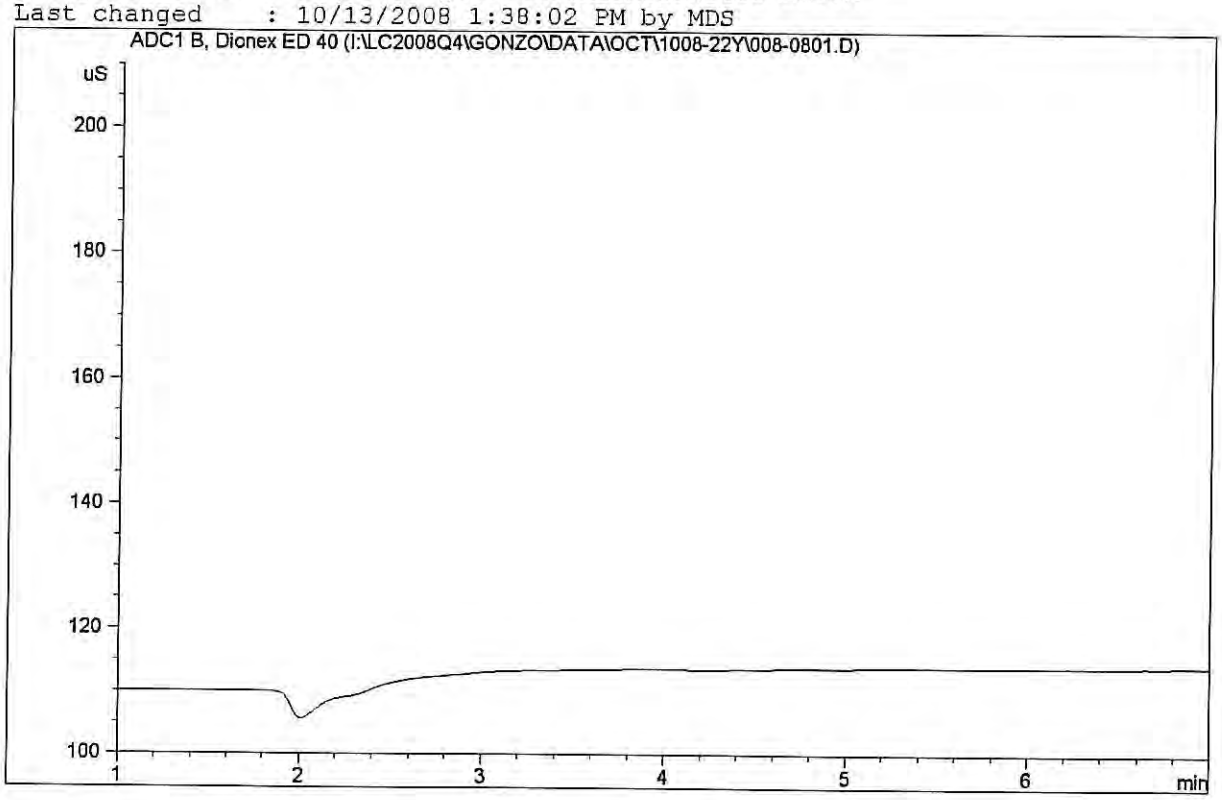
Warning : Calibrated compound(s) not found

==========

0.01N H2SO4, used to prepare standards

==========

Injection Date : 10/10/2008 10:48:16 AM Seq. Line : 8
Sample Name : H2SO4 Lab Blank Location : Vial 8
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:02 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.109		-	-	-		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide

Totals : 0.00000

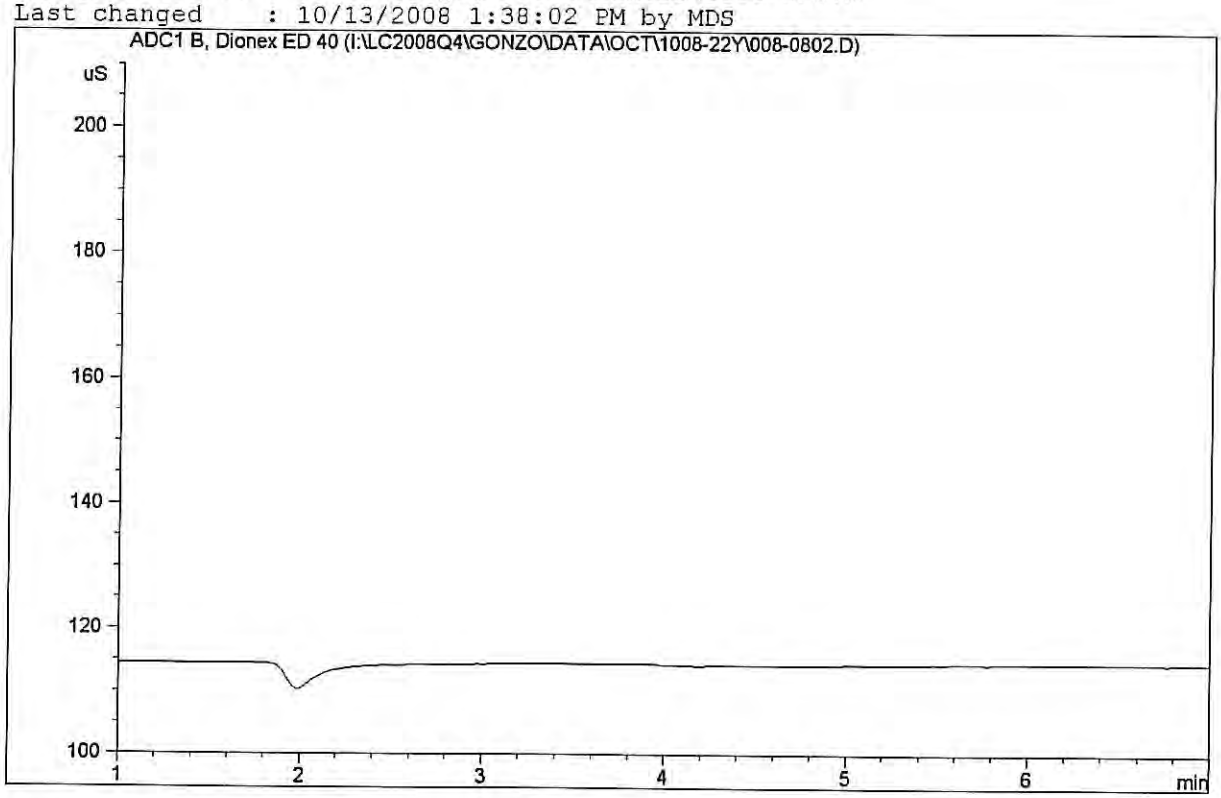
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

0.01N H2SO4, used to prepare standards

Injection Date	: 10/10/2008 3:23:22 PM	Seq. Line :	8
Sample Name	: H2SO4 Lab Blank	Location :	Vial 8
Acq. Operator	: MDS	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M		
Last changed	: 10/9/2008 1:53:38 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22Y.M		
Last changed	: 10/13/2008 1:38:02 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 1:35:44 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

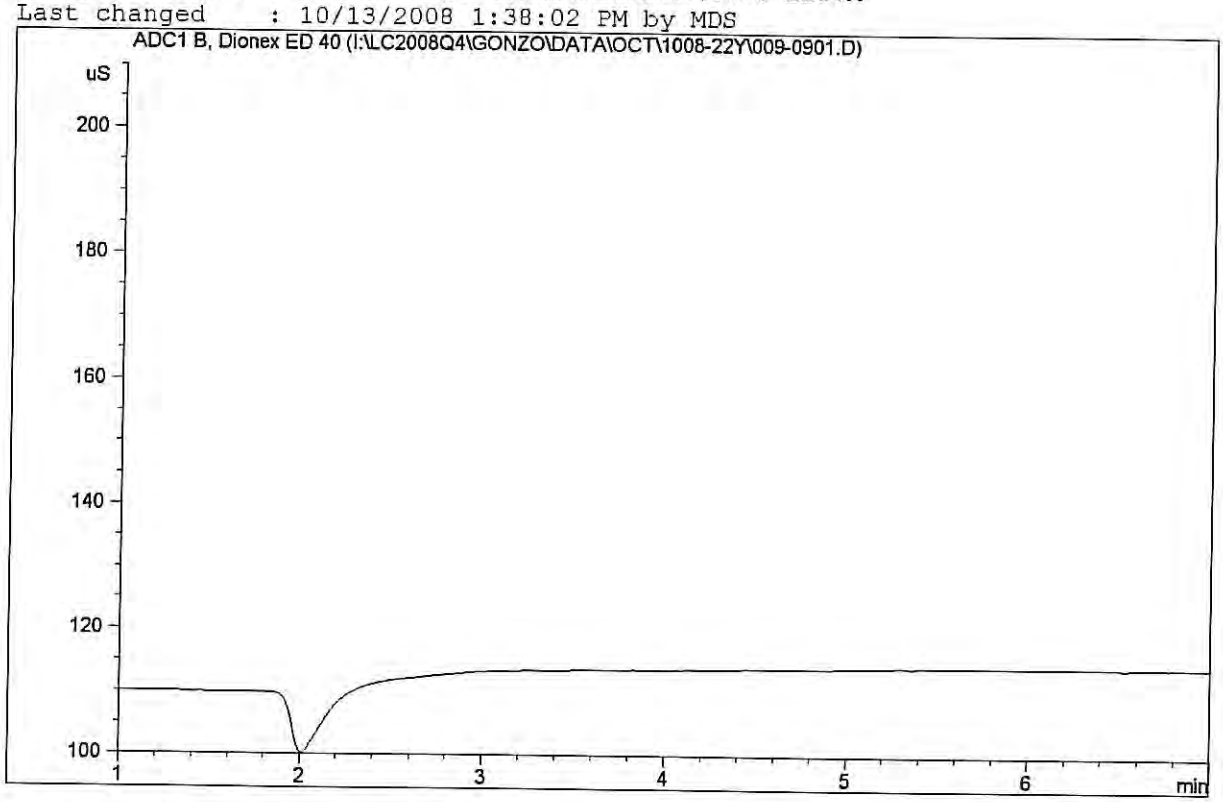
RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.876		-	-	-		Hydrogen Fluoride
4.109		-	-	-		Hydrogen Chloride
6.045		-	-	-		Hydrogen Bromide
Totals :				0.00000		

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

used to dilute samples

```
==========================================================================
Injection Date  : 10/10/2008 3:32:22 PM          Seq. Line :   9
Sample Name     : DI H2O Lab Blank                Location : Vial 9
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.876          -          -          -          Hydrogen Fluoride
  4.109          -          -          -          Hydrogen Chloride
  6.045          -          -          -          Hydrogen Bromide

Totals :                                 0.00000

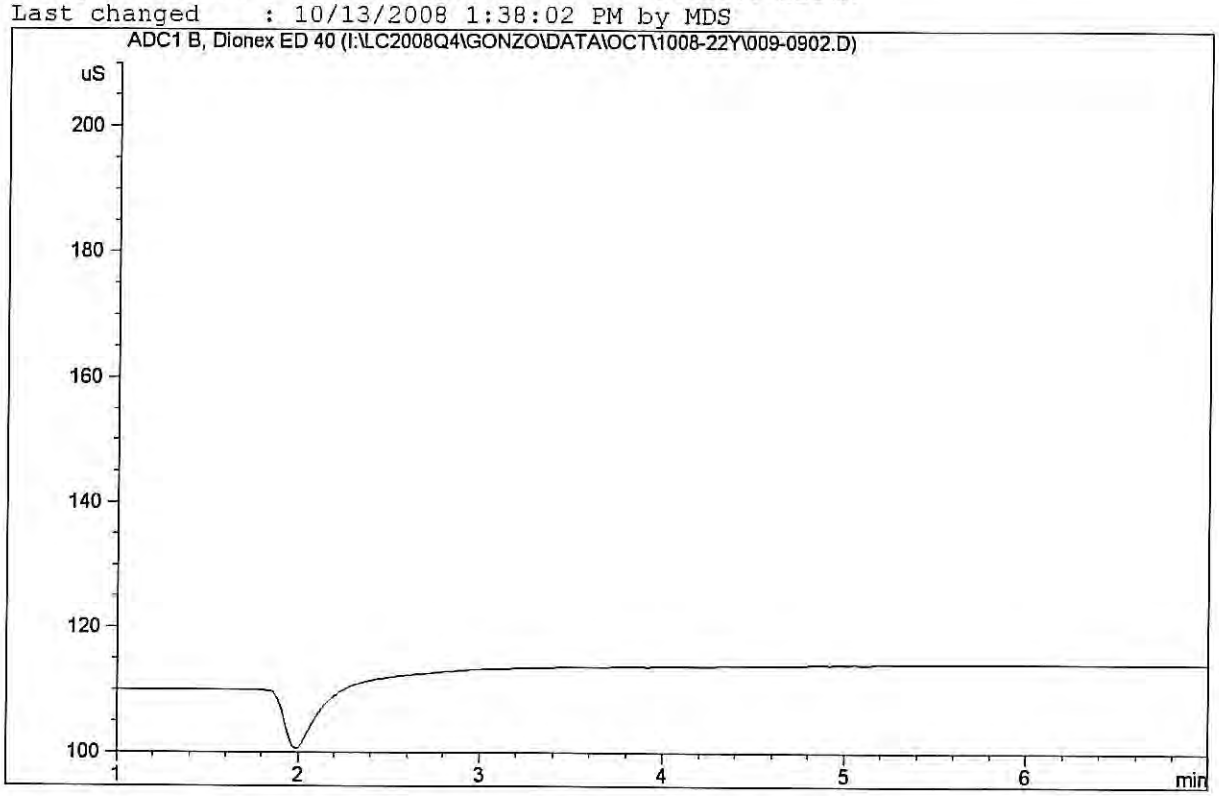
 Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========================================================================
```

used to dilute samples

```
==========================================================================
Injection Date  : 10/10/2008 3:41:22 PM          Seq. Line :   9
Sample Name     : DI H2O Lab Blank                Location : Vial 9
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.876           -          -          -          Hydrogen Fluoride
  4.109           -          -          -          Hydrogen Chloride
  6.045           -          -          -          Hydrogen Bromide

Totals :                                 0.00000

 Results obtained with enhanced integrator!
1 Warnings or Errors :

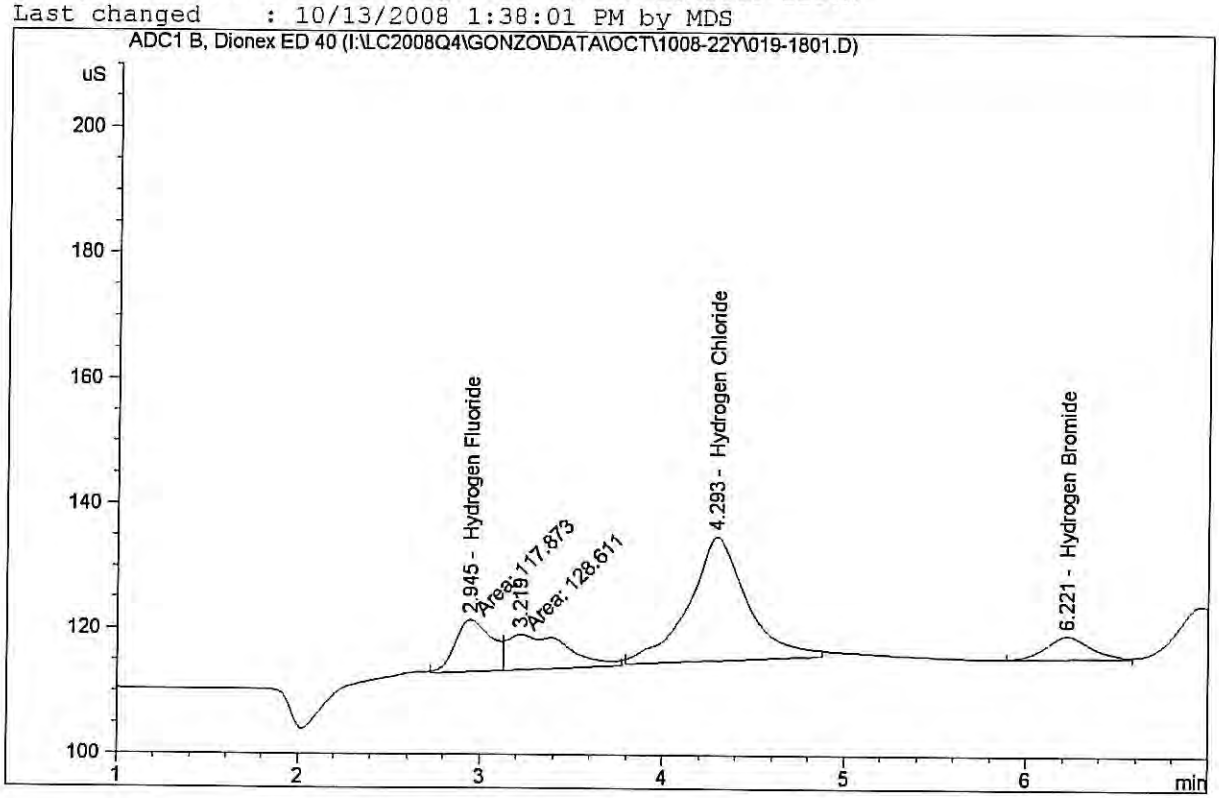
Warning : Calibrated compound(s) not found

==========================================================================
```

1008-22 Matrix Spike

==========

Injection Date : 10/10/2008 6:12:48 PM Seq. Line : 18
Sample Name : MS/In R1 C3 Location : Vial 19
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:01 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.945	MF	117.87312	9.08168e-3	1.07049		Hydrogen Fluoride
4.293	BB	448.19116	1.27749e-2	5.72561		Hydrogen Chloride
6.221	PV	66.61400	3.03550e-2	2.02207		Hydrogen Bromide

Totals : 8.81816

Results obtained with enhanced integrator!

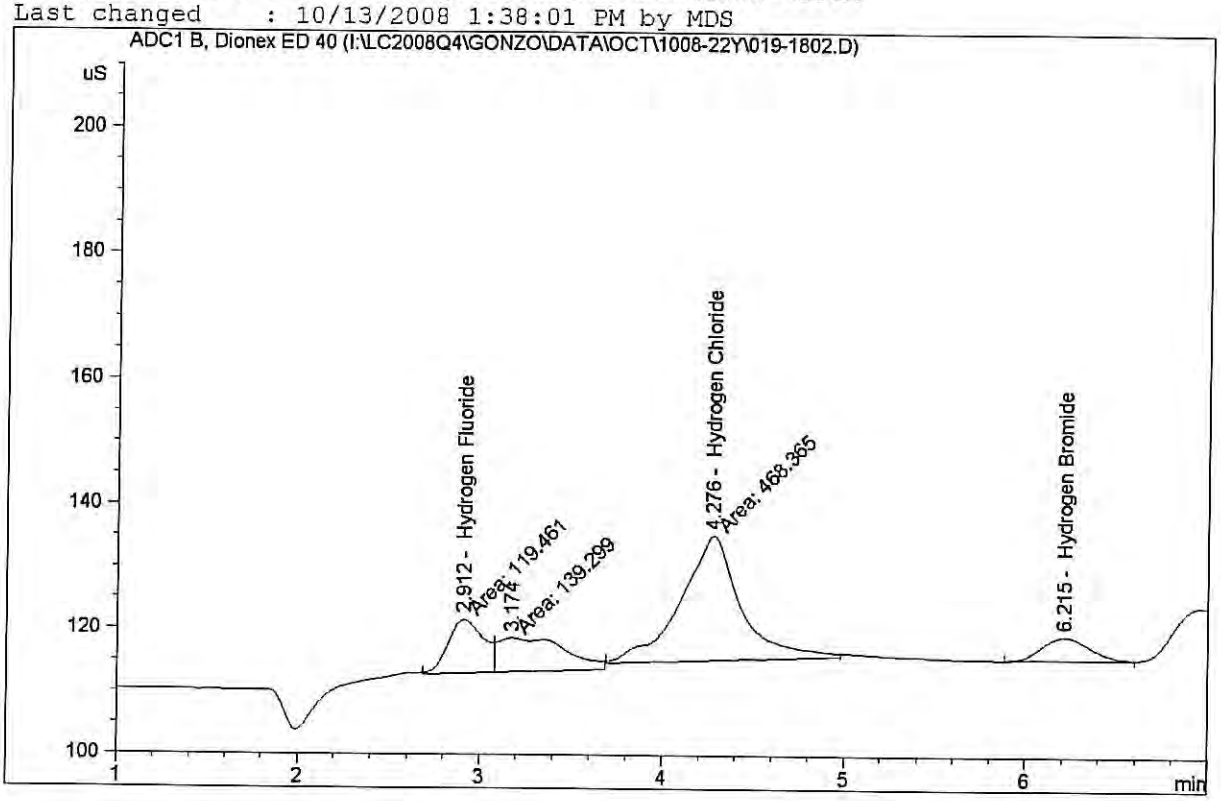
==========

*** End of Report ***

1008-22 Matrix Spike

==========

Injection Date : 10/10/2008 6:21:46 PM Seq. Line : 18
Sample Name : MS/In R1 C3 Location : Vial 19
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:01 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.912	MF	119.46140	9.08502e-3	1.08531		Hydrogen Fluoride
4.276	MM	468.36490	1.27728e-2	5.98232		Hydrogen Chloride
6.215	PV	70.19758	3.03958e-2	2.13371		Hydrogen Bromide

Totals : 9.20134

Results obtained with enhanced integrator!

==========

*** End of Report ***

Curve(s)/QA Point(s) Chromatograms

Calibration Table

Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM

Calculate : External Standard
Based on : Peak Area

Rel. Reference Window : 20.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 20.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : Yes, identified peaks are recalibrated
Correct All Ret. Times: No, only for identified peaks

Curve Type : Linear
Origin : Connected
Weight : Linear (Amnt)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

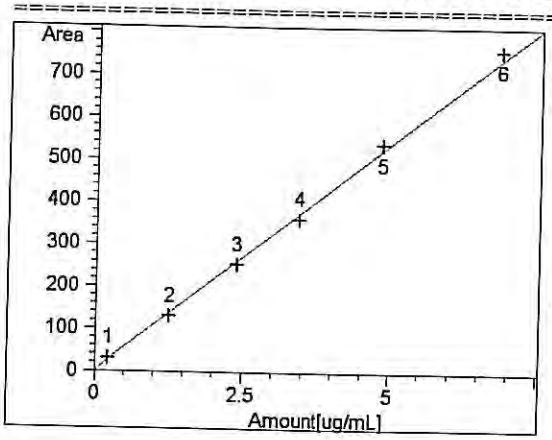
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Sig	Lvl	Amount [ug/mL]	Area	Amt/Area	Ref	Grp	Name
2.876	1	1	2.30000e-1	30.01021	7.66406e-3			Hydrogen Fluoride
		2	1.26000	130.08972	9.68562e-3			
		3	2.41000	251.59485	9.57889e-3			
		4	3.46000	360.09478	9.60858e-3			
		5	4.87000	535.66176	9.09156e-3			
		6	6.87000	758.15613	9.06146e-3			
4.109	1	1	4.46000e-1	36.86977	1.20966e-2			Hydrogen Chloride
		2	2.45000	178.29101	1.37416e-2			
		3	4.67000	347.25224	1.34484e-2			
		4	6.70000	503.11096	1.33171e-2			
		5	9.44000	756.85345	1.24727e-2			
		6	13.30000	1075.20206	1.23698e-2			
6.045	1	1	4.39000e-1	16.32732	2.68874e-2			Hydrogen Bromide
		2	2.41000	76.62213	3.14531e-2			
		3	4.60000	147.41295	3.12049e-2			
		4	6.60000	211.91928	3.11439e-2			
		5	9.29000	301.96807	3.07648e-2			
		6	13.10000	425.63907	3.07772e-2			

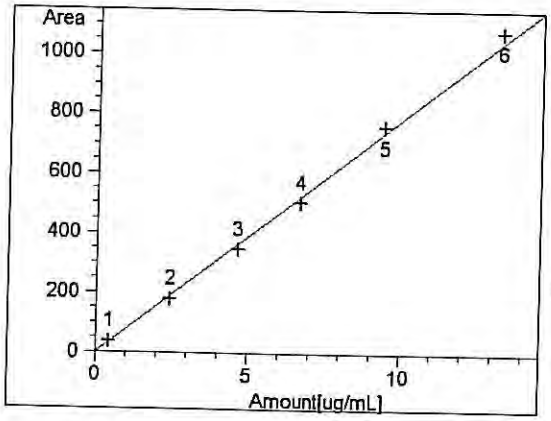
Peak Sum Table

No Entries in table

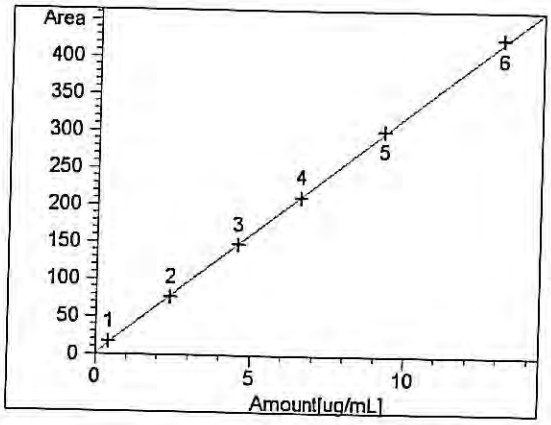
Calibration Curves



Hydrogen Fluoride at exp. RT: 2.876
ADC1 B, Dionex ED 40
Correlation: 0.99920
Residual Std. Dev.: 14.37654
Formula: y = mx + b
m: 107.15154
b: 3.16885
x: Amount[ug/mL]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.18254
Level 3 : 0.095436
Level 4 : 0.066474
Level 5 : 0.047228
Level 6 : 0.033479

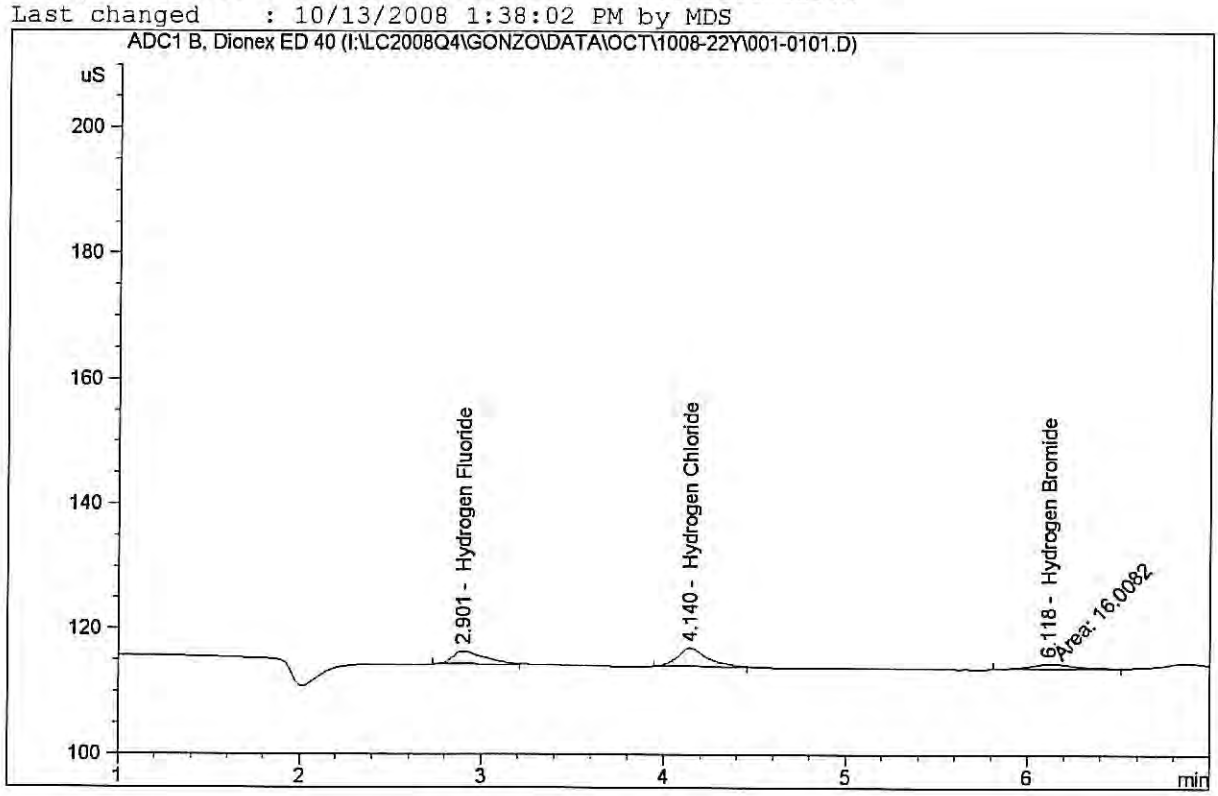


Hydrogen Chloride at exp. RT: 4.109
ADC1 B, Dionex ED 40
Correlation: 0.99894
Residual Std. Dev.: 23.72875
Formula: y = mx + b
m: 78.58450
b: -1.75310
x: Amount[ug/mL]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.182041
Level 3 : 0.095503
Level 4 : 0.066567
Level 5 : 0.047246
Level 6 : 0.033534



Hydrogen Bromide at exp. RT: 6.045
ADC1 B, Dionex ED 40
Correlation: 0.99989
Residual Std. Dev.: 2.68486
Formula: y = mx + b
m: 32.09848
b: 1.70873
x: Amount[ug/mL]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.182158
Level 3 : 0.095435
Level 4 : 0.066515
Level 5 : 0.047255
Level 6 : 0.033511

```
==========================================================================
Injection Date  : 10/10/2008 8:43:47 AM          Seq. Line :   1
Sample Name     : Standard 1                      Location : Vial 1
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

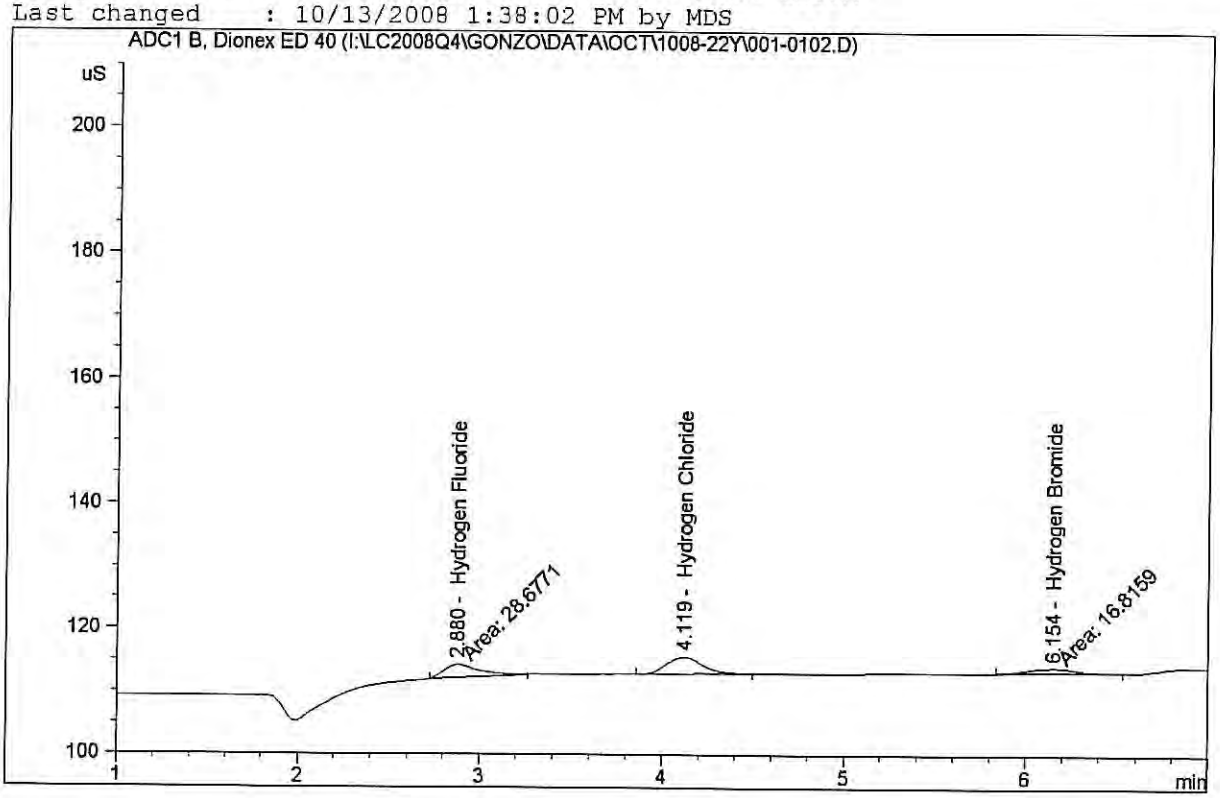
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.901 BB       27.07996 8.26930e-3 2.23932e-1     Hydrogen Fluoride
  4.140 BB       37.27600 1.33236e-2 4.96651e-1     Hydrogen Chloride
  6.118 MM       16.00819 2.78287e-2 4.45487e-1     Hydrogen Bromide

Totals :                                 1.16607

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 8:52:42 AM          Seq. Line :   1
Sample Name     : Standard 1                      Location : Vial 1
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

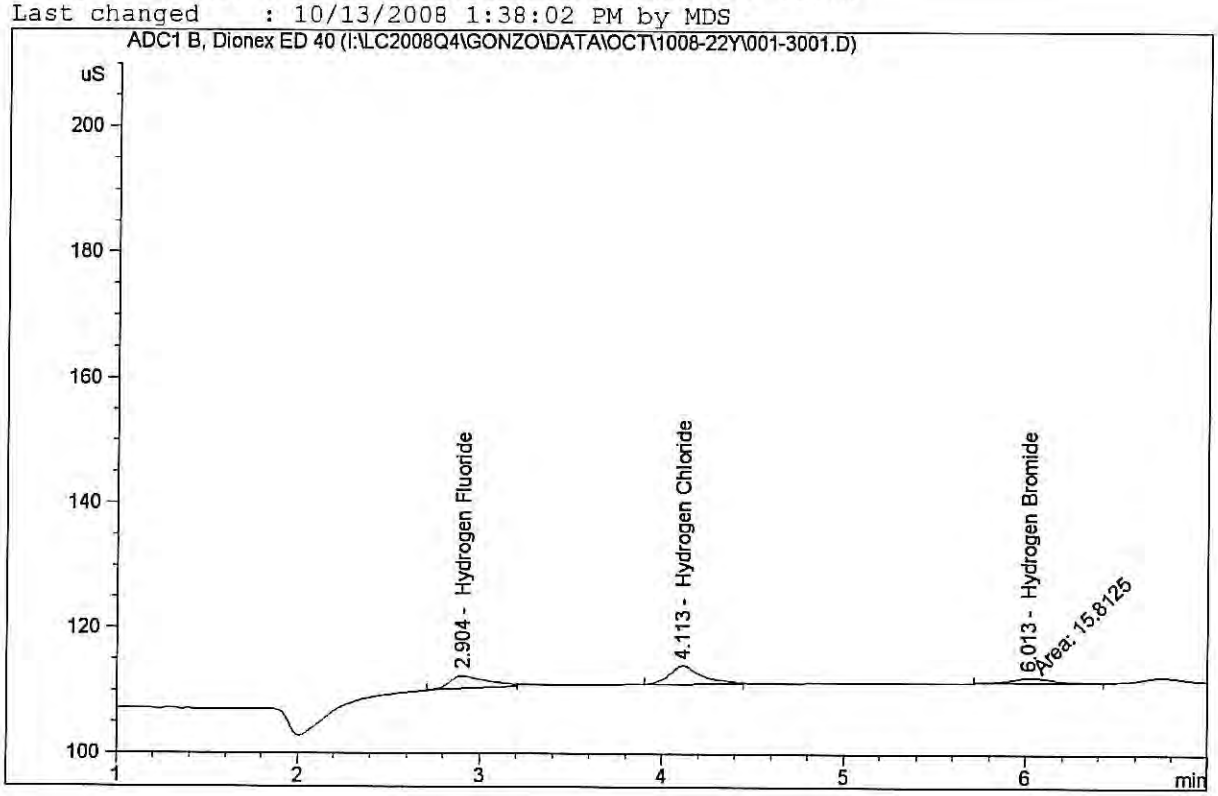
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  2.880 MM       28.67711 8.30132e-3 2.38058e-1     Hydrogen Fluoride
  4.119 BB       37.22715 1.33244e-2 4.96030e-1     Hydrogen Chloride
  6.154 MM       16.81589 2.79884e-2 4.70650e-1     Hydrogen Bromide

Totals :                                 1.20474

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 9:46:10 PM          Seq. Line :  30
Sample Name     : Standard 1                      Location : Vial 1
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

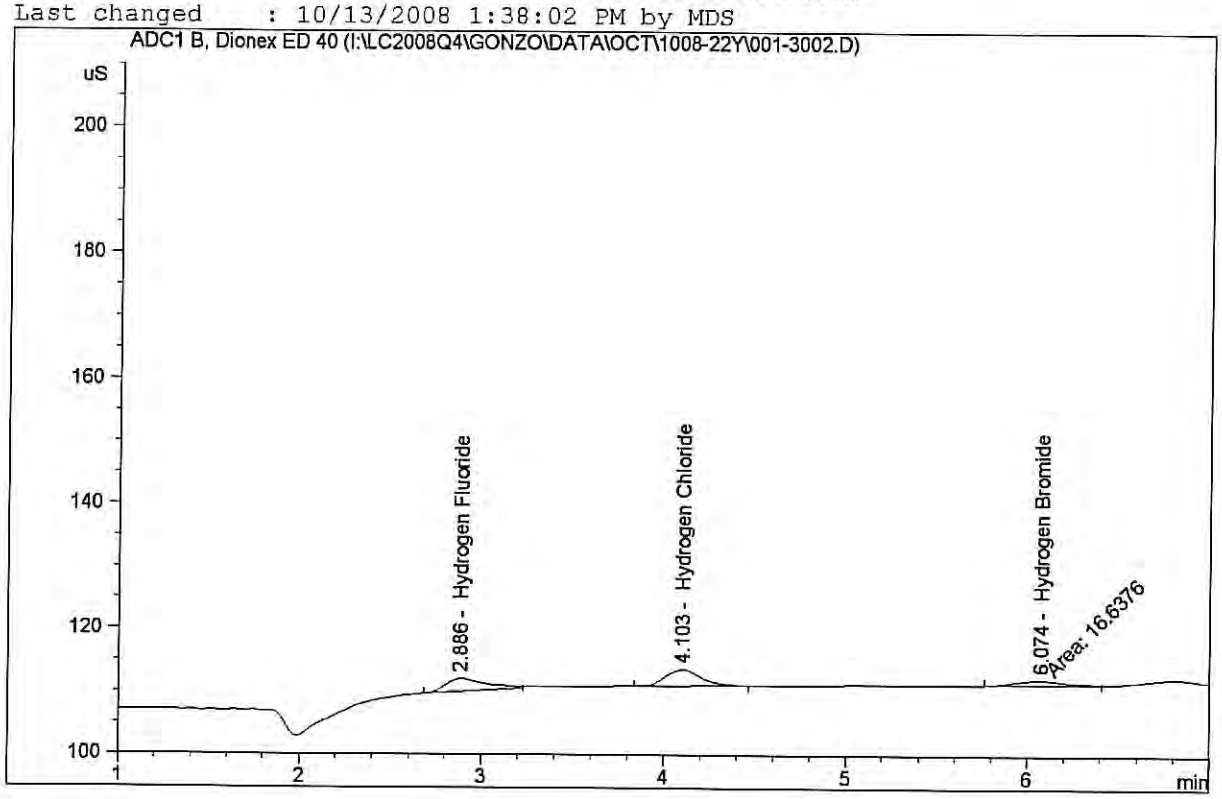
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.904 BB       30.91696 8.37603e-3 2.58961e-1     Hydrogen Fluoride
  4.113 BB       37.13653 1.33259e-2 4.94877e-1     Hydrogen Chloride
  6.013 MM       15.81254 2.77876e-2 4.39392e-1     Hydrogen Bromide

Totals :                                1.19323

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 9:55:03 PM          Seq. Line :  30
Sample Name     : Standard 1                      Location : Vial 1
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

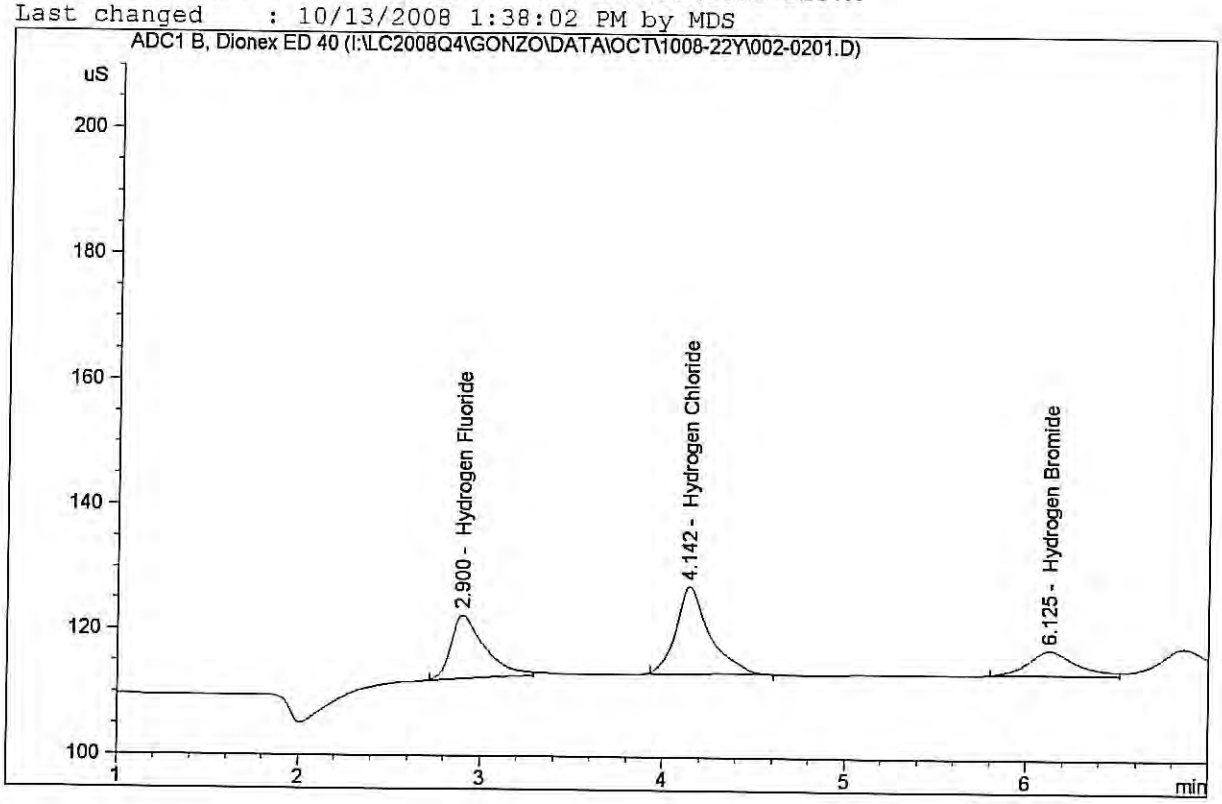
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  2.886 BB       33.37997 8.44661e-3 2.81948e-1     Hydrogen Fluoride
  4.103 BB       35.83940 1.33476e-2 4.78370e-1     Hydrogen Chloride
  6.074 MM       16.63763 2.79545e-2 4.65097e-1     Hydrogen Bromide

Totals :                                 1.22542

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==================================================================
Injection Date  : 10/10/2008 9:01:40 AM          Seq. Line :   2
Sample Name     : Standard 2                      Location : Vial 2
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==================================================================
                      External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

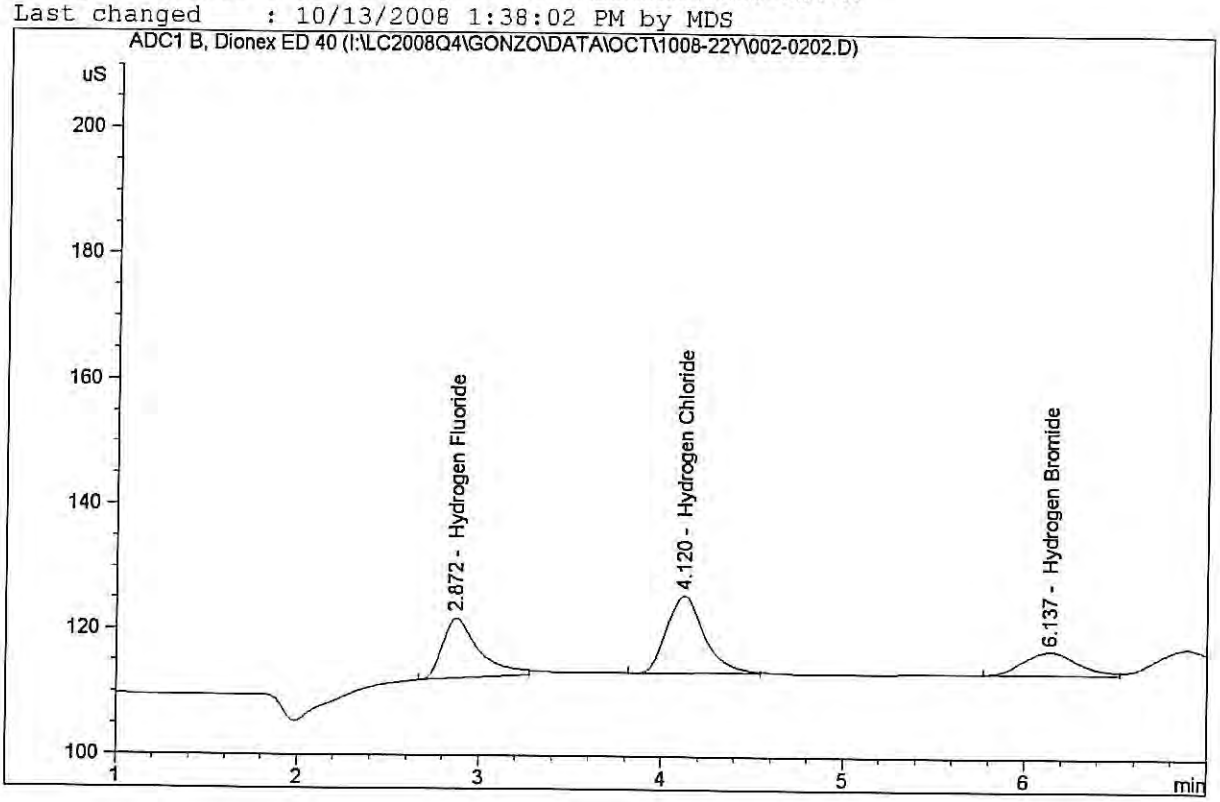
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.900 BB      131.05283 9.10692e-3    1.19349      Hydrogen Fluoride
  4.142 BB      181.68993 1.28479e-2    2.33434      Hydrogen Chloride
  6.125 BV       77.34501 3.04659e-2    2.35638      Hydrogen Bromide

Totals :                                5.88421

 Results obtained with enhanced integrator!
==================================================================
                     *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 9:10:33 AM          Seq. Line :   2
Sample Name     : Standard 2                      Location : Vial 2
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  2.872 BB      131.42128 9.10755e-3    1.19693     Hydrogen Fluoride
  4.120 PB      179.46944 1.28495e-2    2.30608     Hydrogen Chloride
  6.137 BV       78.24472 3.04738e-2    2.38441     Hydrogen Bromide

Totals :                                5.88742

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

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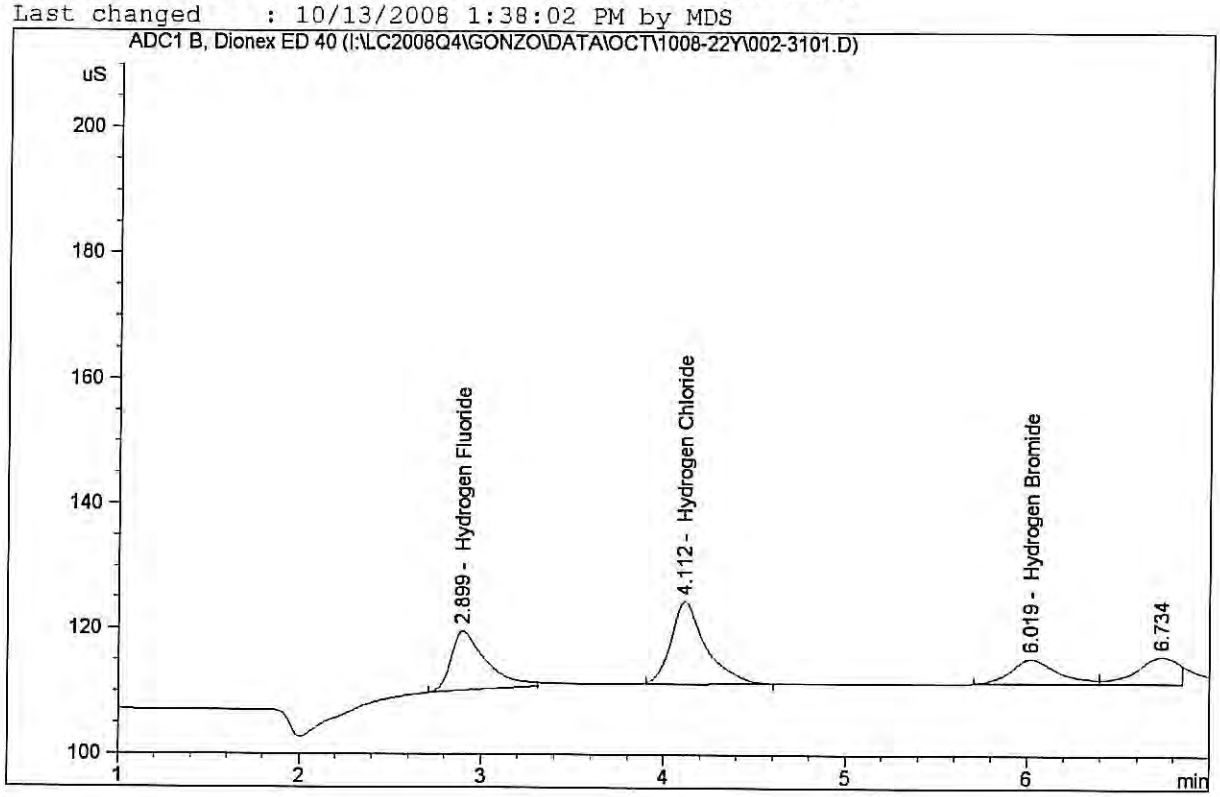
Injection Date : 10/10/2008 10:03:54 PM Seq. Line : 31
Sample Name : Standard 2 Location : Vial 2
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed : 10/13/2008 1:38:02 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 1:35:44 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
2.899	BB	129.39874	9.10403e-3	1.17805		Hydrogen Fluoride
4.112	BB	177.04762	1.28512e-2	2.27527		Hydrogen Chloride
6.019	BV	74.40536	3.04387e-2	2.26480		Hydrogen Bromide

Totals : 5.71812

Results obtained with enhanced integrator!

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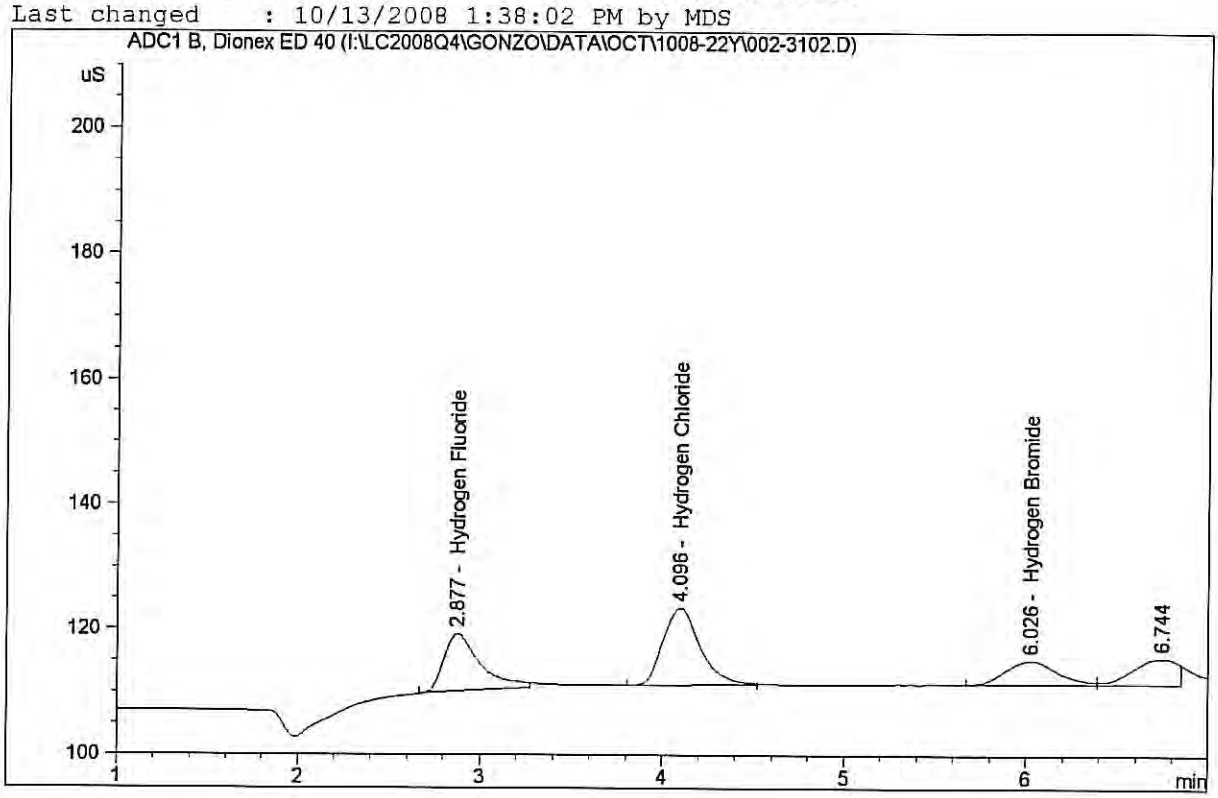
*** End of Report ***

```
==========================================================================
Injection Date  : 10/10/2008 10:12:47 PM          Seq. Line :  31
Sample Name     : Standard 2                       Location : Vial 2
Acq. Operator   : MDS                                  Inj :  2
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

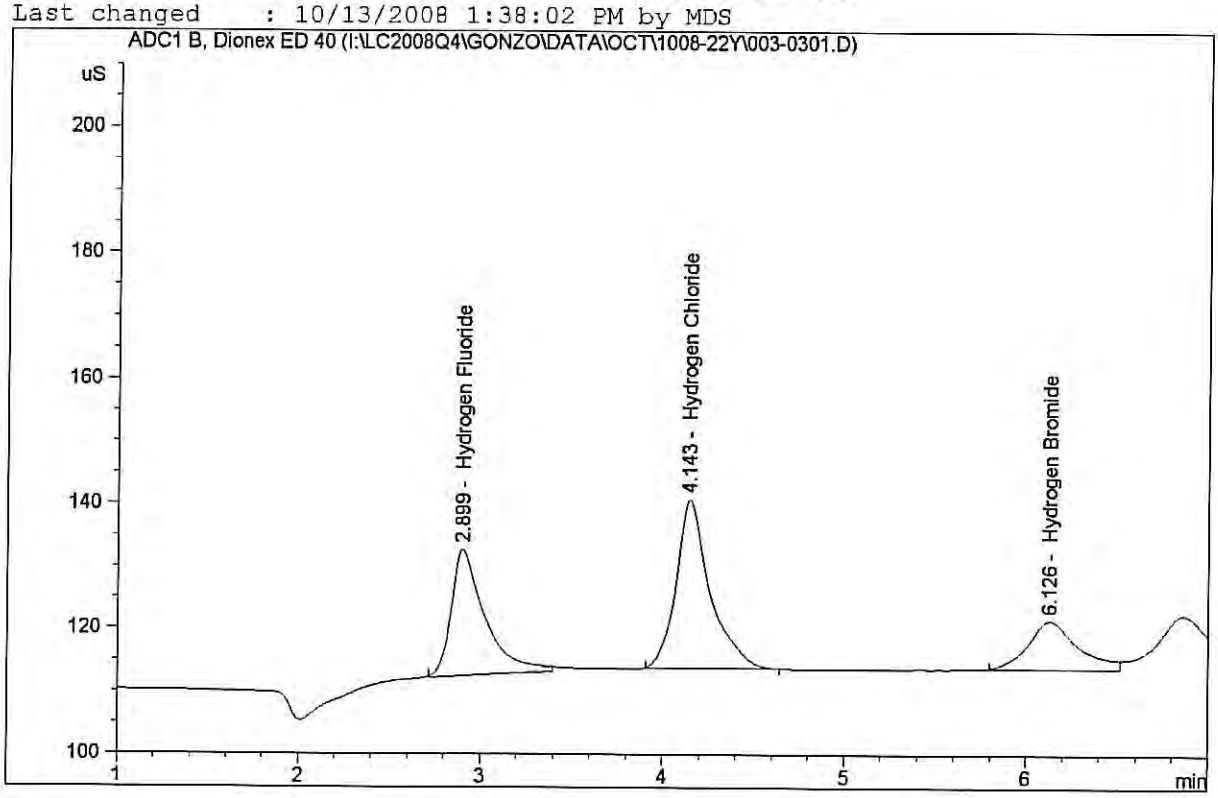
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.877 BB      128.48602 9.10241e-3    1.16953     Hydrogen Fluoride
  4.096 PB      174.95706 1.28527e-2    2.24866     Hydrogen Chloride
  6.026 BV       76.49343 3.04582e-2    2.32985     Hydrogen Bromide

Totals :                                5.74805

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 9:19:27 AM          Seq. Line :   3
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

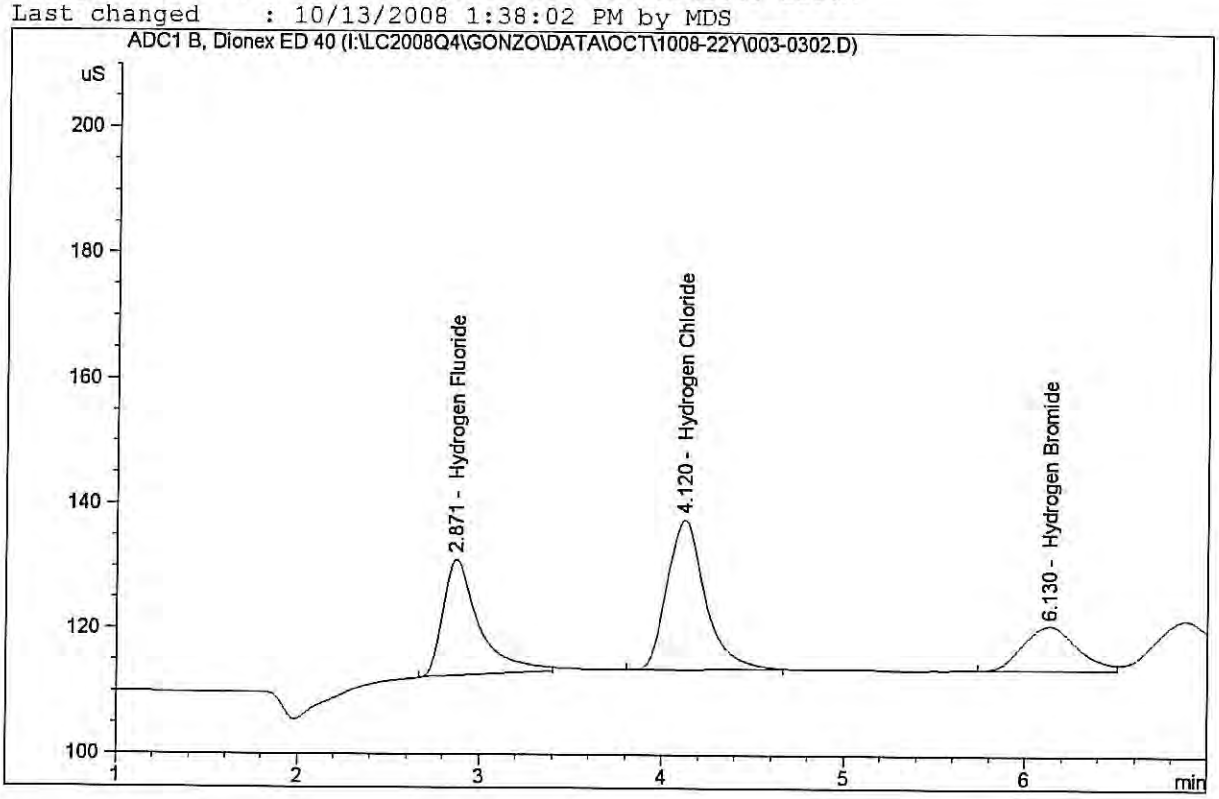
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  2.899 BB      257.81790 9.21787e-3    2.37653     Hydrogen Fluoride
  4.143 BB      352.17218 1.27885e-2    4.50375     Hydrogen Chloride
  6.126 BV      150.19145 3.07997e-2    4.62585     Hydrogen Bromide

Totals :                                11.50614

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 9:28:18 AM          Seq. Line :   3
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

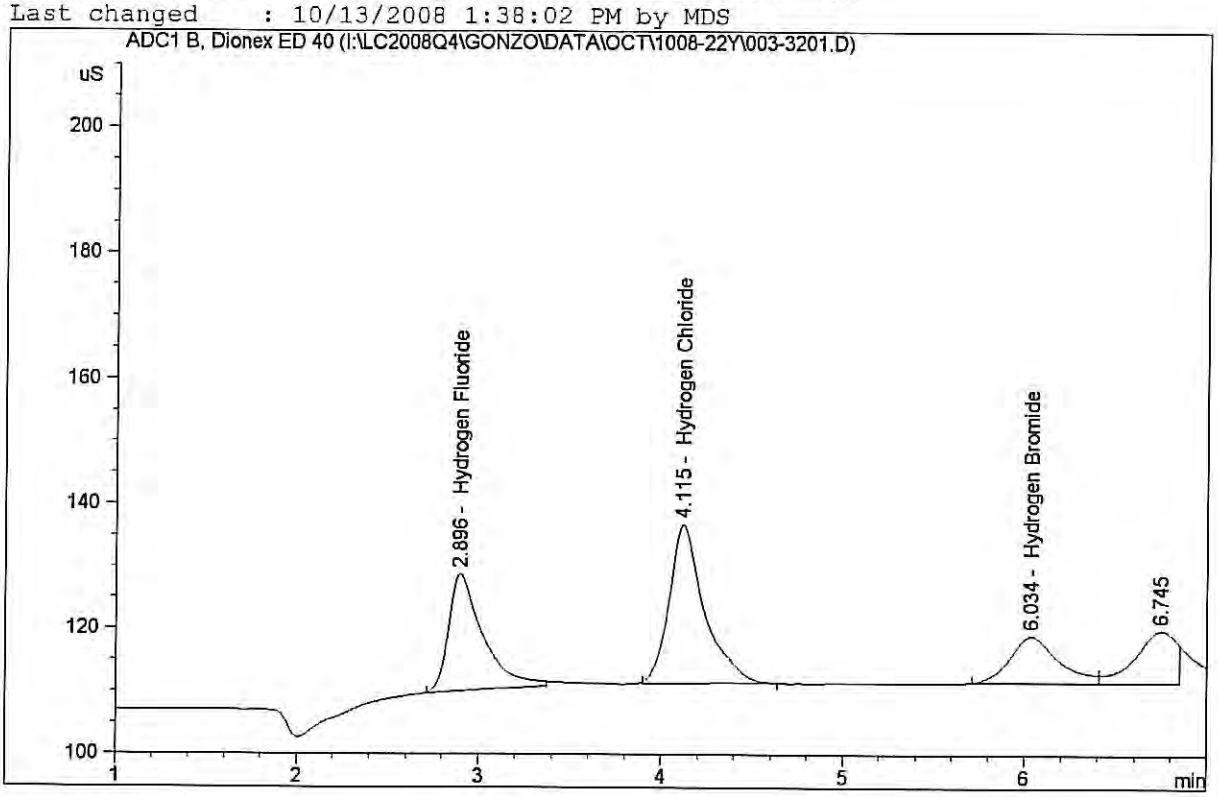
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.871 BB      256.14951 9.21712e-3    2.36096     Hydrogen Fluoride
  4.120 PB      351.24615 1.27887e-2    4.49197     Hydrogen Chloride
  6.130 BV      150.02679 3.07993e-2    4.62072     Hydrogen Bromide

Totals :                                11.47365

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 10:21:39 PM          Seq. Line :  32
Sample Name     : Standard 3                       Location : Vial 3
Acq. Operator   : MDS                                   Inj :   1
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

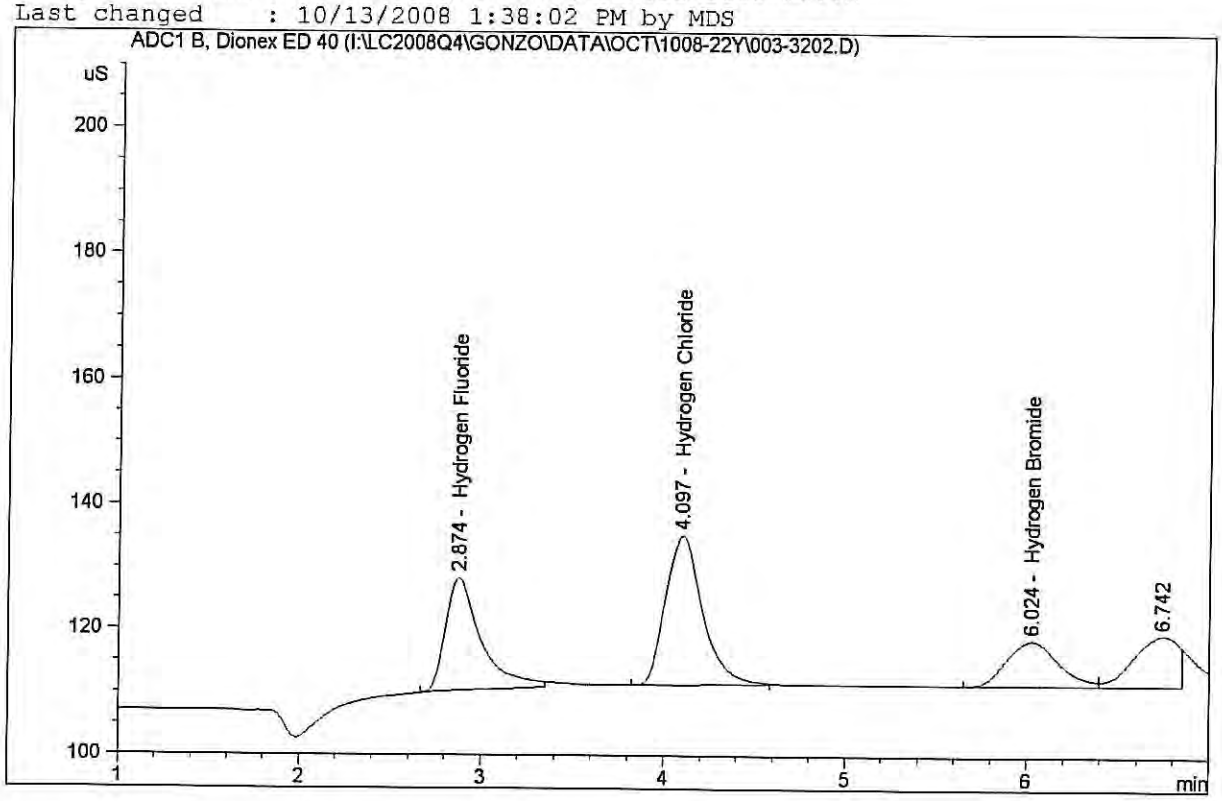
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.896 BB      247.58858 9.21313e-3    2.28107     Hydrogen Fluoride
  4.115 BB      343.68091 1.27901e-2    4.39570     Hydrogen Chloride
  6.034 BV      144.42712 3.07855e-2    4.44627     Hydrogen Bromide

Totals :                                11.12303

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 10:30:36 PM          Seq. Line :  32
Sample Name     : Standard 3                       Location : Vial 3
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

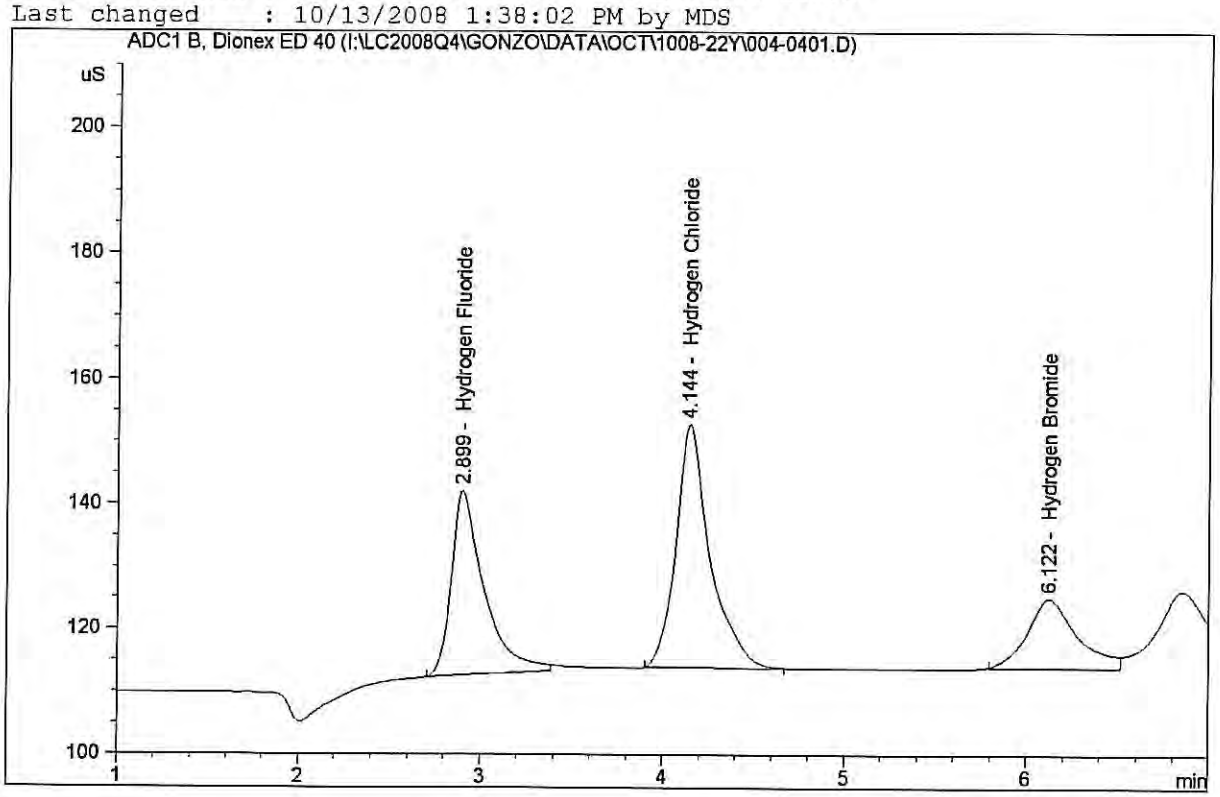
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.874 BB      244.82341 9.21178e-3    2.25526     Hydrogen Fluoride
  4.097 PB      341.90970 1.27904e-2    4.37316     Hydrogen Chloride
  6.024 PV      145.00644 3.07870e-2    4.46431     Hydrogen Bromide

Totals :                                11.09274

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 9:37:14 AM          Seq. Line :   4
Sample Name     : Standard 4                      Location : Vial 4
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

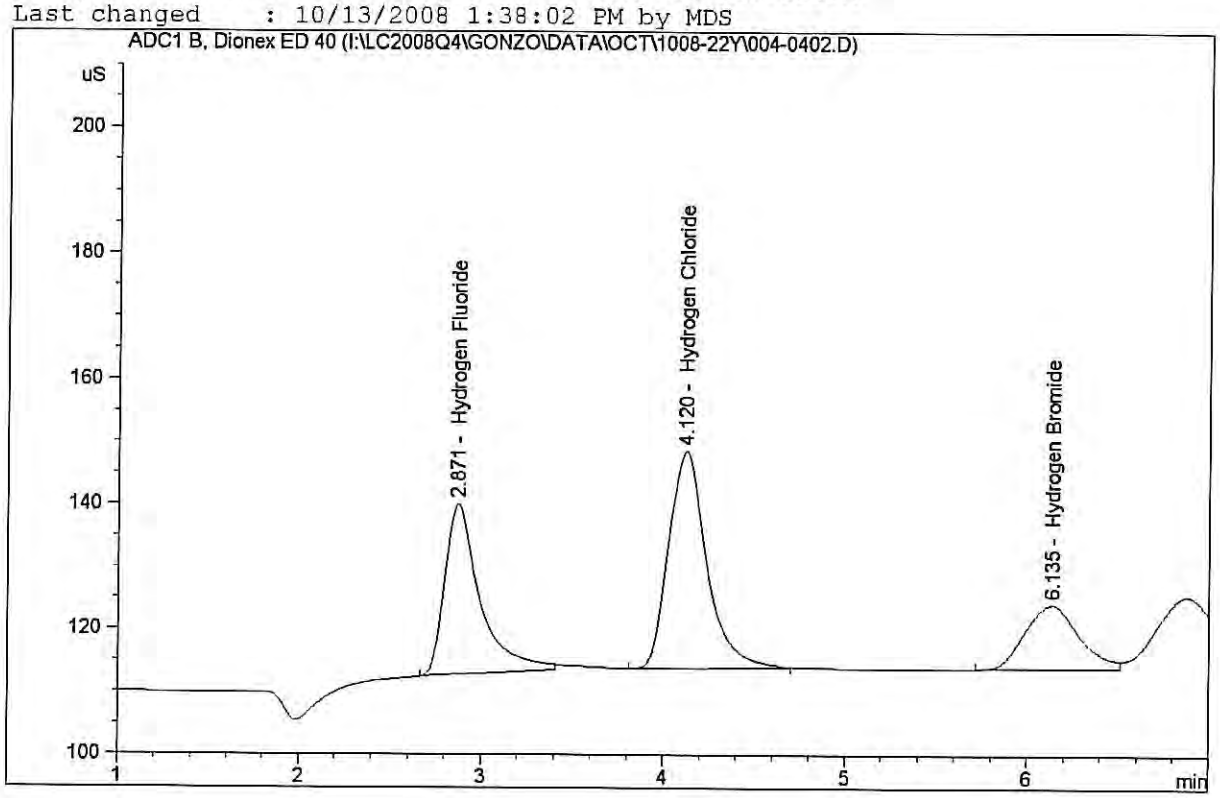
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.899 BB      366.81796 9.25196e-3    3.39378     Hydrogen Fluoride
  4.144 BB      510.09067 1.27689e-2    6.51329     Hydrogen Chloride
  6.122 BV      216.57455 3.09083e-2    6.69396     Hydrogen Bromide

Totals :                                16.60103

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 9:46:13 AM          Seq. Line :   4
Sample Name     : Standard 4                      Location : Vial 4
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

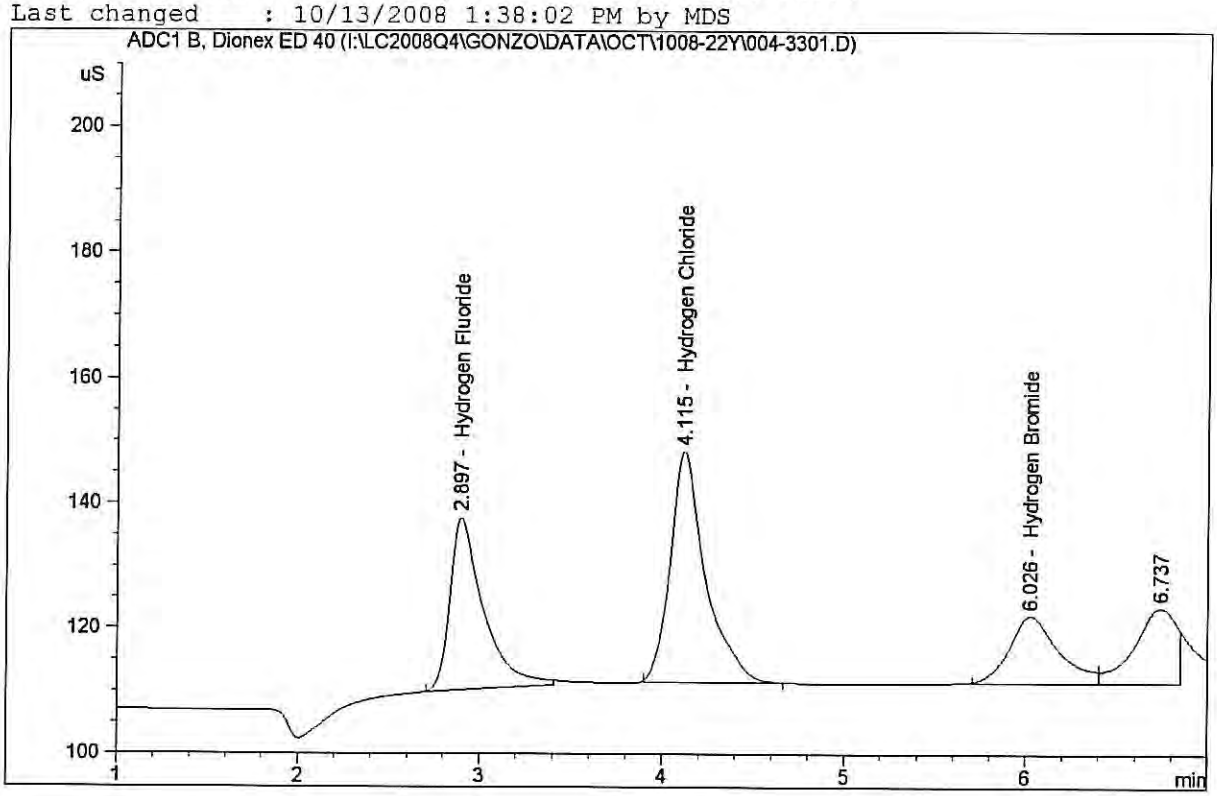
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.871 BB      364.58557 9.25146e-3    3.37295     Hydrogen Fluoride
  4.120 PB      507.40176 1.27691e-2    6.47907     Hydrogen Chloride
  6.135 BV      214.06905 3.09054e-2    6.61590     Hydrogen Bromide

Totals :                                16.46792

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 10:39:34 PM          Seq. Line :  33
Sample Name     : Standard 4                       Location : Vial 4
Acq. Operator   : MDS                                  Inj :   1
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

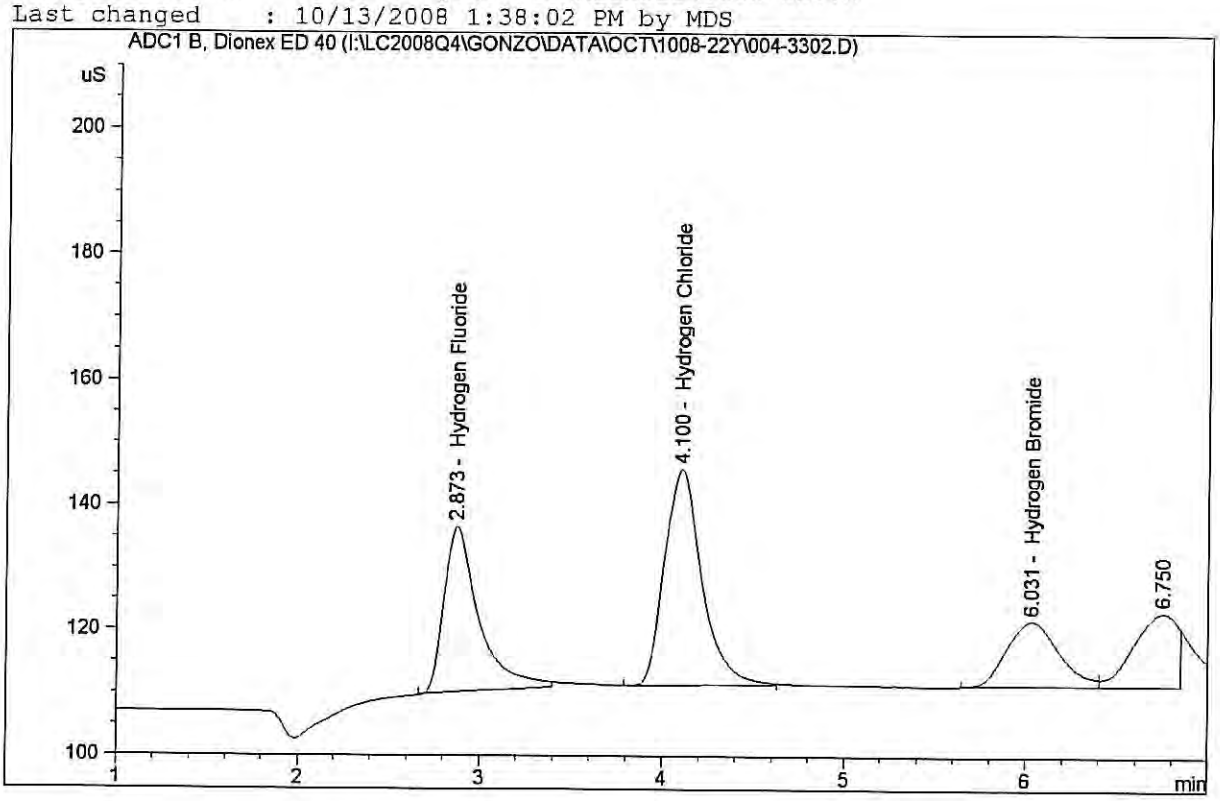
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  2.897 BB      354.97626 9.24927e-3    3.28327     Hydrogen Fluoride
  4.115 BB      499.76730 1.27698e-2    6.38193     Hydrogen Chloride
  6.026 BV      207.52055 3.08976e-2    6.41189     Hydrogen Bromide

Totals :                                16.07708

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 10:48:26 PM        Seq. Line :  33
Sample Name     : Standard 4                     Location : Vial 4
Acq. Operator   : MDS                                Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

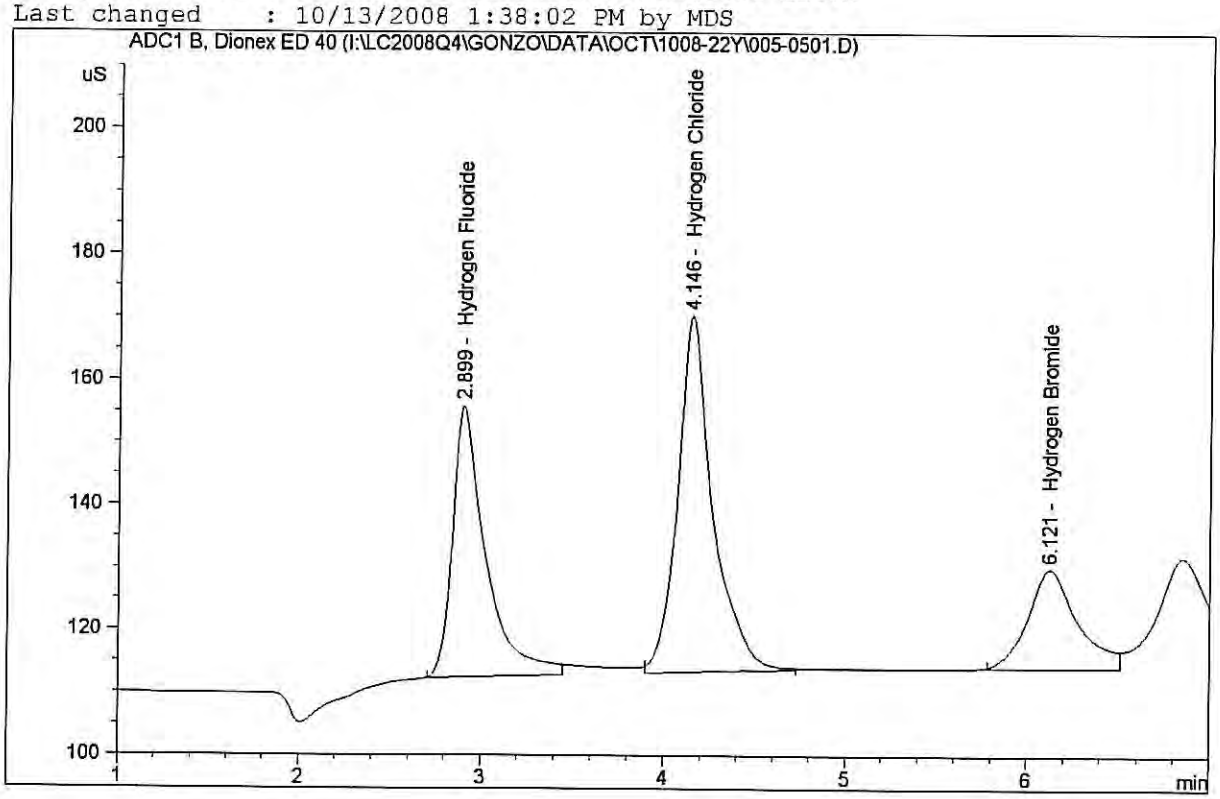
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.873 BB      353.99933 9.24904e-3    3.27415     Hydrogen Fluoride
  4.100 PB      495.18411 1.27702e-2    6.32360     Hydrogen Chloride
  6.031 BV      209.51299 3.09000e-2    6.47396     Hydrogen Bromide

Totals :                                16.07172

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 9:55:07 AM          Seq. Line :   5
Sample Name     : Standard 5                      Location : Vial 5
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

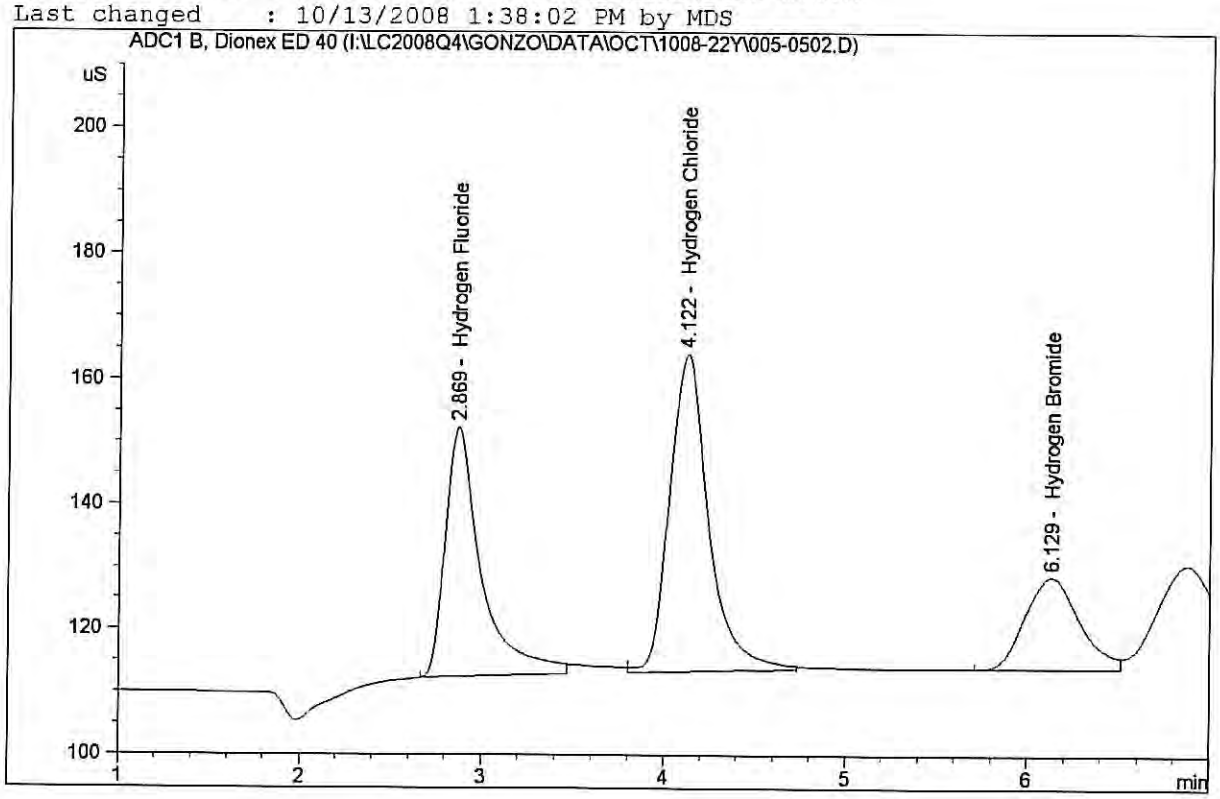
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  2.899 BB      545.30420 9.27834e-3    5.05952     Hydrogen Fluoride
  4.146 BB      767.67322 1.27542e-2    9.79107     Hydrogen Chloride
  6.121 BV      308.92505 3.09818e-2    9.57106     Hydrogen Bromide

Totals :                                24.42165

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 10:03:59 AM          Seq. Line :   5
Sample Name     : Standard 5                       Location : Vial 5
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

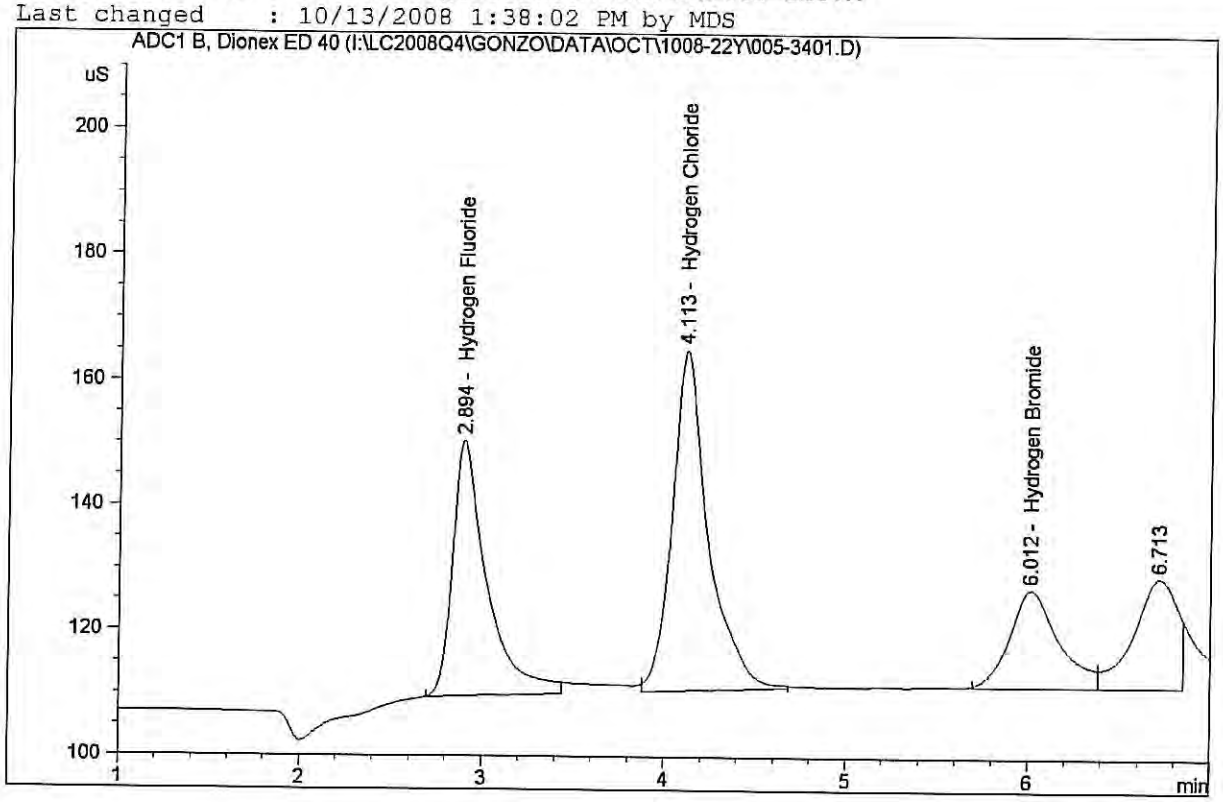
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.869 BB      543.10034 9.27812e-3    5.03895     Hydrogen Fluoride
  4.122 BB      764.38885 1.27543e-2    9.74928     Hydrogen Chloride
  6.129 BV      305.27386 3.09797e-2    9.45731     Hydrogen Bromide

Totals :                                24.24553

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 10:57:12 PM        Seq. Line :  34
Sample Name     : Standard 5                     Location : Vial 5
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

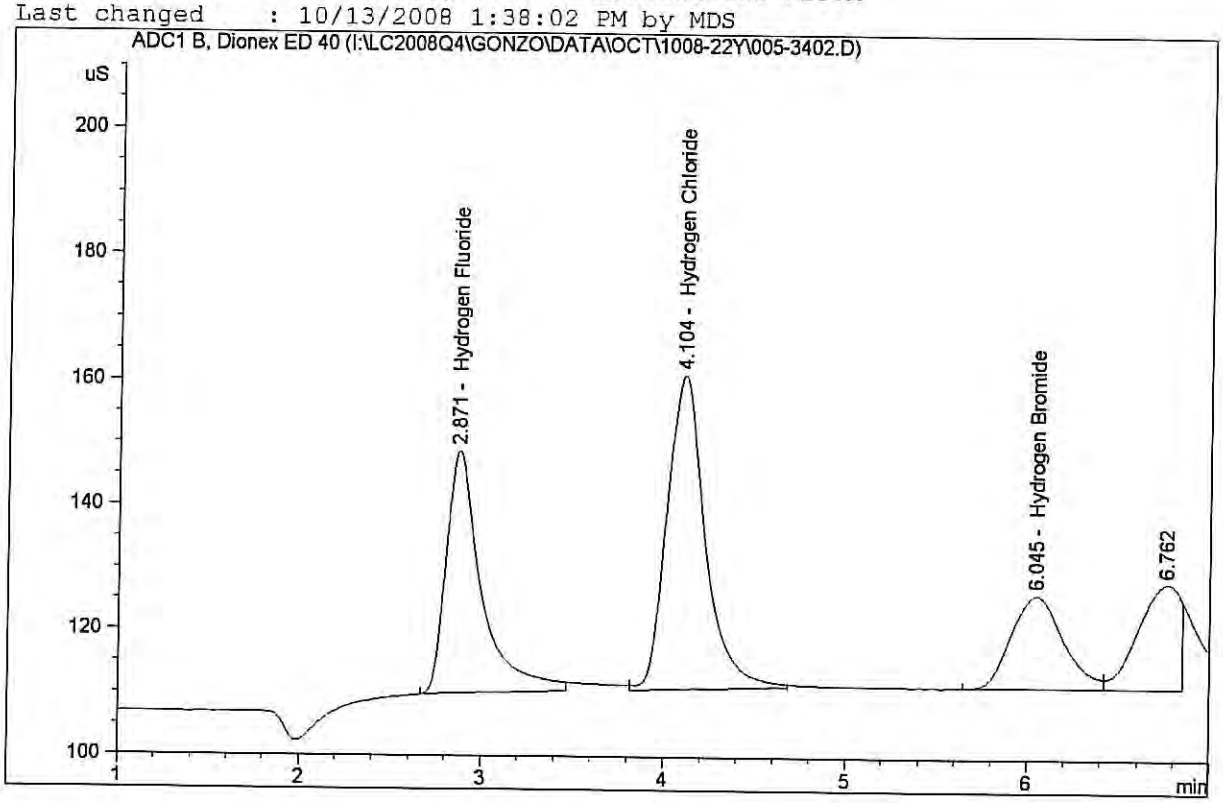
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.894 BB      531.11322 9.27690e-3    4.92708     Hydrogen Fluoride
  4.113 BB      754.54309 1.27547e-2    9.62399     Hydrogen Chloride
  6.012 BV      295.86142 3.09742e-2    9.16407     Hydrogen Bromide

Totals :                                23.71514

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 11:06:12 PM          Seq. Line :  34
Sample Name     : Standard 5                       Location : Vial 5
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

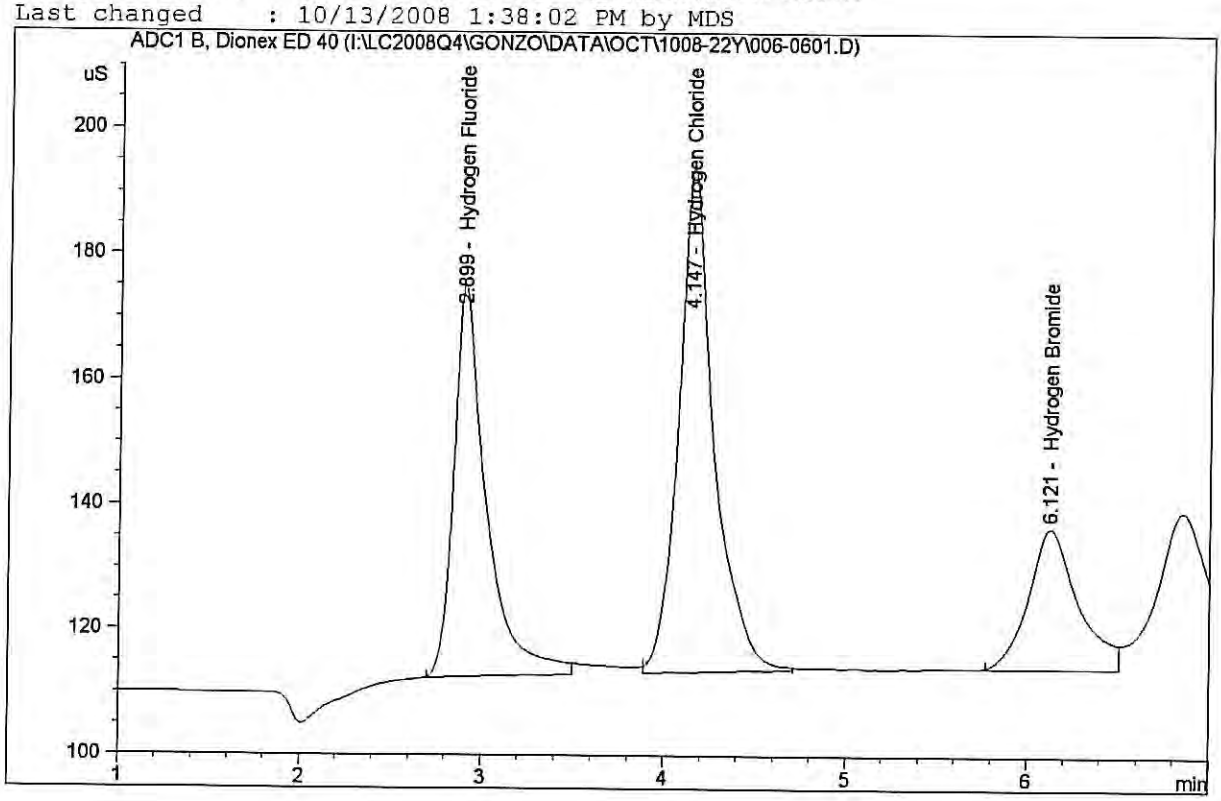
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.871 BB      523.12927 9.27605e-3    4.85257     Hydrogen Fluoride
  4.104 BB      740.80865 1.27553e-2    9.44921     Hydrogen Chloride
  6.045 BV      297.81195 3.09754e-2    9.22484     Hydrogen Bromide

Totals :                                23.52662

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 10:12:52 AM          Seq. Line :   6
Sample Name     : Standard 6                       Location : Vial 6
Acq. Operator   : MDS                                   Inj :   1
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

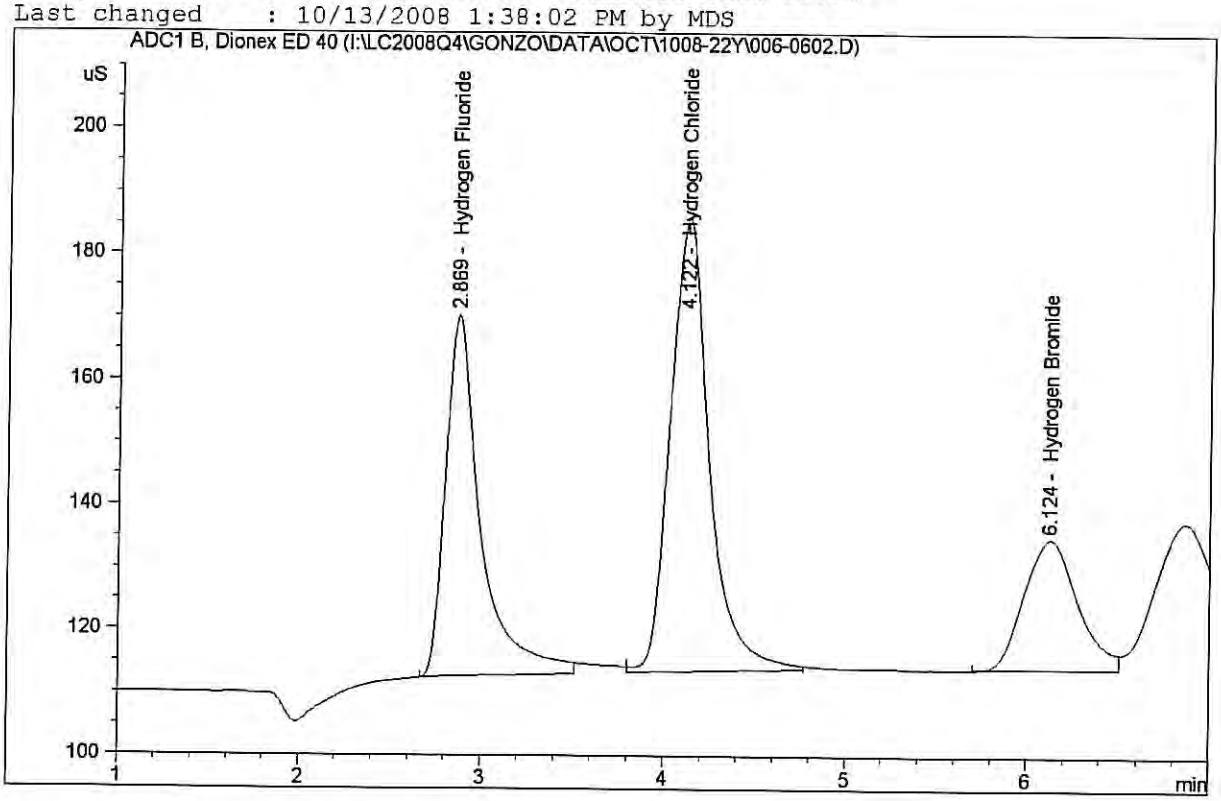
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.899 BB      772.48480 9.29429e-3    7.17970     Hydrogen Fluoride
  4.147 BB     1087.12183 1.27457e-2   13.85610     Hydrogen Chloride
  6.121 BV      431.88321 3.10309e-2   13.40171     Hydrogen Bromide

Totals :                                34.43751

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 10:21:47 AM          Seq. Line :   6
Sample Name     : Standard 6                       Location : Vial 6
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

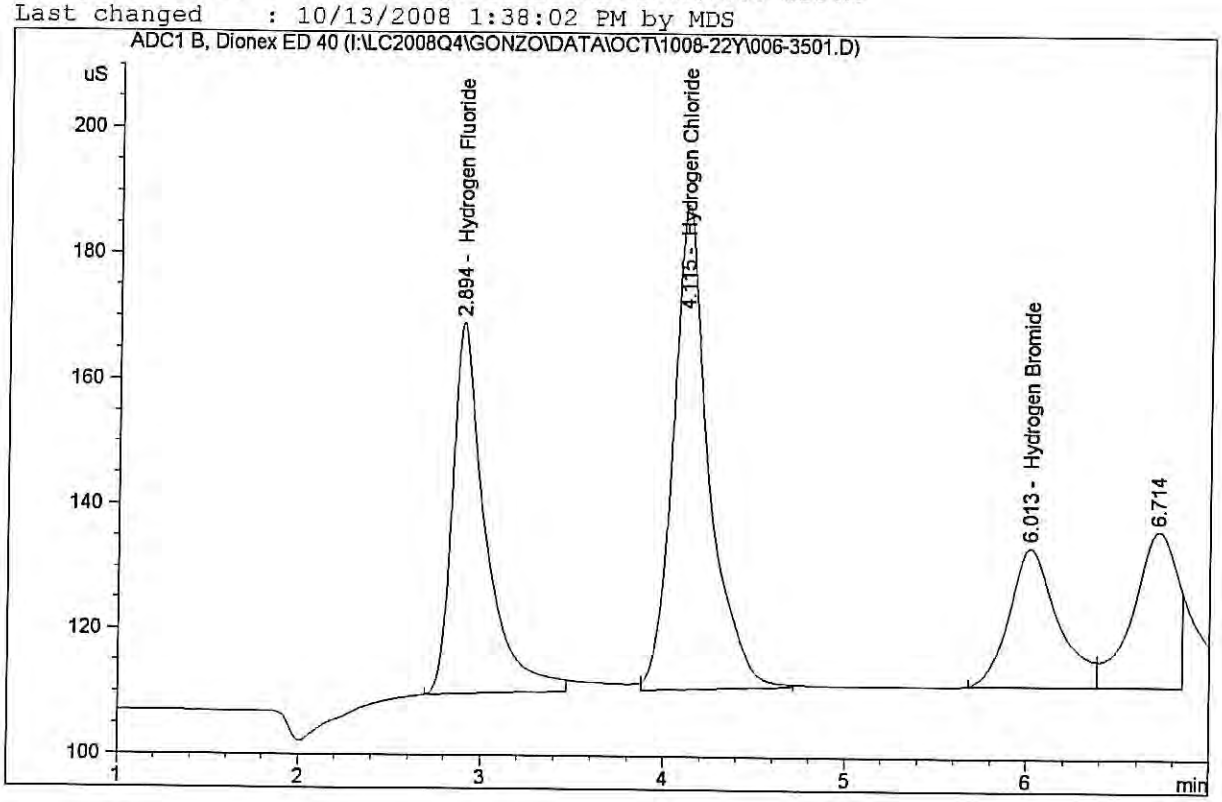
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.869 BB      767.03015 9.29402e-3    7.12879     Hydrogen Fluoride
  4.122 BB     1083.36365 1.27457e-2   13.80828     Hydrogen Chloride
  6.124 PV      430.47882 3.10305e-2   13.35796     Hydrogen Bromide

Totals :                                34.29503

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==================================================================
Injection Date  : 10/10/2008 11:15:04 PM        Seq. Line :  35
Sample Name     : Standard 6                     Location : Vial 6
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==================================================================
                      External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

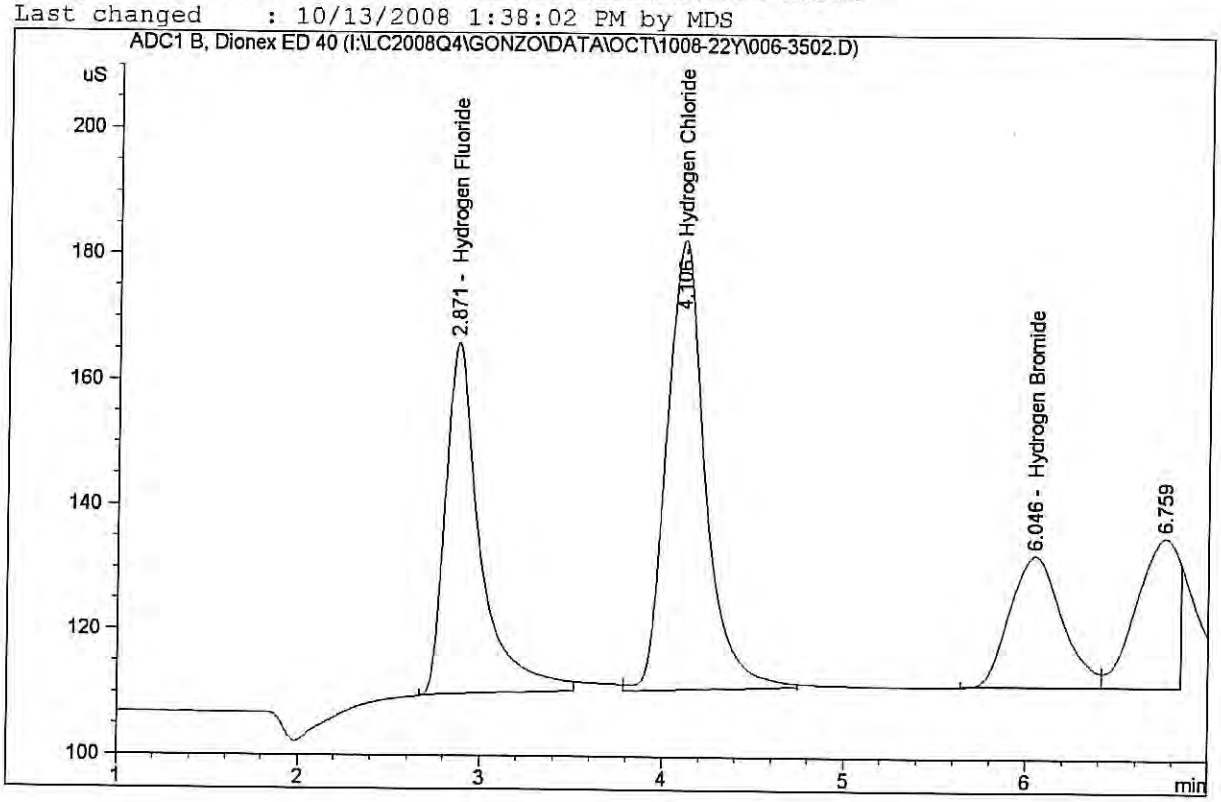
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  2.894 BB      747.52655 9.29302e-3    6.94678     Hydrogen Fluoride
  4.115 BB     1066.87720 1.27461e-2   13.59849     Hydrogen Chloride
  6.013 BV      418.00403 3.10268e-2   12.96932     Hydrogen Bromide

Totals :                               33.51458

 Results obtained with enhanced integrator!
==================================================================
                     *** End of Report ***
```

```
==================================================================
Injection Date  : 10/10/2008 11:23:56 PM        Seq. Line :  35
Sample Name     : Standard 6                     Location : Vial 6
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==================================================================
                      External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

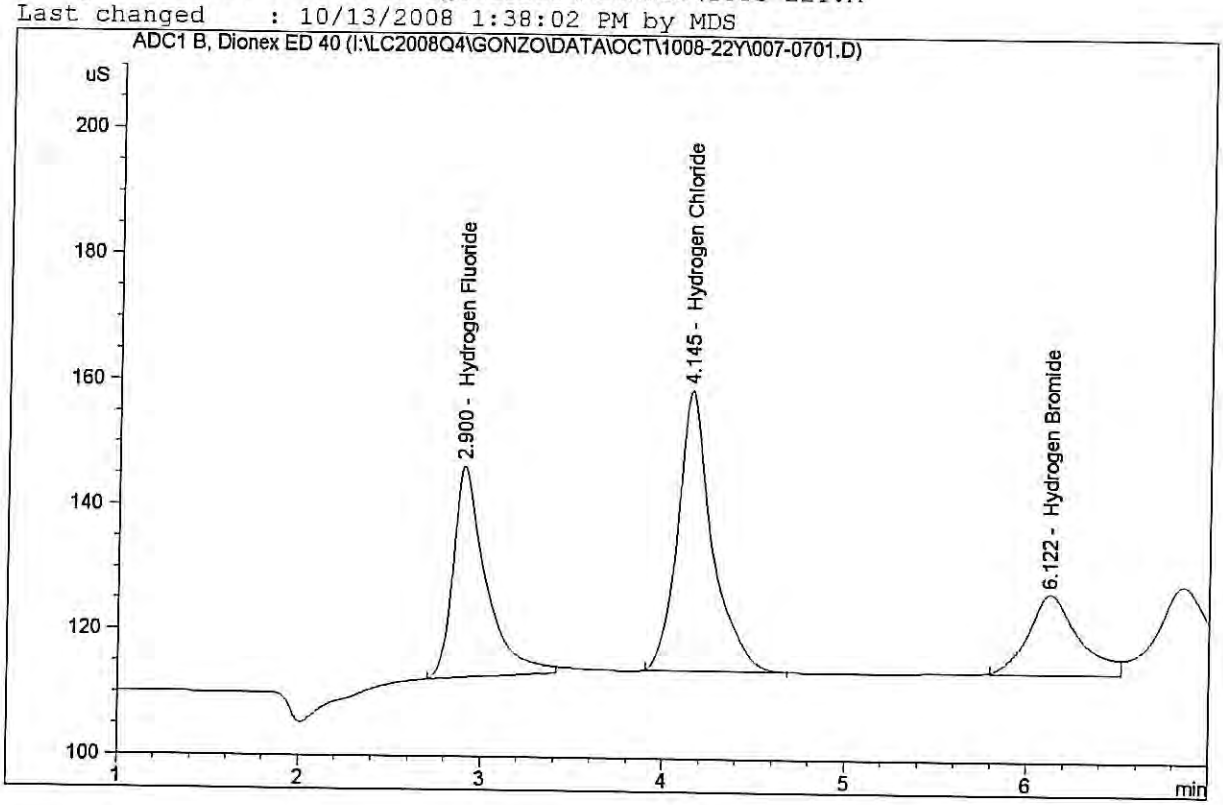
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.871 BB      745.58301 9.29291e-3    6.92864     Hydrogen Fluoride
  4.106 BB     1063.44556 1.27461e-2   13.55482     Hydrogen Chloride
  6.046 BV      422.19022 3.10280e-2   13.09973     Hydrogen Bromide

Totals :                                33.58319

 Results obtained with enhanced integrator!
==================================================================
                     *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 10:30:38 AM          Seq. Line :   7
Sample Name     : Second Source                    Location : Vial 7
Acq. Operator   : MDS                                  Inj :   1
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

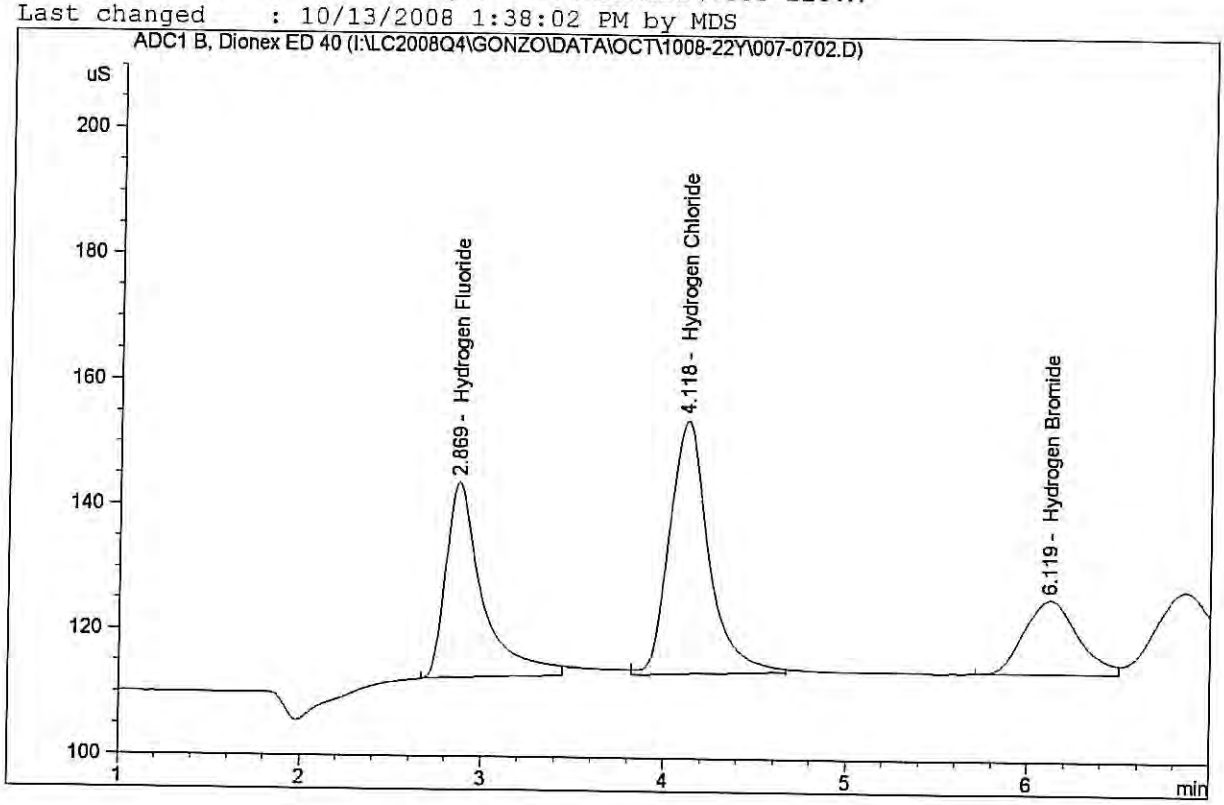
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.900 BB      421.85052 9.26247e-3    3.90738     Hydrogen Fluoride
  4.145 BB      589.59924 1.27630e-2    7.52505     Hydrogen Chloride
  6.122 BV      248.58453 3.09400e-2    7.69120     Hydrogen Bromide

Totals :                                19.12363

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 10:39:28 AM          Seq. Line :   7
Sample Name     : Second Source                    Location : Vial 7
Acq. Operator   : MDS                                  Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

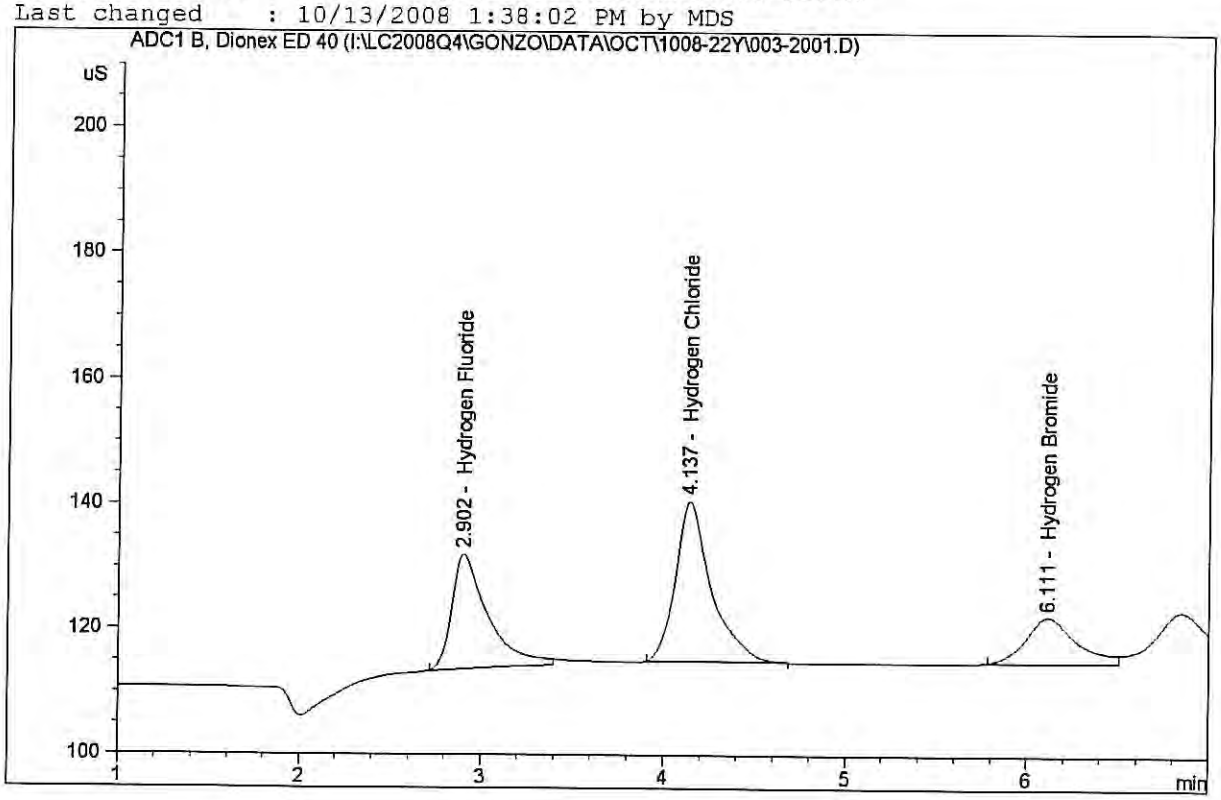
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  2.869 BB      436.20340 9.26478e-3    4.04133      Hydrogen Fluoride
  4.118 BB      610.33618 1.27617e-2    7.78893      Hydrogen Chloride
  6.119 BV      245.87801 3.09376e-2    7.60688      Hydrogen Bromide

Totals :                                19.43714

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==================================================================
Injection Date  : 10/10/2008 6:48:37 PM          Seq. Line :  20
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==================================================================
                     External Standard Report
==================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Monday, October 13, 2008 1:35:44 PM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

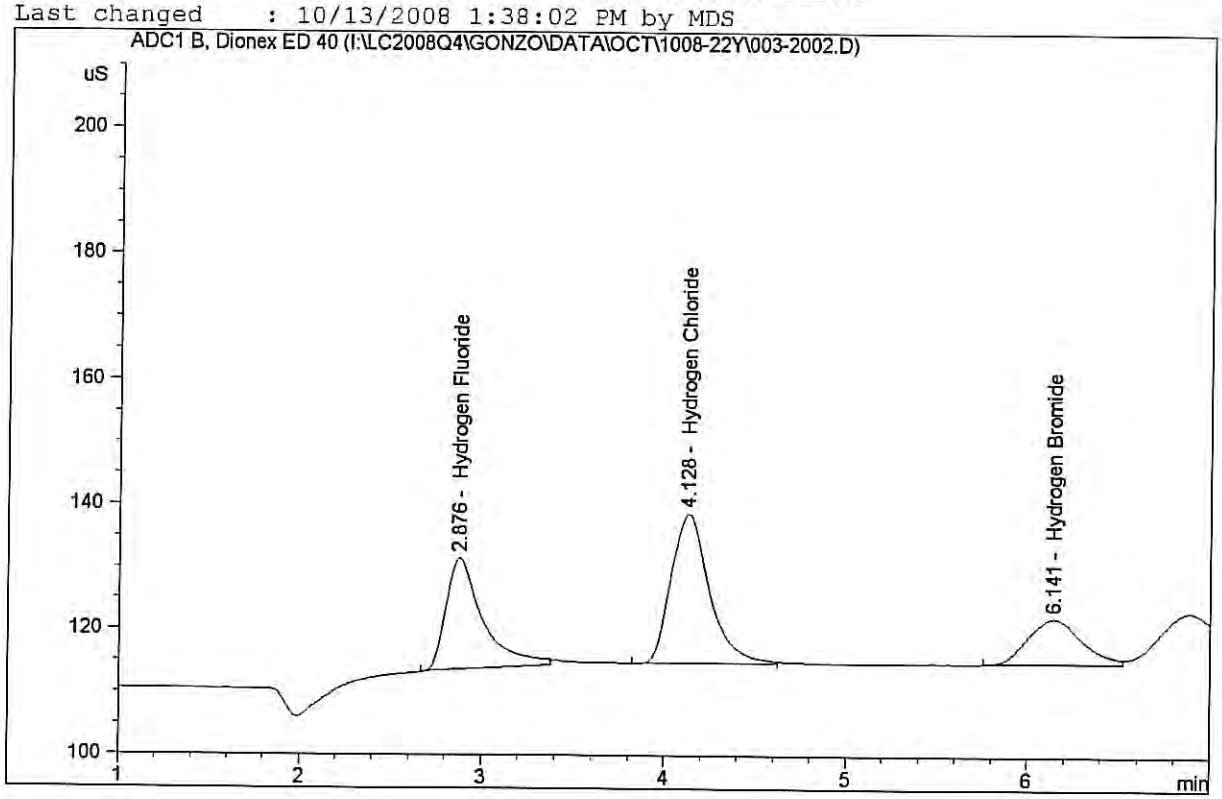
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.902 BB      251.86543 9.21516e-3    2.32098     Hydrogen Fluoride
  4.137 BB      353.13641 1.27883e-2    4.51602     Hydrogen Chloride
  6.111 BV      146.92604 3.07918e-2    4.52412     Hydrogen Bromide

Totals :                                11.36112

 Results obtained with enhanced integrator!
==================================================================
                      *** End of Report ***
```

```
==================================================================
Injection Date  : 10/10/2008 6:57:33 PM          Seq. Line :  20
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22Y.M
Last changed    : 10/13/2008 1:38:02 PM by MDS
```




```
==================================================================
                    External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 1:35:44 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  2.876 BB      249.48161 9.21404e-3    2.29873     Hydrogen Fluoride
  4.128 PB      350.58881 1.27888e-2    4.48361     Hydrogen Chloride
  6.141 BV      149.40140 3.07978e-2    4.60124     Hydrogen Bromide

Totals :                                11.38357

 Results obtained with enhanced integrator!
==================================================================
                    *** End of Report ***
```

Method Information

Dionex IonPac AS-14A 4-mm analytical (4x250mm) column.
Flow rate 1.2 mL/min
8mM Na2CO3/1mM NaHCO3 mobile phase
Suppressed anion conductivity detection

==========

ANALOG DIGITAL CONVERTER

==========

	Signal 1
Description:	Dionex ED 40
Source:	Signal
Unit:	uS
Units/Volt:	1000.000
Peakwidth (Data Rate):	0.027 Min (10.00 Hz)
Stop Time:	No Limit
Data Storage:	All

Start Signal Source: External Device Will Start 35900

Timed Event Table:
<no events>

```
=====================================================================
                        1100 Quaternary Pump 1
=====================================================================

Control
    Column Flow             :      1.200 ml/min
    Stoptime                :          7.00 min
    Posttime                :      Off

Solvents
    Solvent A               :      100.0 % (8.0mM Na2CO3/1.0mM NaHCO3)
    Solvent B               :      Off
    Solvent C               :        0.0 % (8.0mM Na2CO3/1.0mM NaHCO3)
    Solvent D               :      Off

PressureLimits
    Minimum Pressure        :        0 bar
    Maximum Pressure        :      400 bar


Auxiliary
    Maximal Flow Ramp       :      100.00 ml/min^2
    Primary Channel         :      Auto
    Compressibility         :       83*10^-6/bar
    Minimal Stroke          :      Auto

Store Parameters
    Store Ratio A           :      Yes
    Store Ratio B           :      Yes
    Store Ratio C           :      Yes
    Store Ratio D           :      Yes
    Store Flow              :      Yes
    Store Pressure          :      Yes


Agilent 1100 Contacts Option
============================

    Contact 1               :      Open
    Contact 2               :      Open
    Contact 3               :      Open
    Contact 4               :      Open


=====================================================================
                        1100 Quaternary Pump 2
=====================================================================

Control
    Column Flow             :      1.200 ml/min
    Stoptime                :          7.00 min
    Posttime                :      Off

Solvents
    Solvent A               :        0.0 % ( )
    Solvent B               :      Off
    Solvent C               :      Off
    Solvent D               :      100.0 % (8mMNa2CO3\1mMNaHCO3)

PressureLimits
    Minimum Pressure        :        0 bar
    Maximum Pressure        :      400 bar


Auxiliary
    Maximal Flow Ramp       :      100.00 ml/min^2
    Primary Channel         :      Auto
```

Compressibility	:	100*10^-6/bar
Minimal Stroke	:	Auto

Store Parameters

Store Ratio A	:	Yes
Store Ratio B	:	Yes
Store Ratio C	:	Yes
Store Ratio D	:	Yes
Store Flow	:	Yes
Store Pressure	:	Yes

Agilent 1100 Contacts Option
==========

Contact 1	:	Open
Contact 2	:	Open
Contact 3	:	Open
Contact 4	:	Open

==========

Agilent 1100 Autosampler 1

==========

Injection

Injection Mode	:	Needle Wash
Injector volume	:	25.00 µl
Wash Vial	:	100
Optimization	:	none

Auxiliary

Drawspeed	:	100 µl/min
Ejectspeed	:	1000 µl/min
Draw position	:	2.0 mm

Time

Stoptime	:	As Pump
Posttime	:	Off

==========

Agilent 1100 Column Thermostat 1

==========

Temperature settings

Left temperature	:	30.0°C
Right temperature	:	Same as left
Enable analysis	:	When Temp. is within setpoint +/- 0.8°C
Store left temperature	:	No
Store right temperature	:	No

Time

Stoptime	:	As pump
Posttime	:	Off

Column Switching Valve	:	Use current

Sequence Table:

Method and Injection Info Part:

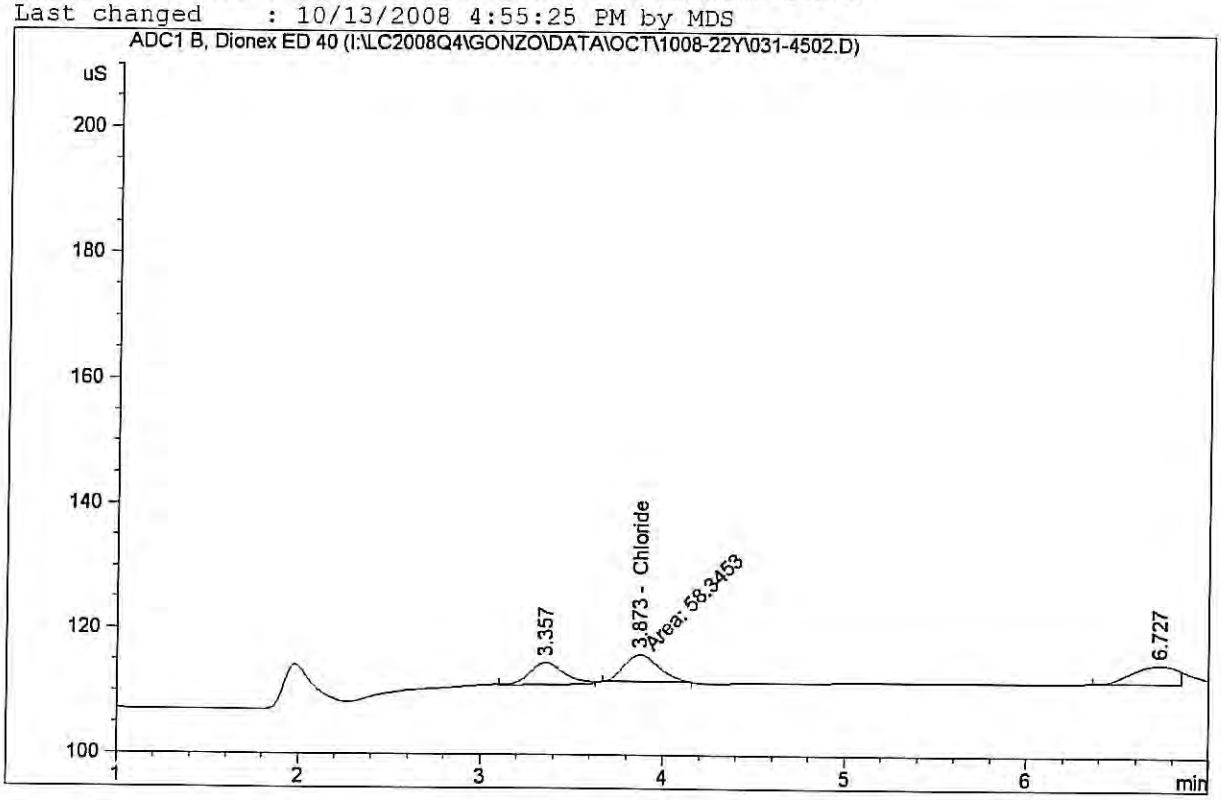
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 1	Standard 1	COLSWTCH	2	Sample		
2	Vial 2	Standard 2	COLSWTCH	2	Sample		
3	Vial 3	Standard 3	COLSWTCH	2	Sample		
4	Vial 4	Standard 4	COLSWTCH	2	Sample		
5	Vial 5	Standard 5	COLSWTCH	2	Sample		
6	Vial 6	Standard 6	COLSWTCH	2	Sample		
7	Vial 7	Second Source	COLSWTCH	2	Sample		
8	Vial 8	H2SO4 Lab Blank	COLSWTCH	2	Sample		
9	Vial 9	DI H2O Lab Blank	COLSWTCH	2	Sample		
10	Vial 11	In R1 C3*1.0009	COLSWTCH	2	Sample		
11	Vial 12	In R2 C3*1.0397	COLSWTCH	2	Sample		
12	Vial 13	In R3 C3*1.0577	COLSWTCH	2	Sample		
13	Vial 14	Stk R1 C3*1.0126	COLSWTCH	2	Sample		
14	Vial 15	Stk R2 C3*1.038	COLSWTCH	2	Sample		
15	Vial 16	Stk R3 C3*1.0471	COLSWTCH	2	Sample		
16	Vial 17	In C6*1.061	COLSWTCH	2	Sample		
17	Vial 18	Stk C6*1.0399	COLSWTCH	2	Sample		
18	Vial 19	MS/In R1 C3	COLSWTCH	2	Sample		
19	Vial 20	T-1*1.1245	COLSWTCH	2	Sample		
20	Vial 3	Standard 3	COLSWTCH	2	Sample		
21	Vial 4	Standard 4	COLSWTCH	2	Sample		
22	Vial 21	T-2*1.1288	COLSWTCH	2	Sample		
23	Vial 22	T-3*1.1384	COLSWTCH	2	Sample		
24	Vial 23	T-4*1.1461	COLSWTCH	2	Sample		
25	Vial 24	MS/T-1	COLSWTCH	2	Sample		
26	Vial 25	Cl- A25	COLSWTCH	2	Sample		
27	Vial 26	Cl- A26	COLSWTCH	2	Sample		
28	Vial 27	Cl- A27	COLSWTCH	2	Sample		
29	Vial 28	Cl- A28	COLSWTCH	2	Sample		
30	Vial 1	Standard 1	COLSWTCH	2	Sample		
31	Vial 2	Standard 2	COLSWTCH	2	Sample		
32	Vial 3	Standard 3	COLSWTCH	2	Sample		
33	Vial 4	Standard 4	COLSWTCH	2	Sample		
34	Vial 5	Standard 5	COLSWTCH	2	Sample		
35	Vial 6	Standard 6	COLSWTCH	2	Sample		
36	Vial 1	Standard 1	COLSWTCH	2	Sample		
37	Vial 2	Standard 2	COLSWTCH	2	Sample		
38	Vial 3	Standard 3	COLSWTCH	2	Sample		
39	Vial 4	Standard 4	COLSWTCH	2	Sample		
40	Vial 5	Standard 5	COLSWTCH	2	Sample		
41	Vial 6	Standard 6	COLSWTCH	2	Sample		
42	Vial 7	Second Source	COLSWTCH	2	Sample		
43	Vial 8	NaOH Lab Blank	COLSWTCH	2	Sample		
44	Vial 9	DI H2O Lab Blank	COLSWTCH	2	Sample		
45	Vial 31	In R1 C4*4.018	CHLSWTCH	2	Sample		
46	Vial 32	In R2 C4*4.018	CHLSWTCH	2	Sample		
47	Vial 33	In R3 C4*4.018	CHLSWTCH	2	Sample		
48	Vial 34	Stk R1 C4*4.01	CHLSWTCH	2	Sample		
49	Vial 35	Stk R2 C4*4.01	CHLSWTCH	2	Sample		
50	Vial 36	Stack R3 C4*4.01	CHLSWTCH	2	Sample		
51	Vial 37	In C7*4.1	CHLSWTCH	2	Sample		
52	Vial 38	Stk C7*4.1	CHLSWTCH	2	Sample		
53	Vial 39	MS/In R1 C4	CHLSWTCH	2	Sample		
54	Vial 1	Standard 1	COLSWTCH	2	Sample		
55	Vial 2	Standard 2	COLSWTCH	2	Sample		
56	Vial 3	Standard 3	COLSWTCH	2	Sample		
57	Vial 4	Standard 4	COLSWTCH	2	Sample		
58	Vial 5	Standard 5	COLSWTCH	2	Sample		
59	Vial 6	Standard 6	COLSWTCH	2	Sample		
60	Vial 9	DI H2O Lab Blank	SHUTDOWN	2	Sample		

Sample Chromatograms

1008-22

==========

Injection Date : 10/11/2008 2:29:44 AM Seq. Line : 45
Sample Name : In R1 C4*4.018 Location : Vial 31
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
3.873	MM	58.34529	1.27908e-2	7.46283e-1		Chloride
6.083		-	-	-		Bromide

Totals : 7.46283e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

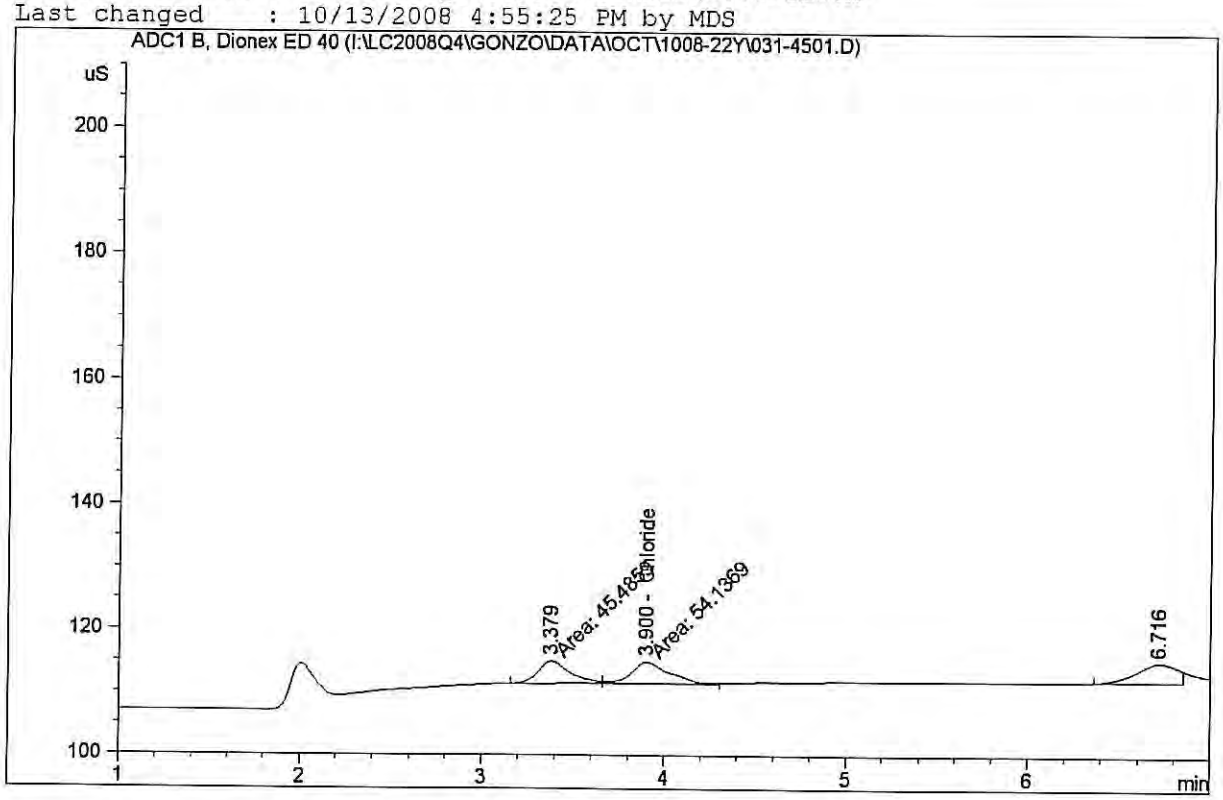
==========

*** End of Report ***

1008-22

==========

Injection Date : 10/11/2008 2:13:00 AM Seq. Line : 45
Sample Name : In R1 C4*4.018 Location : Vial 31
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
3.900	FM	54.13694	1.28247e-2	6.94290e-1		Chloride
6.083		-	-	-		Bromide

Totals : 6.94290e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

*** End of Report ***

1008-22

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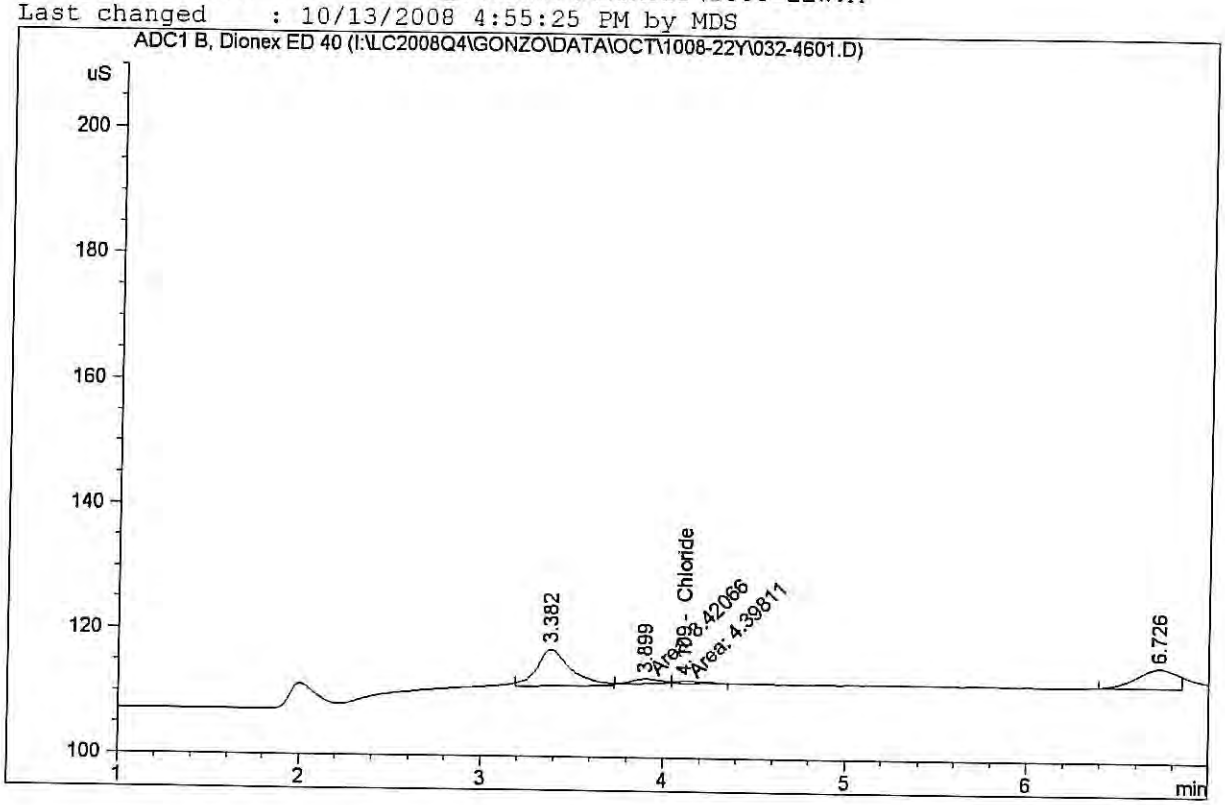
Injection Date : 10/11/2008 2:46:35 AM
Sample Name : In R2 C4*4.018
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 46
Location : Vial 32
Inj : 1
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.109	FM	4.39811	1.31240e-2	5.77206e-2		Chloride
6.083		-	-	-		Bromide

Totals : 5.77206e-2

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

*** End of Report ***

Instrument 3 10/13/2008 5:12:58 PM MDS

Data File I:\LC2008Q4\GONZO\DATA\OCT\1008-22Y\032-4602.D

Sample Name: In R2 C4*4.0

1008-22

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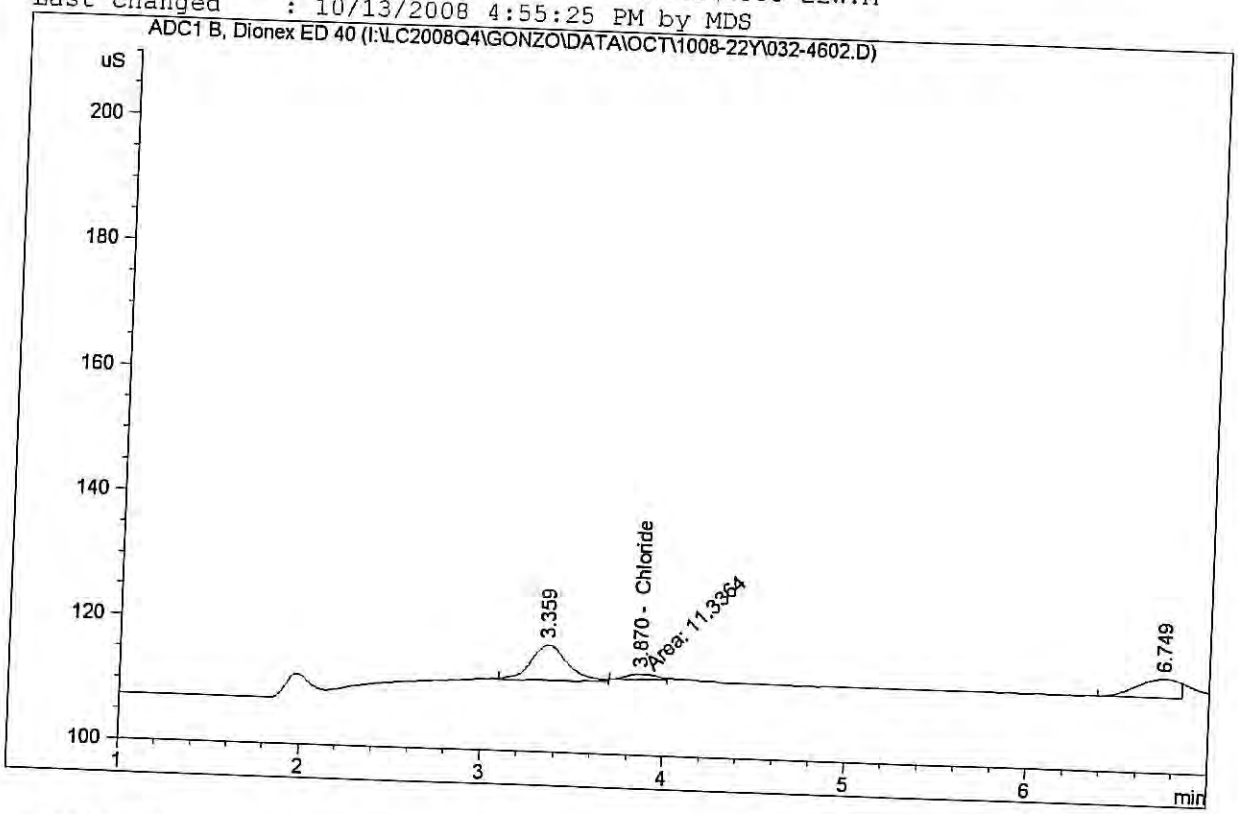
Injection Date : 10/11/2008 3:03:29 AM
Sample Name : In R2 C4*4.018
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 46
Location : Vial 32
Inj : 2
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
3.870	MF	11.33644	1.31240e-2	1.48779e-1		Chloride
6.083		-	-	-		Bromide

Totals : 1.48779e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

*** End of Report ***

Instrument 3 10/13/2008 5:13:30 PM MDS

Data File I:\LC2008Q4\GONZO\DATA\OCT\1008-22Y\033-4701.D

Sample Name: In R3 C4*4.0

1008-22

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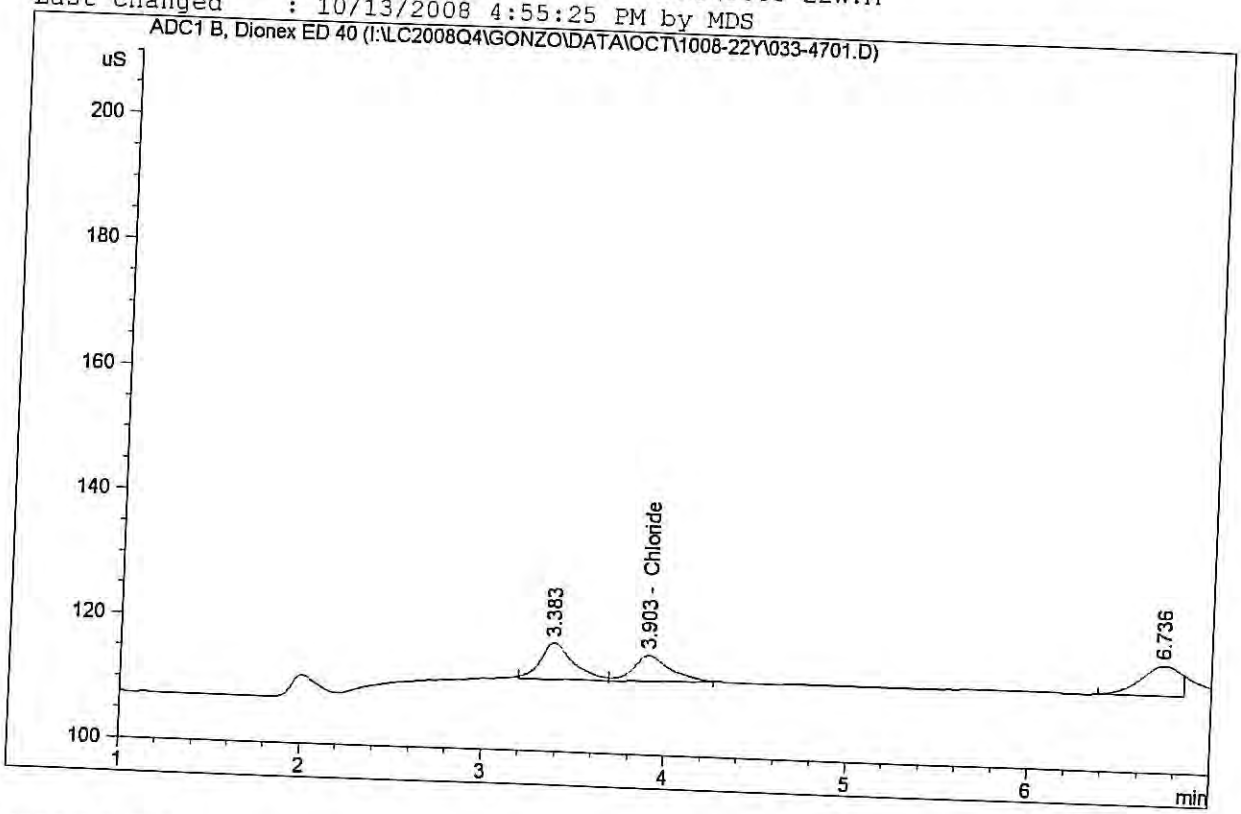
Injection Date : 10/11/2008 3:20:22 AM
Sample Name : In R3 C4*4.018
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 47
Location : Vial 33
Inj : 1
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
3.903	VB	61.12610	1.27710e-2	7.80640e-1		Chloride
6.083		-	-	-		Bromide
Totals :				7.80640e-1		

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

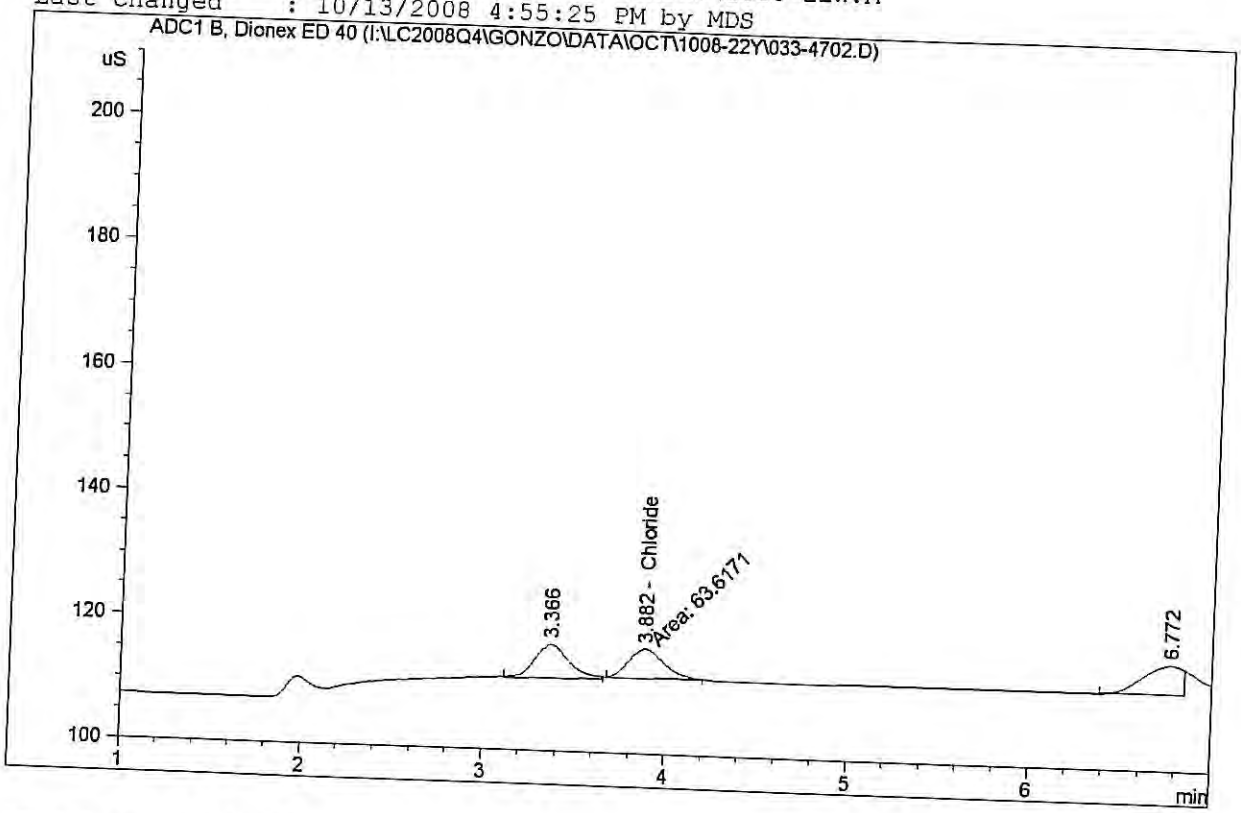
==========

*** End of Report ***

Instrument 3 10/13/2008 5:19:25 PM MDS

Injection Date : 10/11/2008 3:37:16 AM
Sample Name : In R3 C4*4.018
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 47
Location : Vial 33
Inj : 2
Inj Volume : 25 µl



External Standard Report

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
3.882	MM	63.61707	1.27547e-2	8.11416e-1		Chloride
6.083		-	-	-		Bromide

Totals : 8.11416e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

*** End of Report ***

Instrument 3 10/13/2008 5:19:40 PM MDS

Data File I:\LC2008Q4\GONZO\DATA\OCT\1008-22Y\034-4801.D

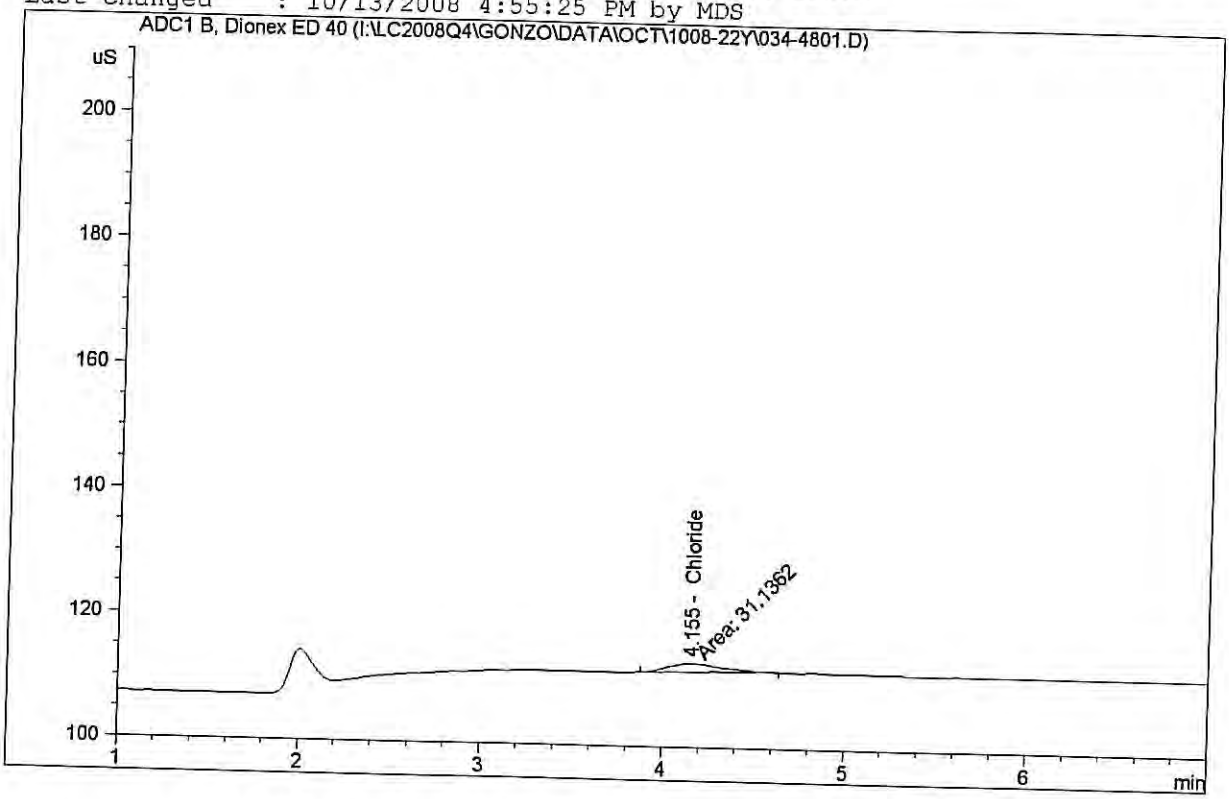
Sample Name: Stk R1 C4*4.0

1008-22

==========

Injection Date : 10/11/2008 3:54:12 AM
Sample Name : Stk R1 C4*4.01
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 48
Location : Vial 34
Inj : 1
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.155	MM	31.13617	1.31240e-2	4.08630e-1		Chloride
6.083		-	-	-		Bromide

Totals : 4.08630e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

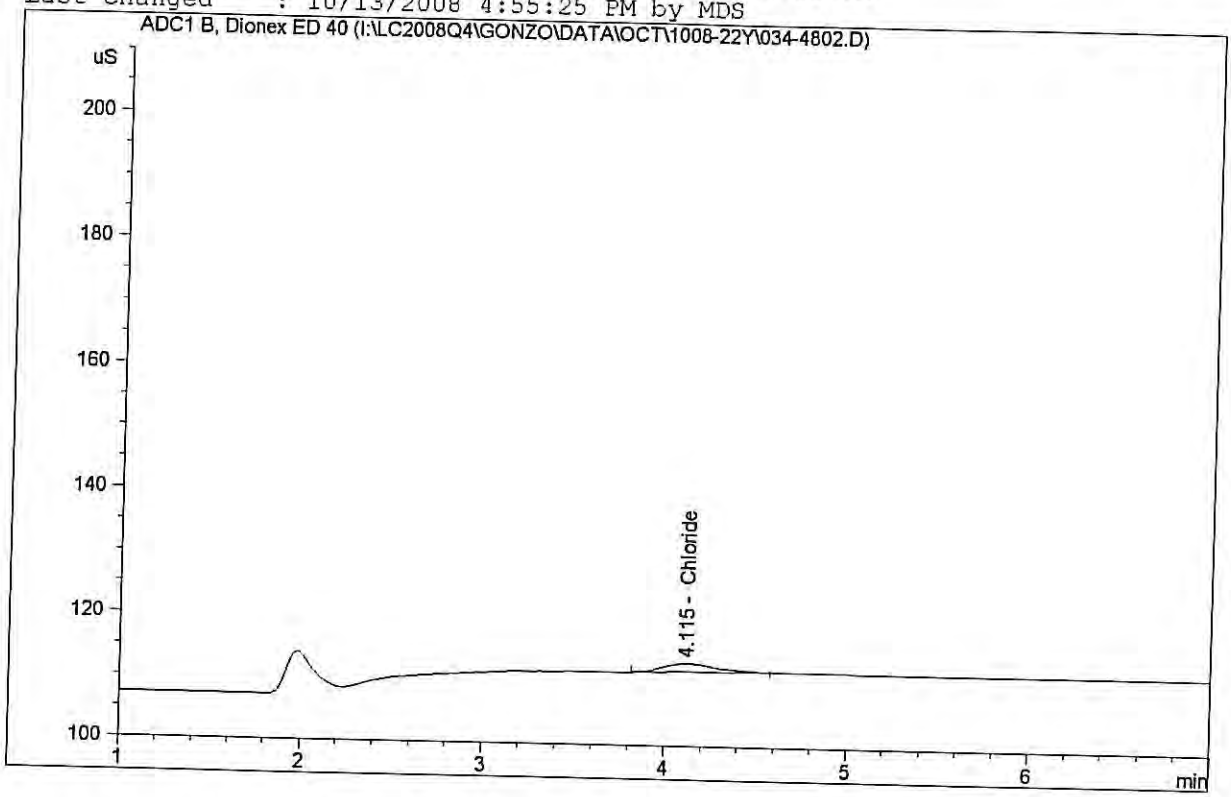
==========

*** End of Report ***

Instrument 3 10/13/2008 5:20:23 PM MDS

1008-22

Injection Date	: 10/11/2008 4:10:58 AM	Seq. Line :	48
Sample Name	: Stk R1 C4*4.01	Location :	Vial 34
Acq. Operator	: MDS	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M		
Last changed	: 10/9/2008 1:54:03 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22W.M		
Last changed	: 10/13/2008 4:55:25 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 4:55:23 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.115	BB	31.88681	1.31240e-2	4.18482e-1		Chloride
6.083		-	-	-		Bromide
Totals :				4.18482e-1		

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

*** End of Report ***

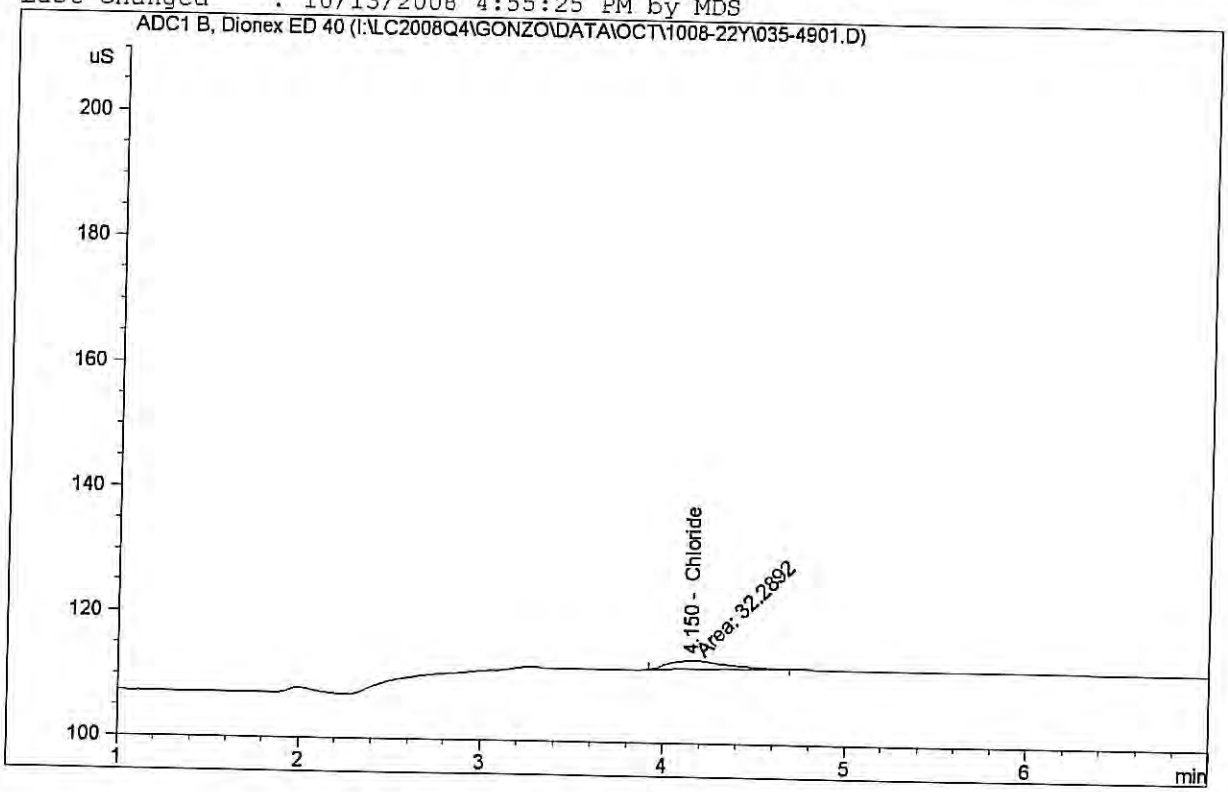
Instrument 3 10/13/2008 5:20:32 PM MDS

1008-22

==========

Injection Date : 10/11/2008 4:27:44 AM
Sample Name : Stk R2 C4*4.01
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 49
Location : Vial 35
Inj : 1
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.150	MM	32.28922	1.31240e-2	4.23763e-1		Chloride
6.083		-	-	-		Bromide

Totals : 4.23763e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

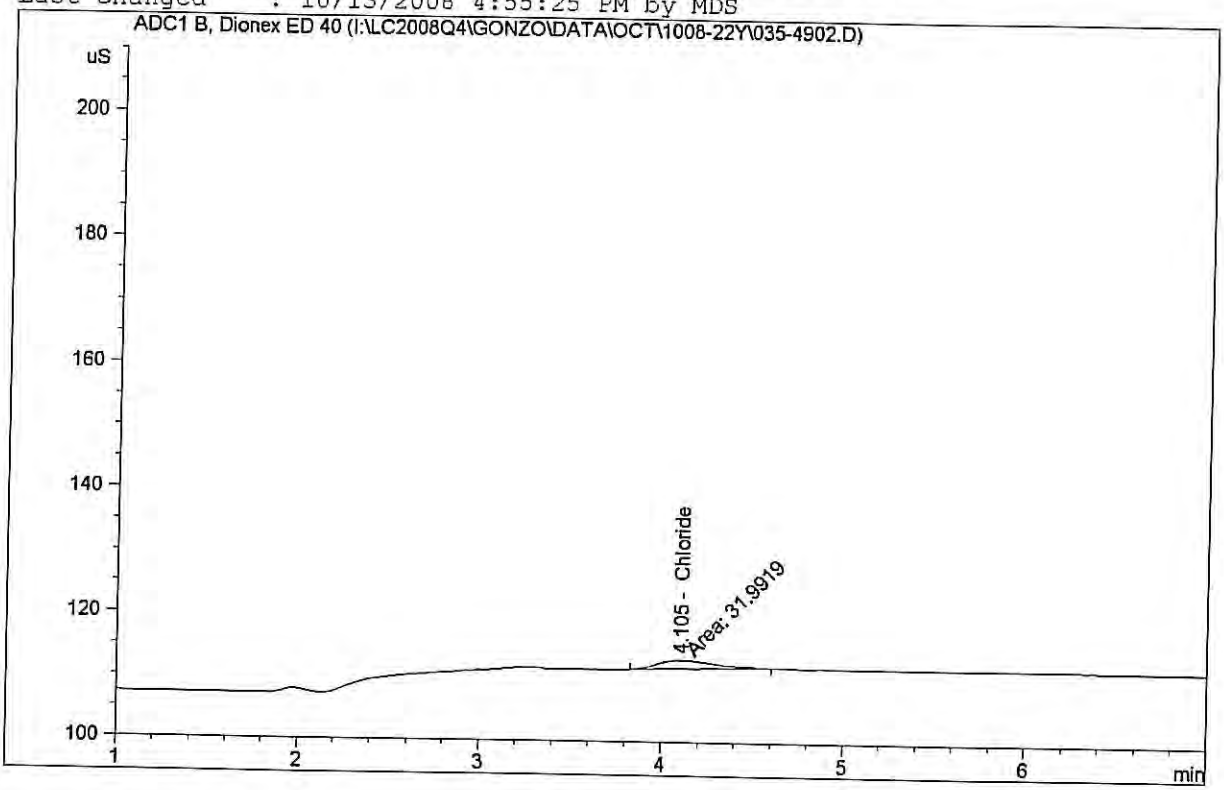
==========

*** End of Report ***

Instrument 3 10/13/2008 5:20:49 PM MDS

1008-22

Injection Date : 10/11/2008 4:44:36 AM Seq. Line : 49
Sample Name : Stk R2 C4*4.01 Location : Vial 35
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS



External Standard Report

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.105	MM	31.99195	1.31240e-2	4.19862e-1		Chloride
6.083		-	-	-		Bromide

Totals : 4.19862e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

*** End of Report ***

Instrument 3 10/13/2008 5:21:10 PM MDS

1008-22

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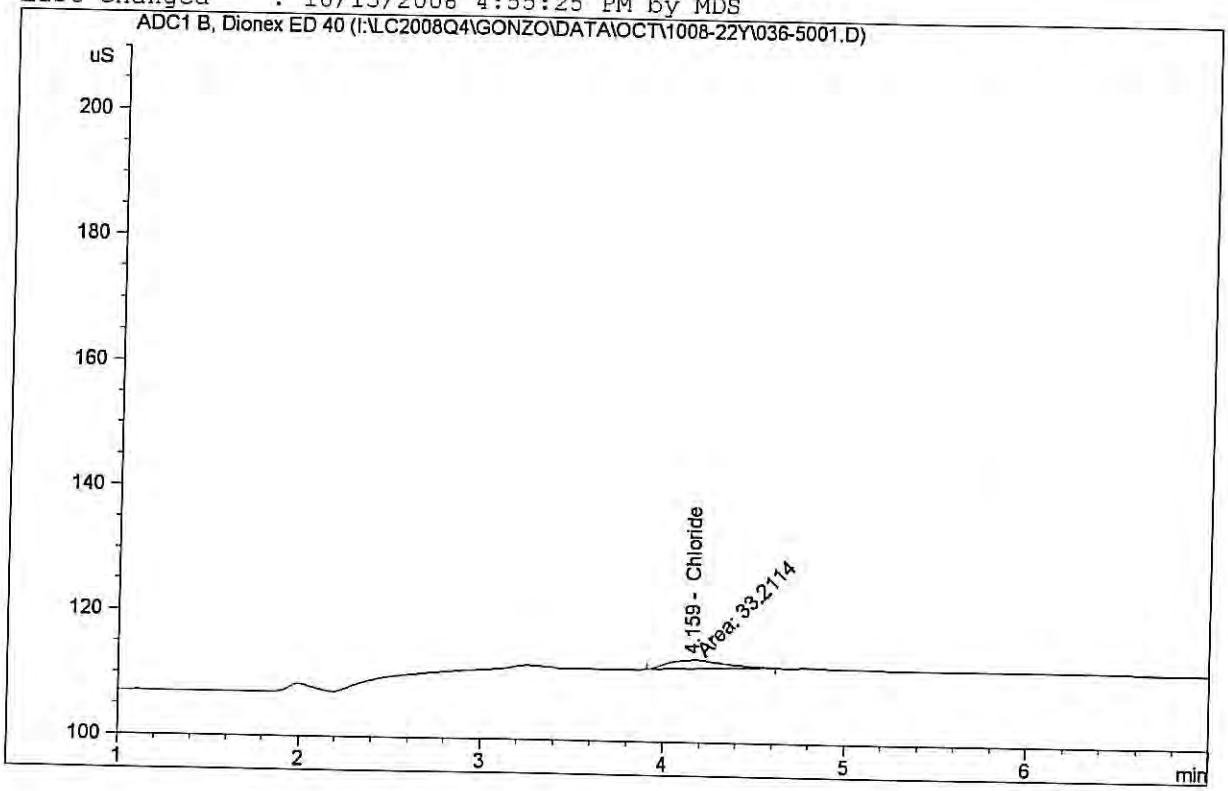
Injection Date : 10/11/2008 5:01:27 AM
Sample Name : Stack R3 C4*4.01
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 50
Location : Vial 36
Inj : 1
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.159	MM	33.21141	1.31207e-2	4.35756e-1		Chloride
6.083		-	-	-		Bromide

Totals : 4.35756e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

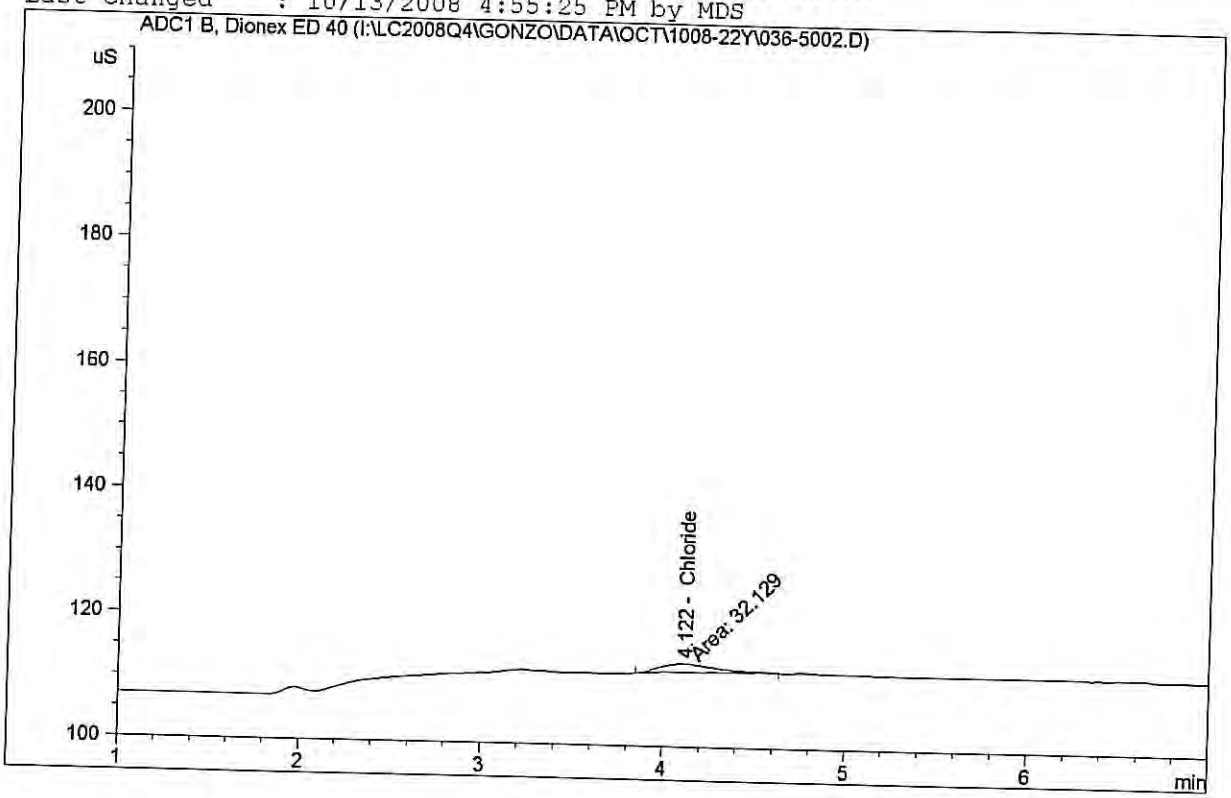
==========

*** End of Report ***

Instrument 3 10/13/2008 5:21:52 PM MDS

Injection Date : 10/11/2008 5:18:24 AM
Sample Name : Stack R3 C4*4.01
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 50
Location : Vial 36
Inj : 2
Inj Volume : 25 µl



External Standard Report

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.122	MM	32.12896	1.31240e-2	4.21660e-1		Chloride
6.083		-	-	-		Bromide
Totals :				4.21660e-1		

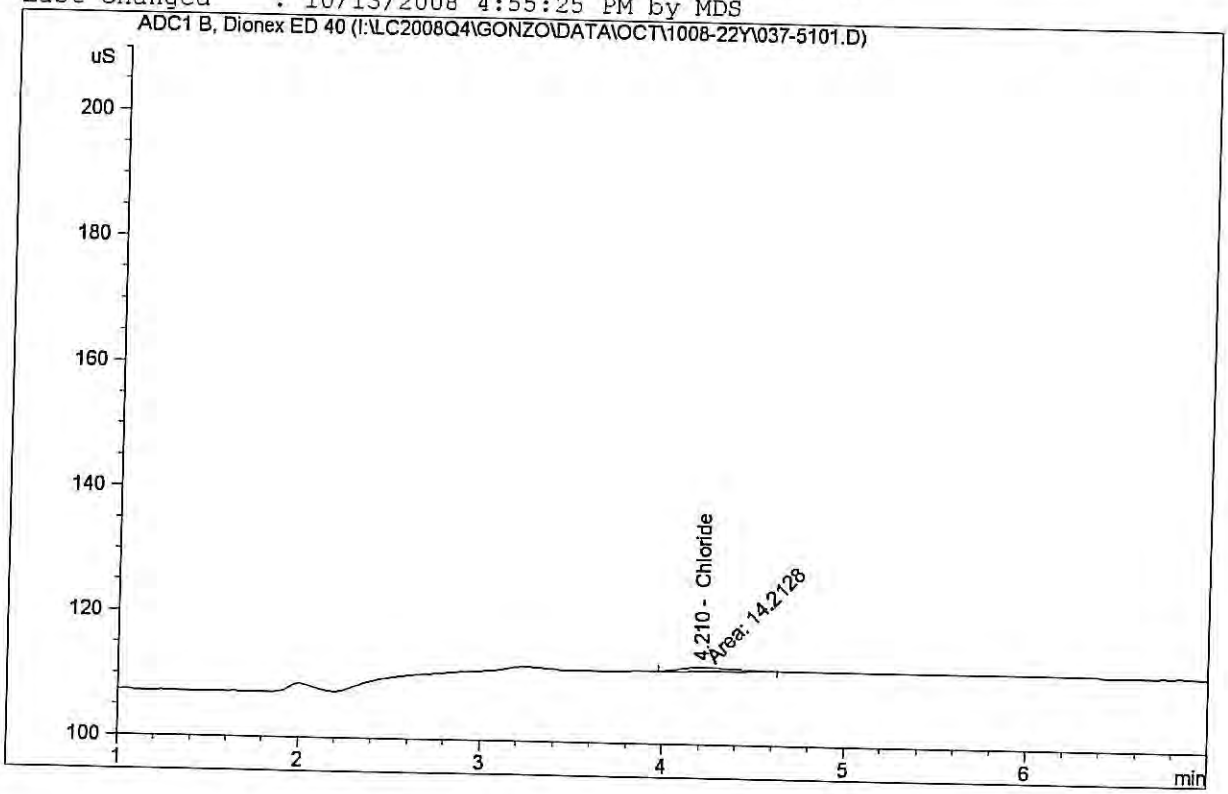
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

*** End of Report ***

1008-22 Sample Blank

Injection Date	: 10/11/2008 5:35:15 AM	Seq. Line :	51
Sample Name	: In C7*4.1	Location :	Vial 37
Acq. Operator	: MDS	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M		
Last changed	: 10/9/2008 1:54:03 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22W.M		
Last changed	: 10/13/2008 4:55:25 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 4:55:23 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.210	MM	14.21276	1.31240e-2	1.86528e-1		Chloride
6.083		-	-	-		Bromide
Totals :				1.86528e-1		

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

*** End of Report ***

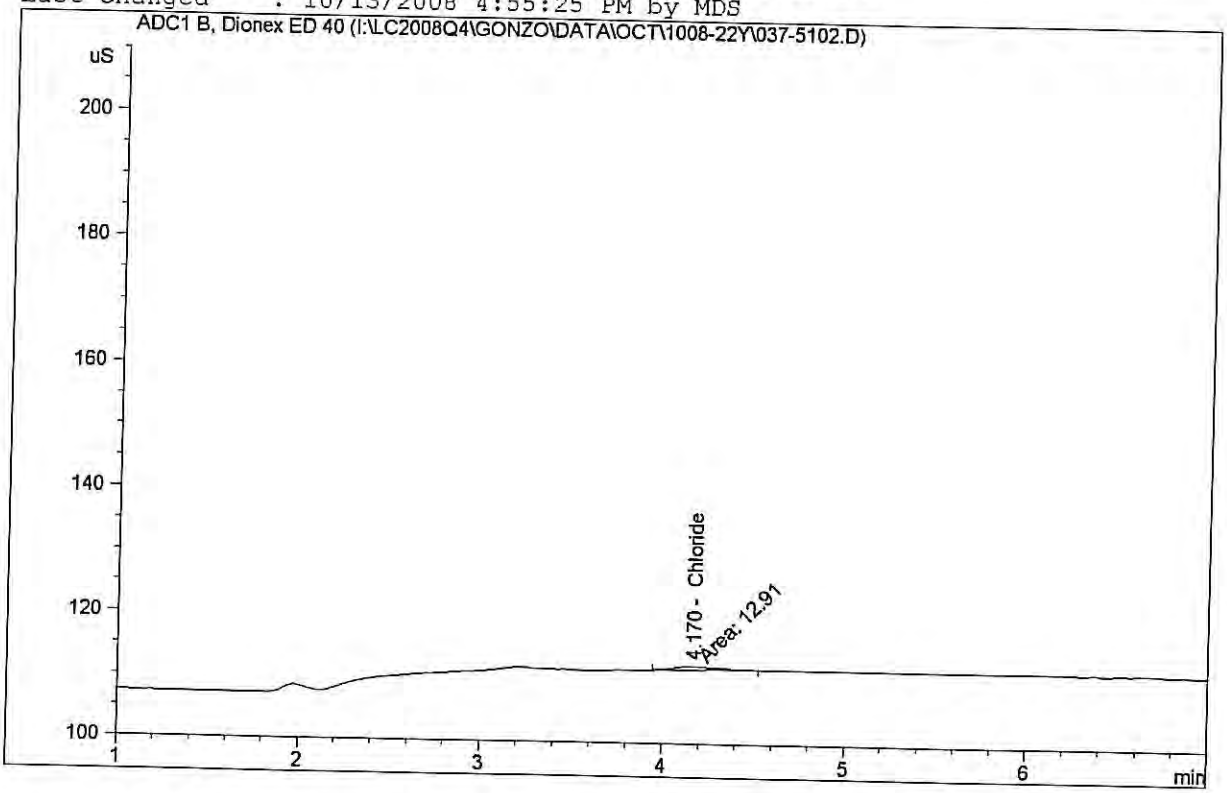
Instrument 3 10/13/2008 5:22:42 PM MDS

1008-22 Sample Blank

==========

Injection Date : 10/11/2008 5:52:09 AM
Sample Name : In C7*4.1
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 51
Location : Vial 37
Inj : 2
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.170	MM	12.90995	1.31240e-2	1.69430e-1		Chloride
6.083		-	-	-		Bromide

Totals : 1.69430e-1

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

*** End of Report ***

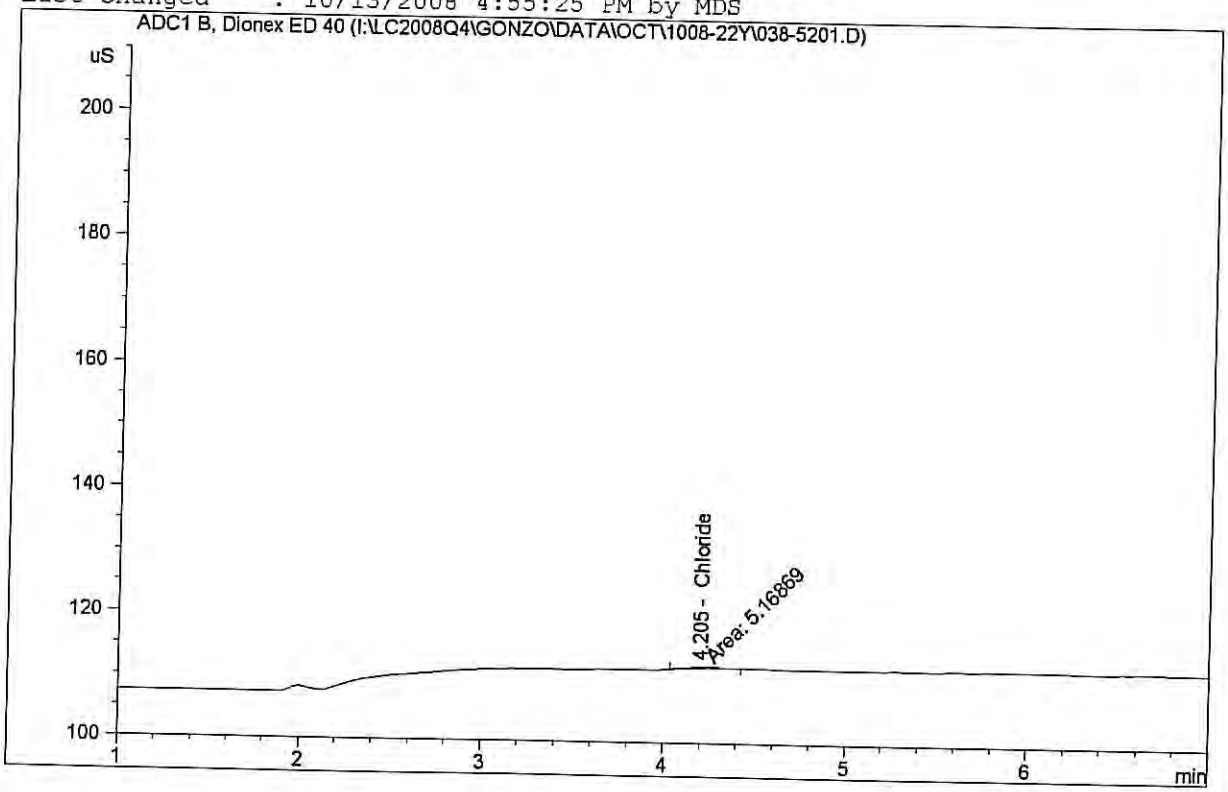
Instrument 3 10/13/2008 5:23:20 PM MDS

1008-22

==========

Injection Date : 10/11/2008 6:09:06 AM
Sample Name : Stk C7*4.1
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 52
Location : Vial 38
Inj : 1
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.205	MM	5.16869	1.31240e-2	6.78338e-2		Chloride
6.083		-	-	-		Bromide

Totals : 6.78338e-2

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

*** End of Report ***

1008-22

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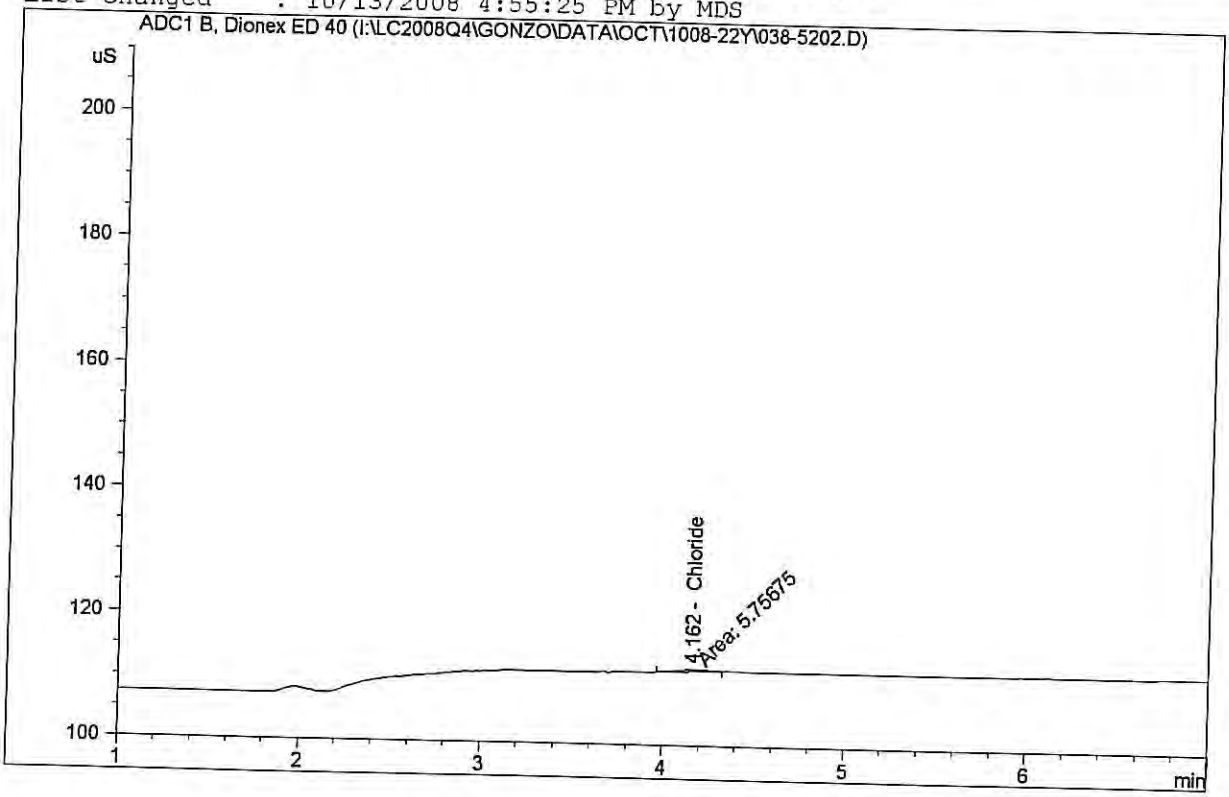
Injection Date : 10/11/2008 6:25:56 AM
Sample Name : Stk C7*4.1
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M
Last changed : 10/9/2008 1:54:03 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 52
Location : Vial 38
Inj : 2
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.162	MM	5.75675	1.31240e-2	7.55515e-2		Chloride
6.083		-	-	-		Bromide

Totals : 7.55515e-2

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

*** End of Report ***

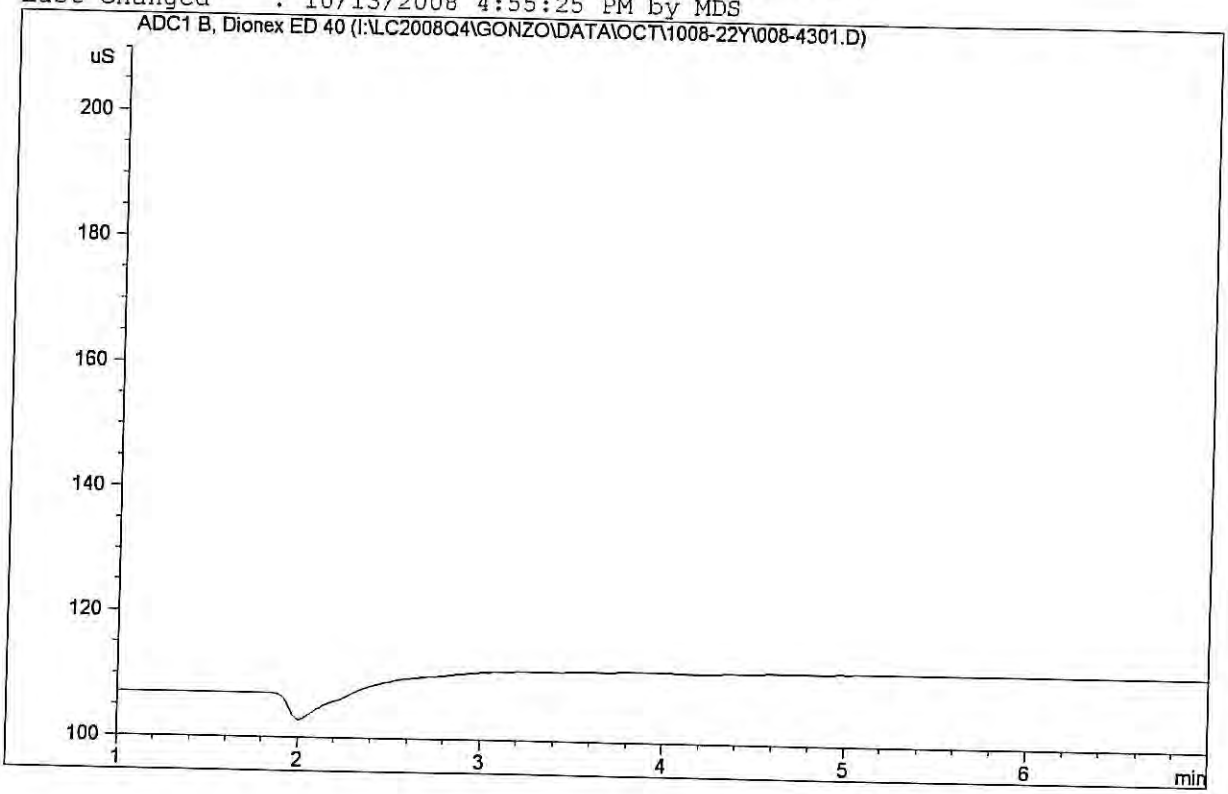
Instrument 3 10/13/2008 5:24:15 PM MDS

0.01N NaOH, used to prepare standards

==========

Injection Date : 10/11/2008 1:37:18 AM
Sample Name : NaOH Lab Blank
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 43
Location : Vial 8
Inj : 1
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.108		-	-	-		Chloride
6.083		-	-	-		Bromide
Totals :				0.00000		

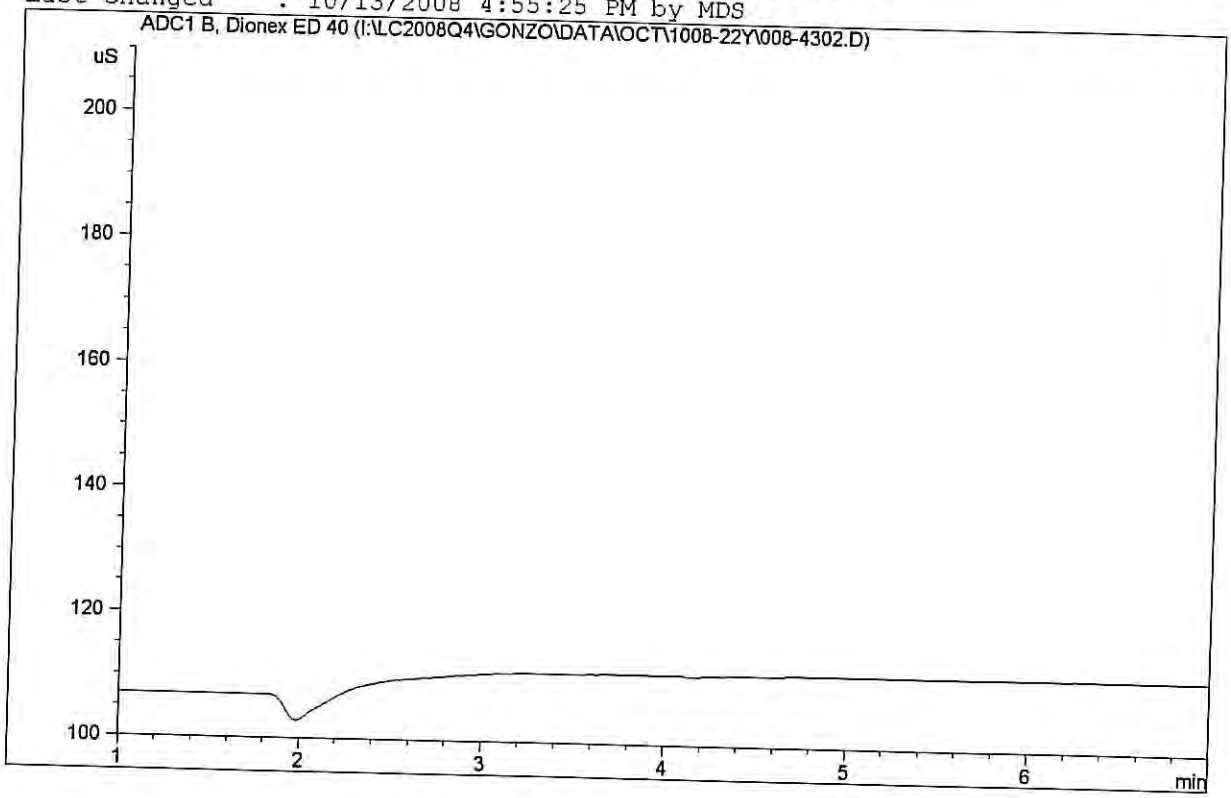
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

0.01N NaOH, used to prepare standards

Injection Date	: 10/11/2008 1:46:13 AM	Seq. Line :	43
Sample Name	: NaOH Lab Blank	Location :	Vial 8
Acq. Operator	: MDS	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M		
Last changed	: 10/9/2008 1:53:38 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22W.M		
Last changed	: 10/13/2008 4:55:25 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 4:55:23 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.108		-	-	-		Chloride
6.083		-	-	-		Bromide
Totals :				0.00000		

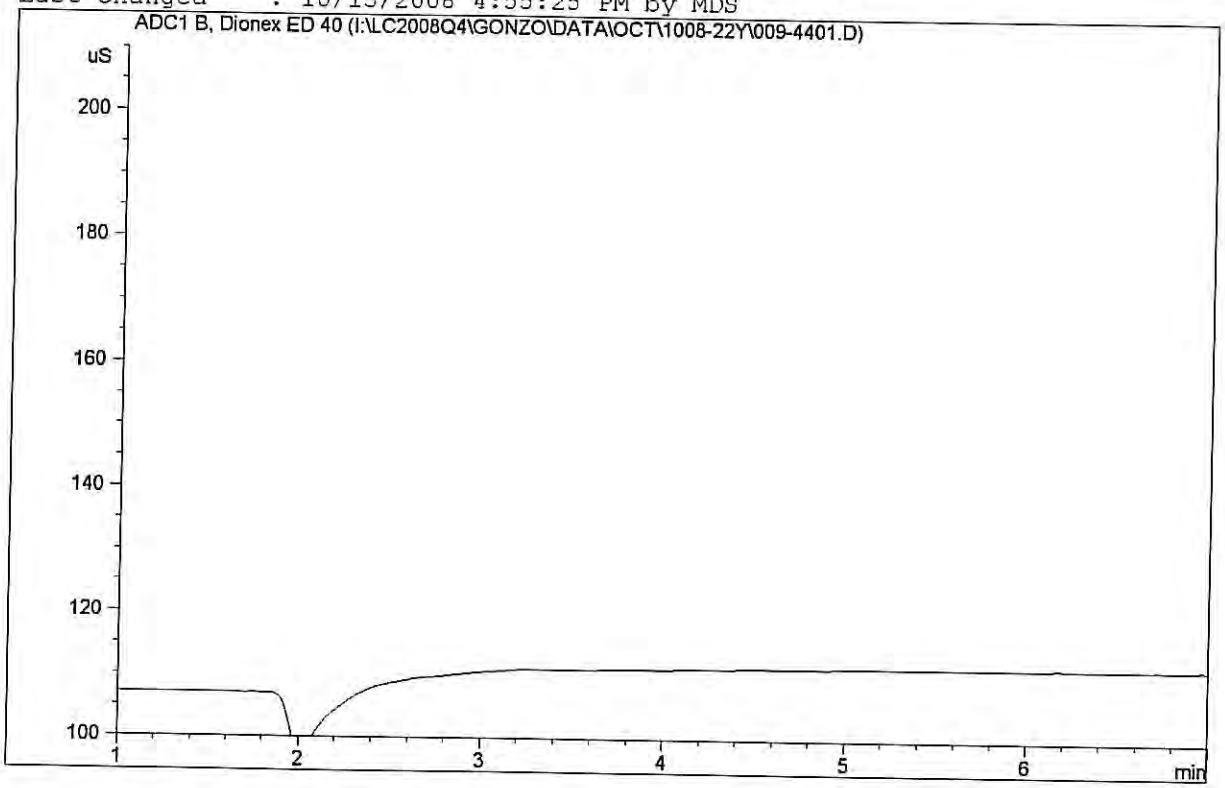
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

used to dilute samples

==========

Injection Date : 10/11/2008 1:55:05 AM Seq. Line : 44
Sample Name : DI H2O Lab Blank Location : Vial 9
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.108		-	-	-		Chloride
6.083		-	-	-		Bromide

Totals : 0.00000

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

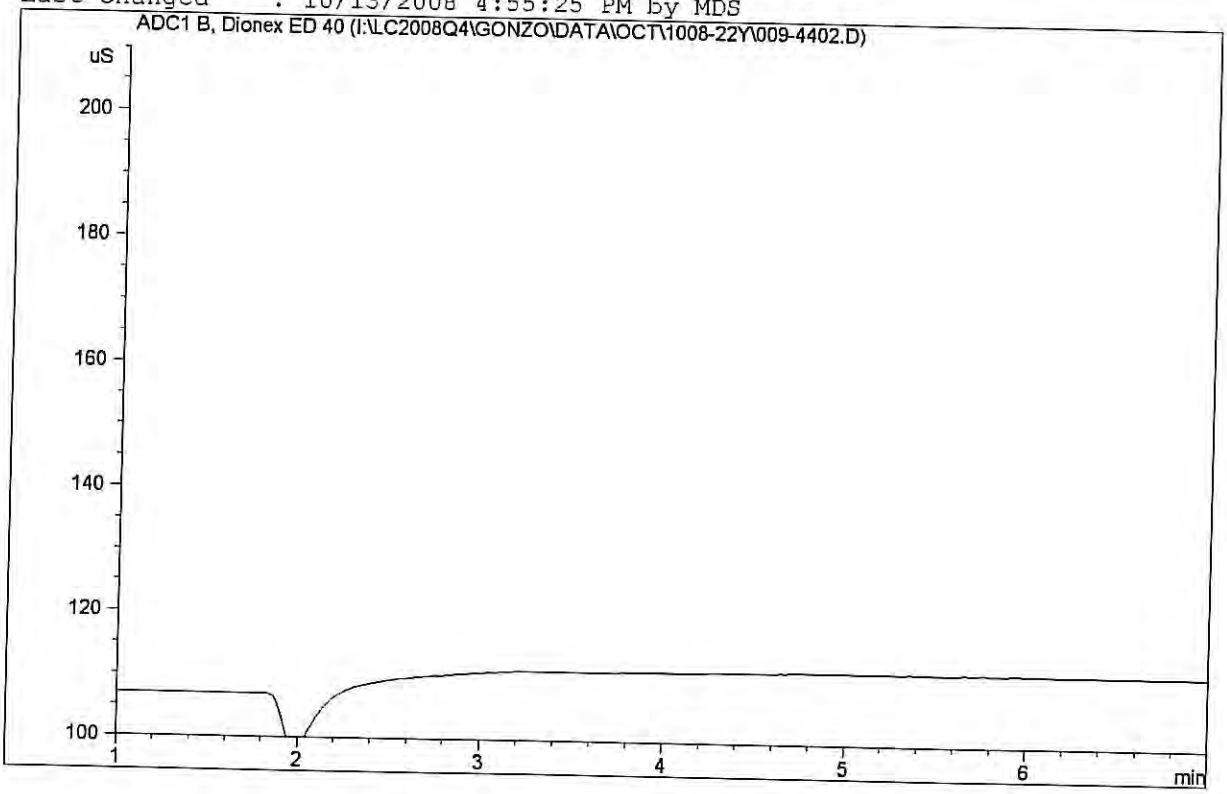
==========

used to dilute samples

==========

Injection Date : 10/11/2008 2:04:05 AM
Sample Name : DI H2O Lab Blank
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 44
Location : Vial 9
Inj : 2
Inj Volume : 25 µl



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.108		-	-	-		Chloride
6.083		-	-	-		Bromide
Totals :				0.00000		

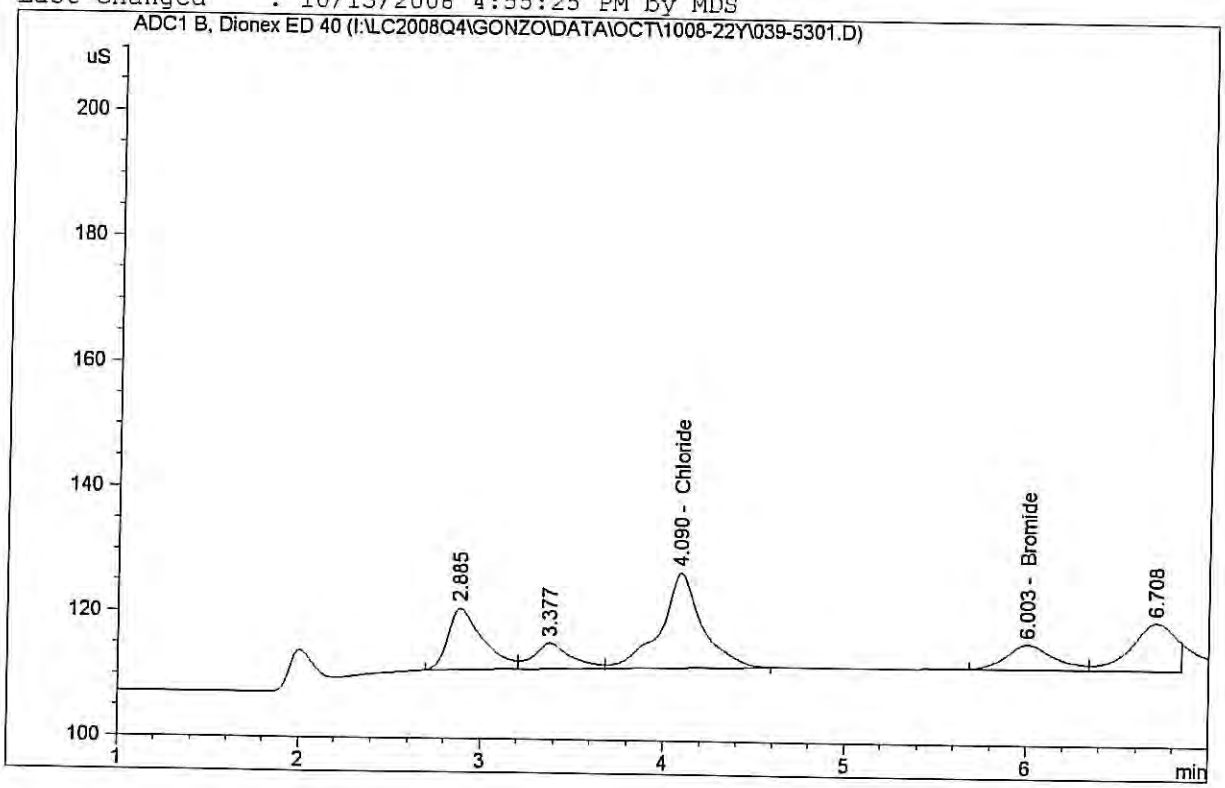
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

1008-22 Matrix Spike

Injection Date	: 10/11/2008 6:42:52 AM	Seq. Line :	53
Sample Name	: MS/In R1 C4	Location :	Vial 39
Acq. Operator	: MDS	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M		
Last changed	: 10/9/2008 1:54:03 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22W.M		
Last changed	: 10/13/2008 4:55:25 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 4:55:23 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

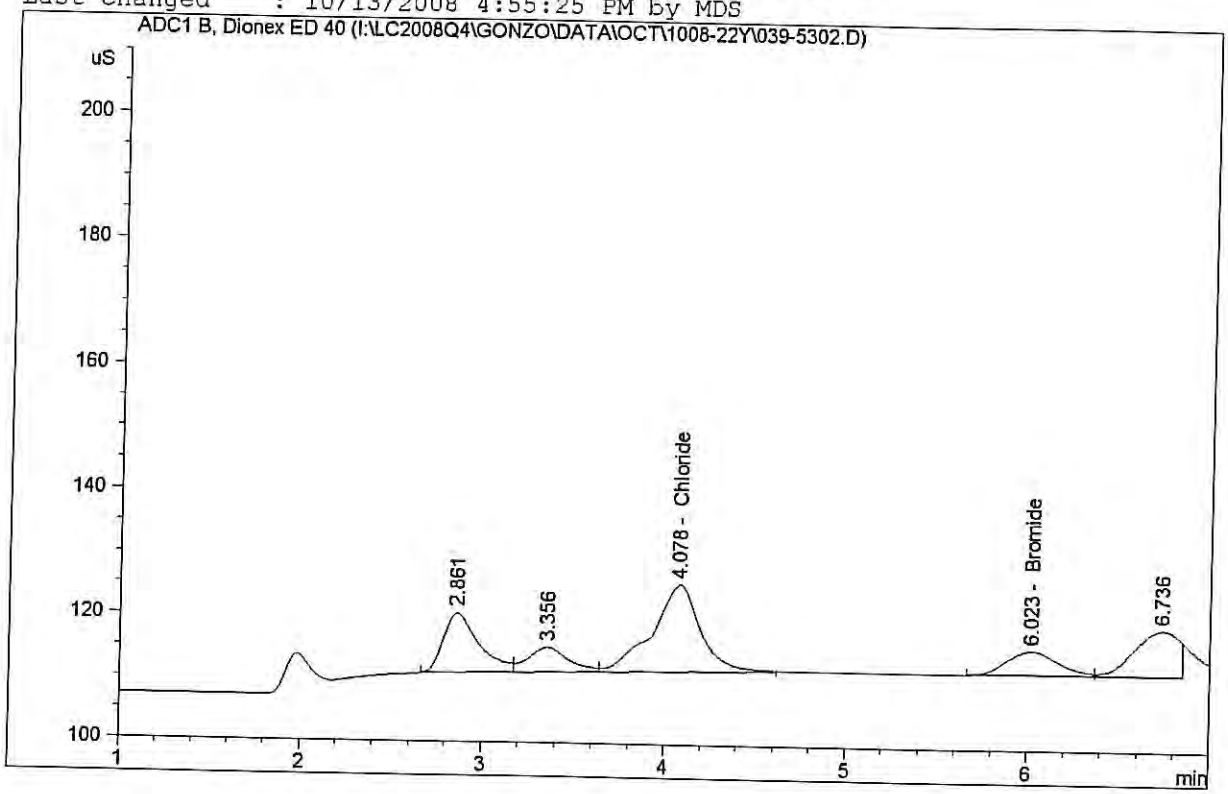
RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.090	VB	246.30531	1.24582e-2	3.06851		Chloride
6.003	BV	75.76545	2.99869e-2	2.27197		Bromide
Totals :				5.34049		

Results obtained with enhanced integrator!

*** End of Report ***

1008-22 Matrix Spike

Injection Date	: 10/11/2008 6:59:45 AM	Seq. Line :	53
Sample Name	: MS/In R1 C4	Location :	Vial 39
Acq. Operator	: MDS	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\CHLSWTCH.M		
Last changed	: 10/9/2008 1:54:03 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22W.M		
Last changed	: 10/13/2008 4:55:25 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 4:55:23 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.078	VB	263.61603	1.24514e-2	3.28239		Chloride
6.023	BV	76.91949	3.00020e-2	2.30774		Bromide
Totals :				5.59012		

Results obtained with enhanced integrator!

*** End of Report ***

Curve(s)/QA Point(s) Chromatograms

Calibration Table

Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM

Calculate : External Standard
Based on : Peak Area

Rel. Reference Window : 20.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 20.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : Yes, identified peaks are recalibrated
Correct All Ret. Times: No, only for identified peaks

Curve Type : Linear
Origin : Connected
Weight : Linear (Amnt)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

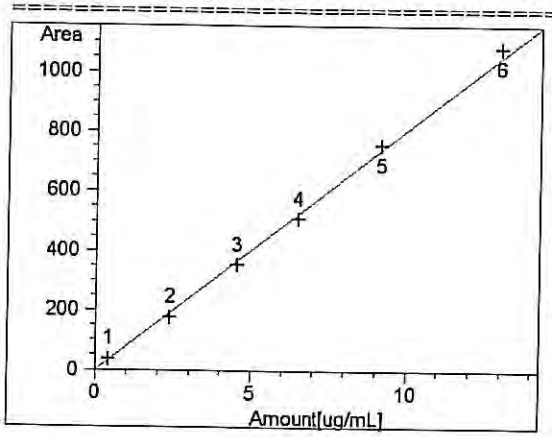
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Sig	Lvl	Amount [ug/mL]	Area	Amt/Area	Ref	Grp	Name
4.108	1	1	4.34000e-1	36.60551	1.18561e-2			Chloride
		2	2.38000	176.71124	1.34683e-2			
		3	4.55000	351.40849	1.29479e-2			
		4	6.52000	506.91790	1.28620e-2			
		5	9.18000	754.46632	1.21675e-2			
		6	13.00000	1080.53940	1.20310e-2			
6.083	1	1	4.34000e-1	17.07885	2.54115e-2			Bromide
		2	2.38000	76.65511	3.10482e-2			
		3	4.55000	146.77074	3.10007e-2			
		4	6.52000	210.10127	3.10327e-2			
		5	9.18000	300.93322	3.05051e-2			
		6	13.00000	426.90957	3.04514e-2			

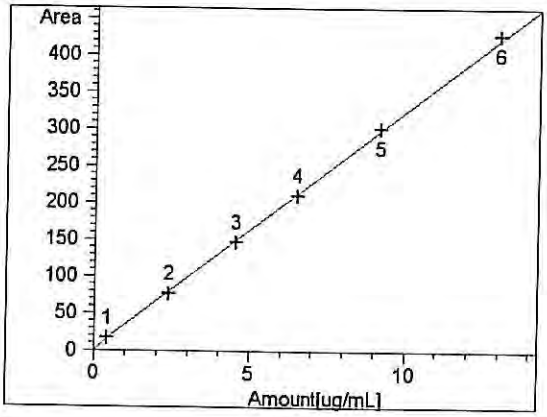
Peak Sum Table

No Entries in table

Calibration Curves

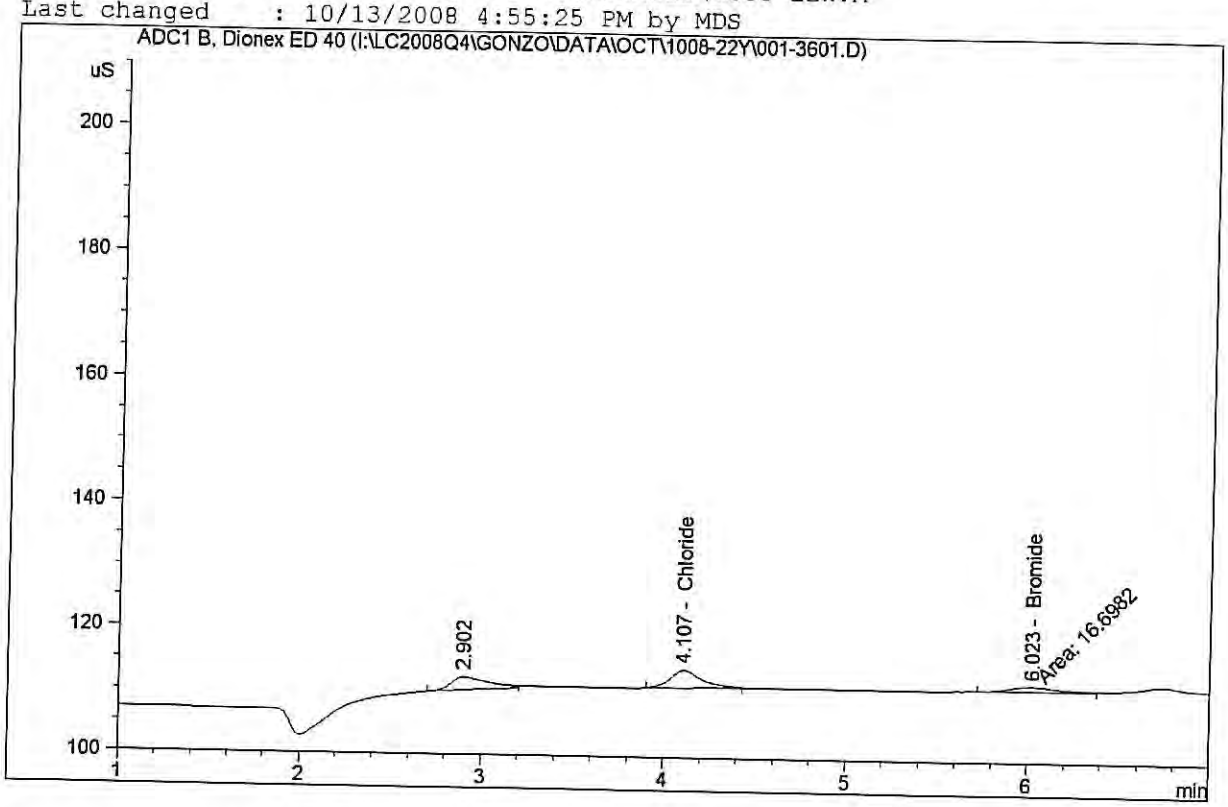


Chloride at exp. RT: 4.108
ADC1 B, Dionex ED 40
Correlation: 0.99908
Residual Std. Dev.: 21.68574
Formula: y = mx + b
m: 80.93943
b: -2.05847
x: Amount[ug/mL]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.182353
Level 3 : 0.095385
Level 4 : 0.066564
Level 5 : 0.047277
Level 6 : 0.033385



Bromide at exp. RT: 6.083
ADC1 B, Dionex ED 40
Correlation: 0.99983
Residual Std. Dev.: 3.55845
Formula: y = mx + b
m: 32.26868
b: 2.45182
x: Amount[ug/mL]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.182353
Level 3 : 0.095385
Level 4 : 0.066564
Level 5 : 0.047277
Level 6 : 0.033385

```
==========================================================================
Injection Date  : 10/10/2008 11:32:54 PM          Seq. Line :  36
Sample Name     : Standard 1                       Location : Vial 1
Acq. Operator   : MDS                                   Inj :   1
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

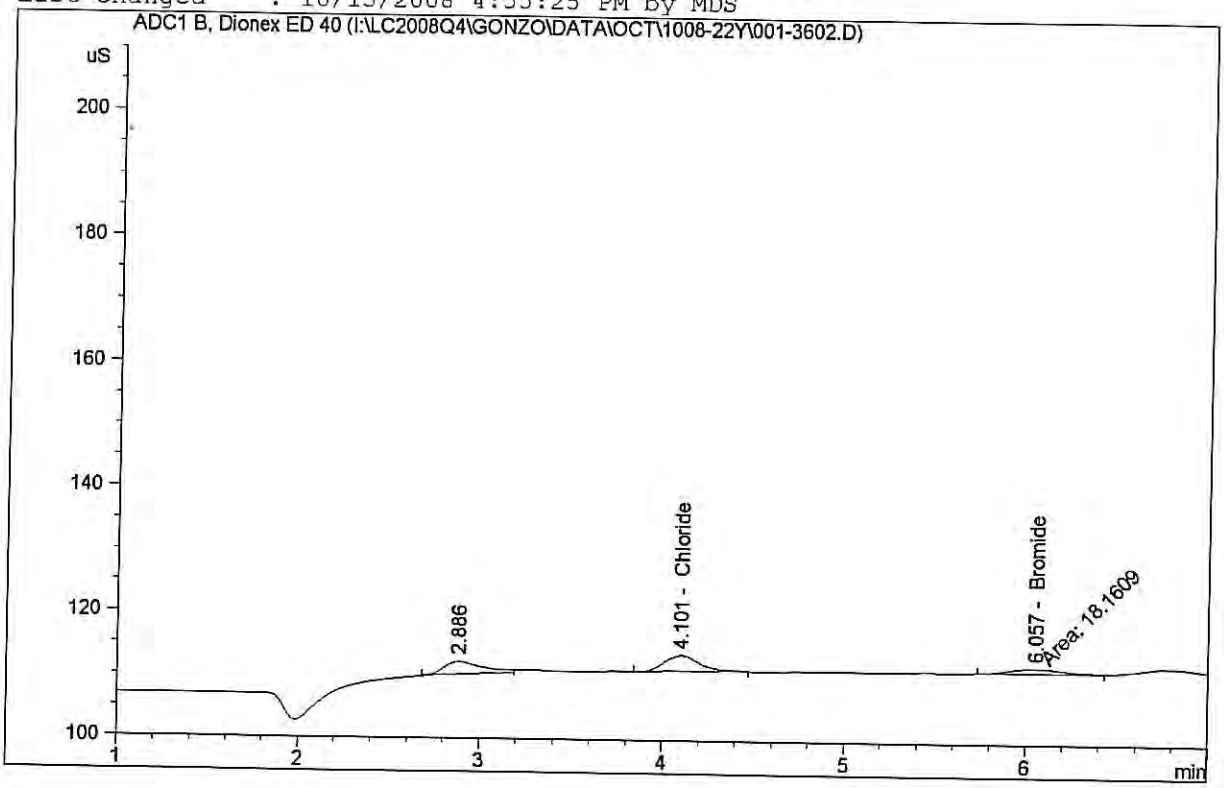
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.107 BB       36.69376 1.30480e-2 4.78781e-1     Chloride
  6.023 MM       16.69819 2.64395e-2 4.41492e-1     Bromide

Totals :                                9.20273e-1

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/10/2008 11:41:53 PM          Seq. Line :  36
Sample Name     : Standard 1                       Location : Vial 1
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

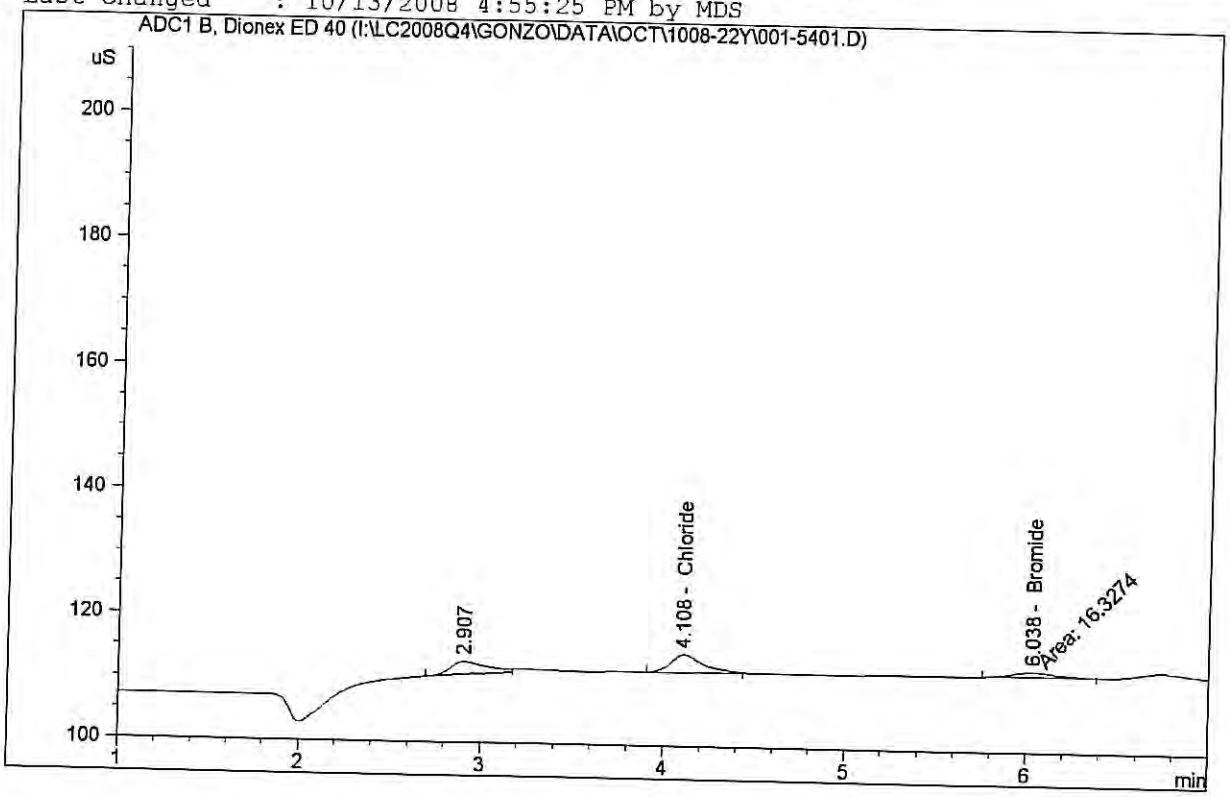
RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.101 PB       35.62722 1.30688e-2 4.65604e-1     Chloride
  6.057 MM       18.16088 2.68060e-2 4.86820e-1     Bromide

Totals :                               9.52424e-1

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

Injection Date : 10/11/2008 7:16:43 AM
Sample Name : Standard 1
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 54
Location : Vial 1
Inj : 1
Inj Volume : 25 µl



External Standard Report

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

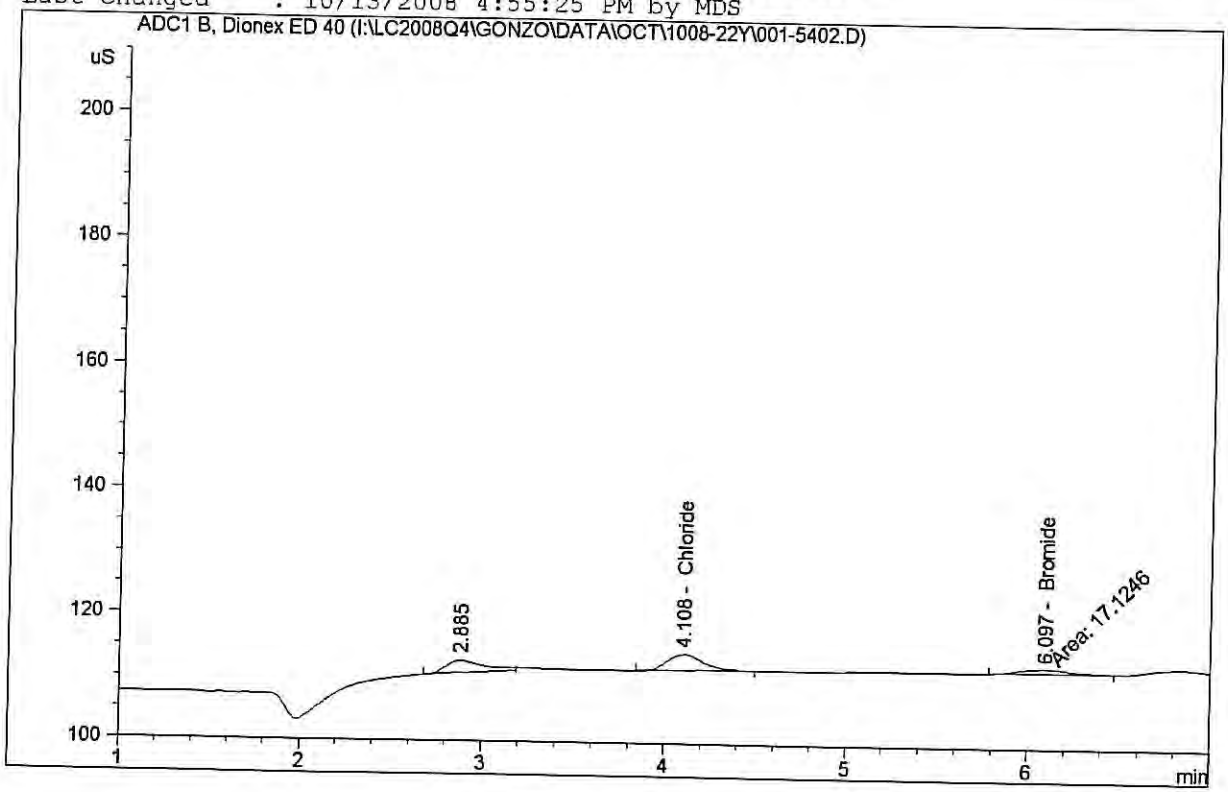
RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.108	BB	36.85690	1.30449e-2	4.80796e-1		Chloride
6.038	MM	16.32742	2.63727e-2	4.30598e-1		Bromide

Totals : 9.11394e-1

Results obtained with enhanced integrator!

*** End of Report ***

```
==========================================================================
Injection Date  : 10/11/2008 7:25:37 AM          Seq. Line :  54
Sample Name     : Standard 1                      Location : Vial 1
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

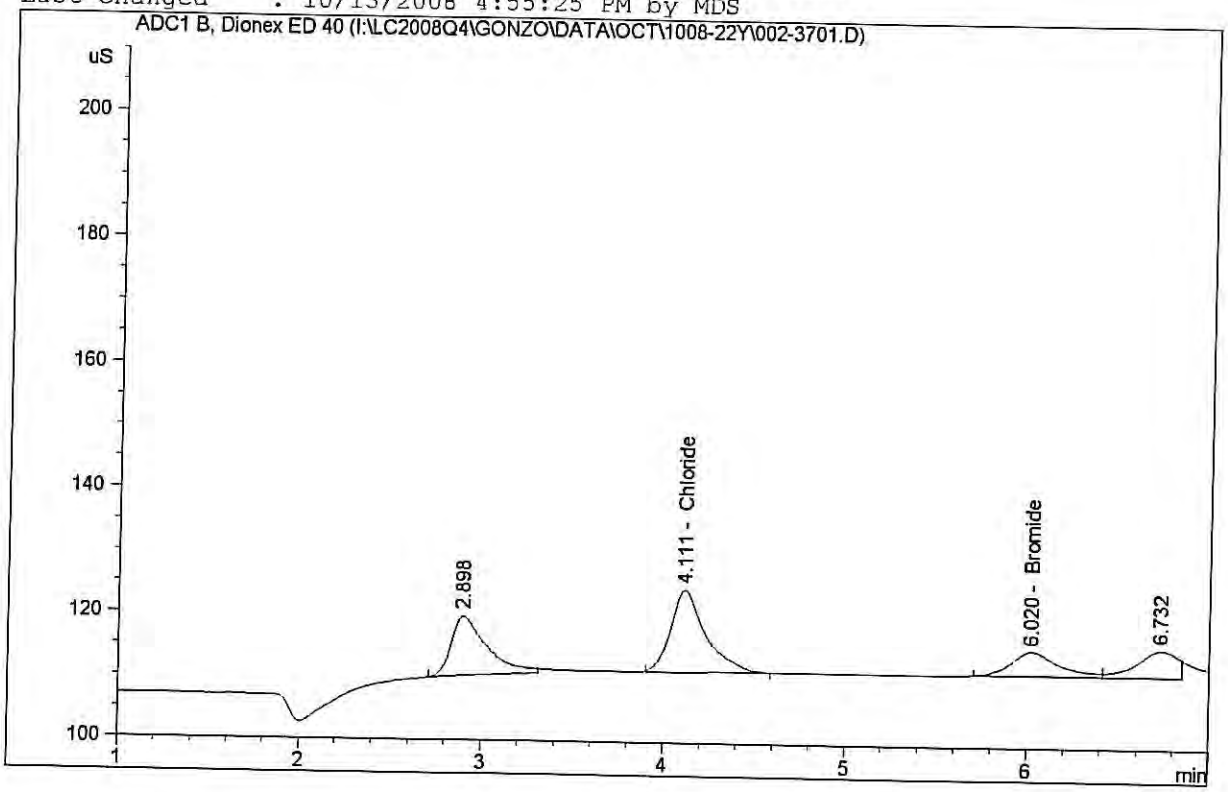
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.108 PB       37.24414 1.30378e-2 4.85581e-1     Chloride
  6.097 MM       17.12465 2.65528e-2 4.54708e-1     Bromide

Totals :                                9.40288e-1

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

Injection Date	: 10/10/2008 11:50:48 PM	Seq. Line :	37
Sample Name	: Standard 2	Location :	Vial 2
Acq. Operator	: MDS	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M		
Last changed	: 10/9/2008 1:53:38 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22W.M		
Last changed	: 10/13/2008 4:55:25 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 4:55:23 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

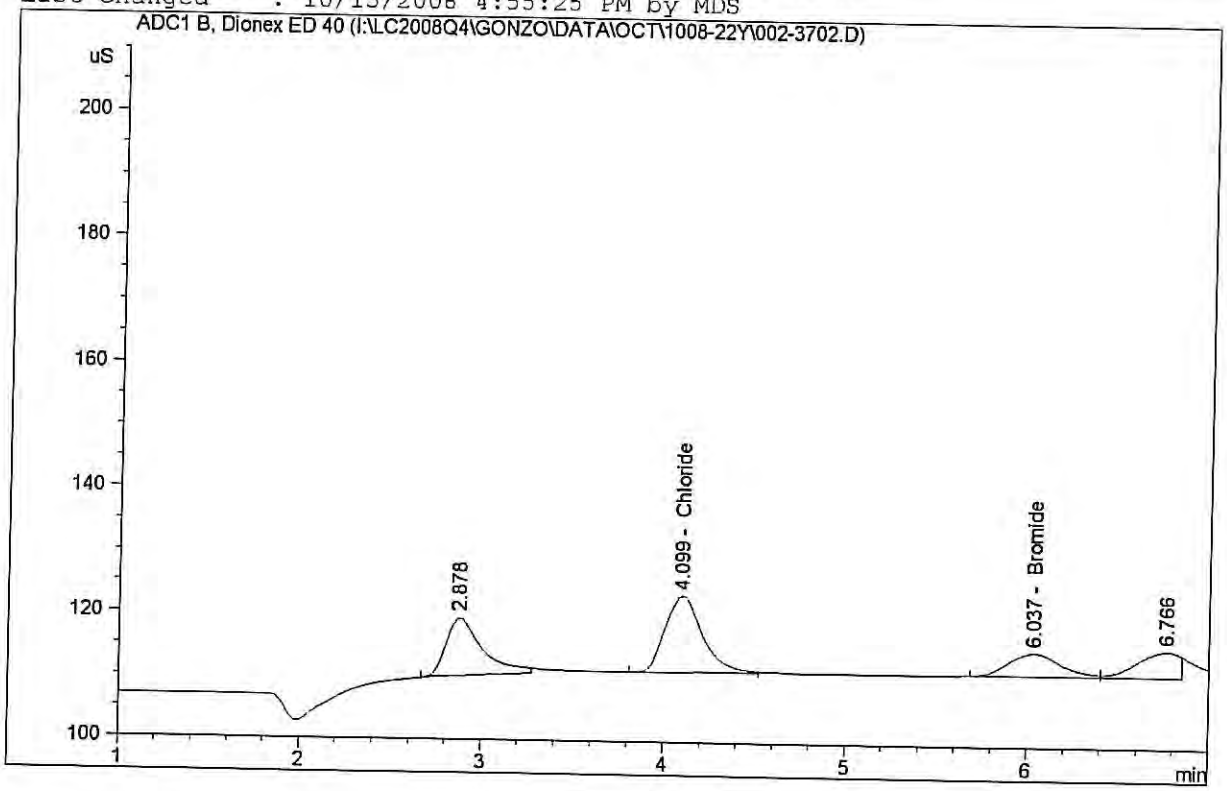
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.111	BB	176.48891	1.24990e-2	2.20594		Chloride
6.020	BV	75.89852	2.99887e-2	2.27610		Bromide
Totals :				4.48204		

Results obtained with enhanced integrator!

*** End of Report ***

```
==========================================================================
Injection Date  : 10/10/2008 11:59:42 PM          Seq. Line :  37
Sample Name     : Standard 2                       Location : Vial 2
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

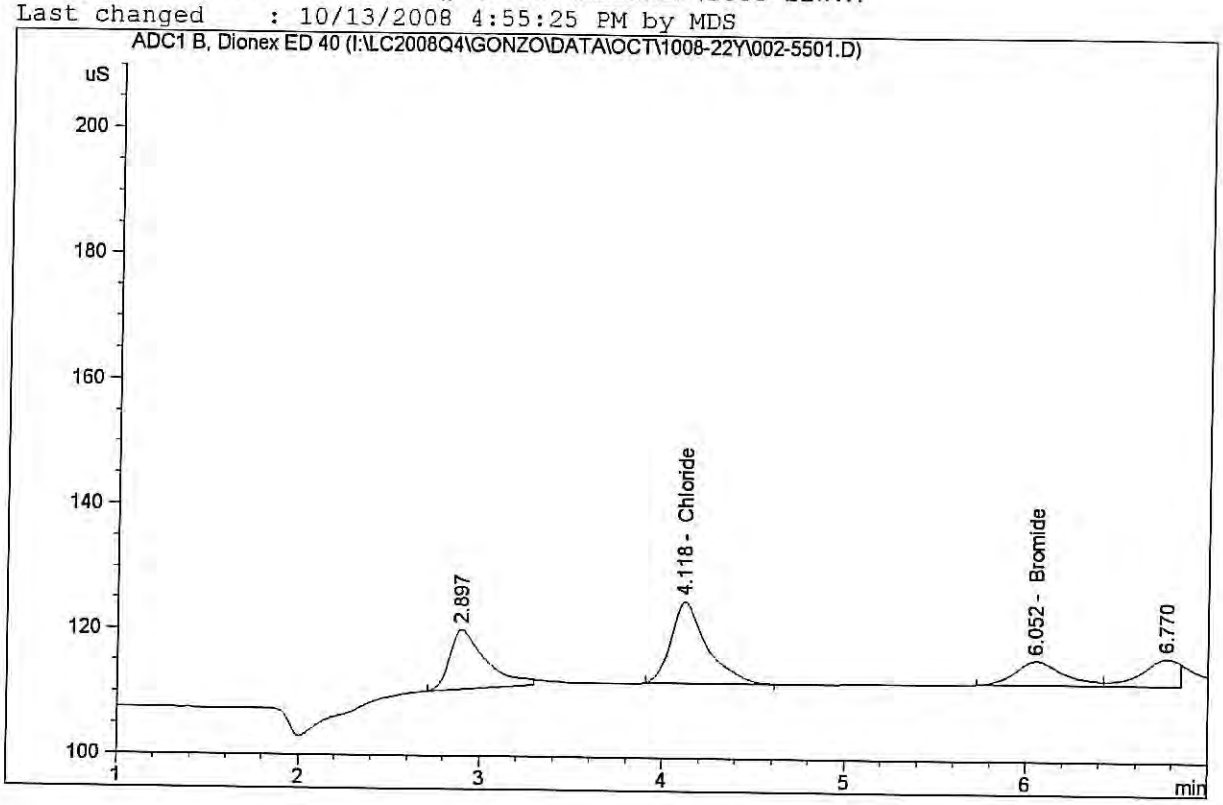
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.099 PB      174.81441 1.25004e-2    2.18525      Chloride
  6.037 BV       76.83750 3.00009e-2    2.30520      Bromide

Totals :                                 4.49045

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 7:34:27 AM          Seq. Line :  55
Sample Name     : Standard 2                      Location : Vial 2
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

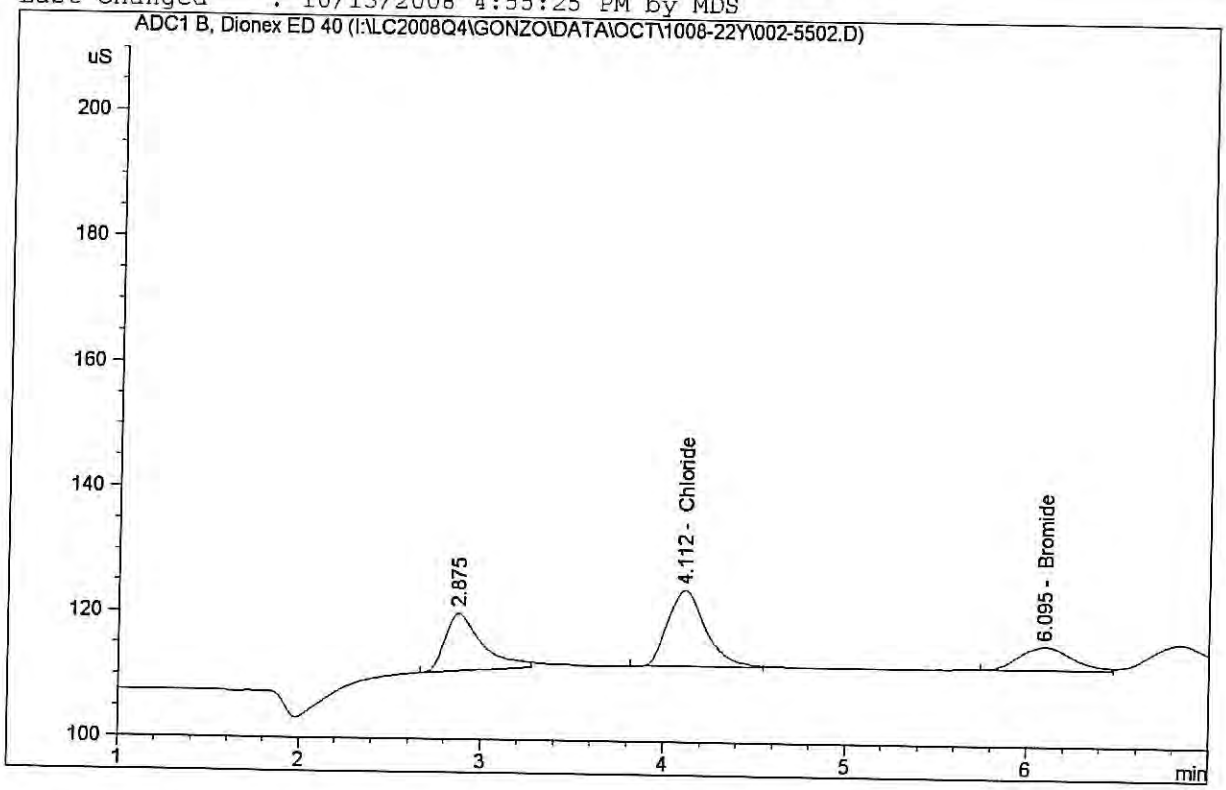
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.118 BB      178.97208 1.24970e-2    2.23662     Chloride
  6.052 BV       76.59715 2.99978e-2    2.29775     Bromide

Totals :                                4.53437

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 7:43:21 AM          Seq. Line :  55
Sample Name     : Standard 2                      Location : Vial 2
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

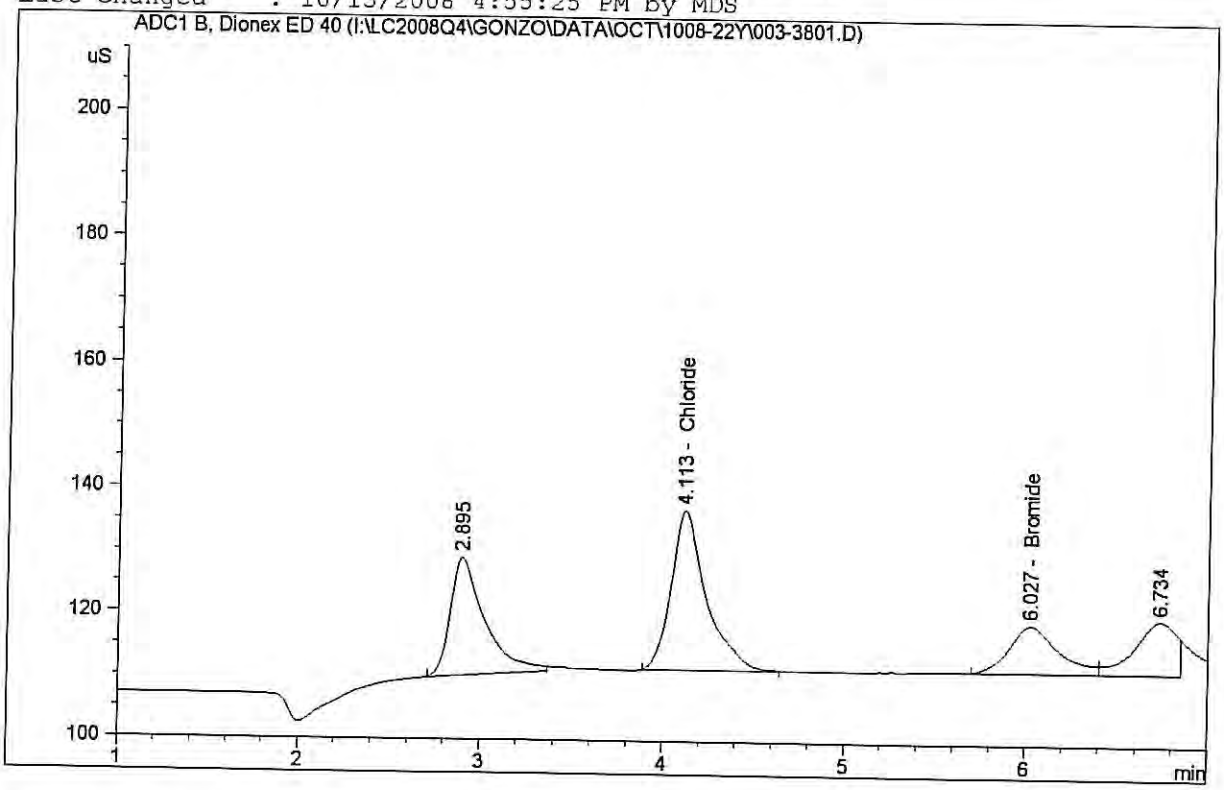
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.112 PB      176.56955 1.24990e-2    2.20693     Chloride
  6.095 BV       77.28726 3.00067e-2    2.31914     Bromide

Totals :                                4.52607

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 12:08:36 AM          Seq. Line :  38
Sample Name     : Standard 3                       Location : Vial 3
Acq. Operator   : MDS                                   Inj :   1
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

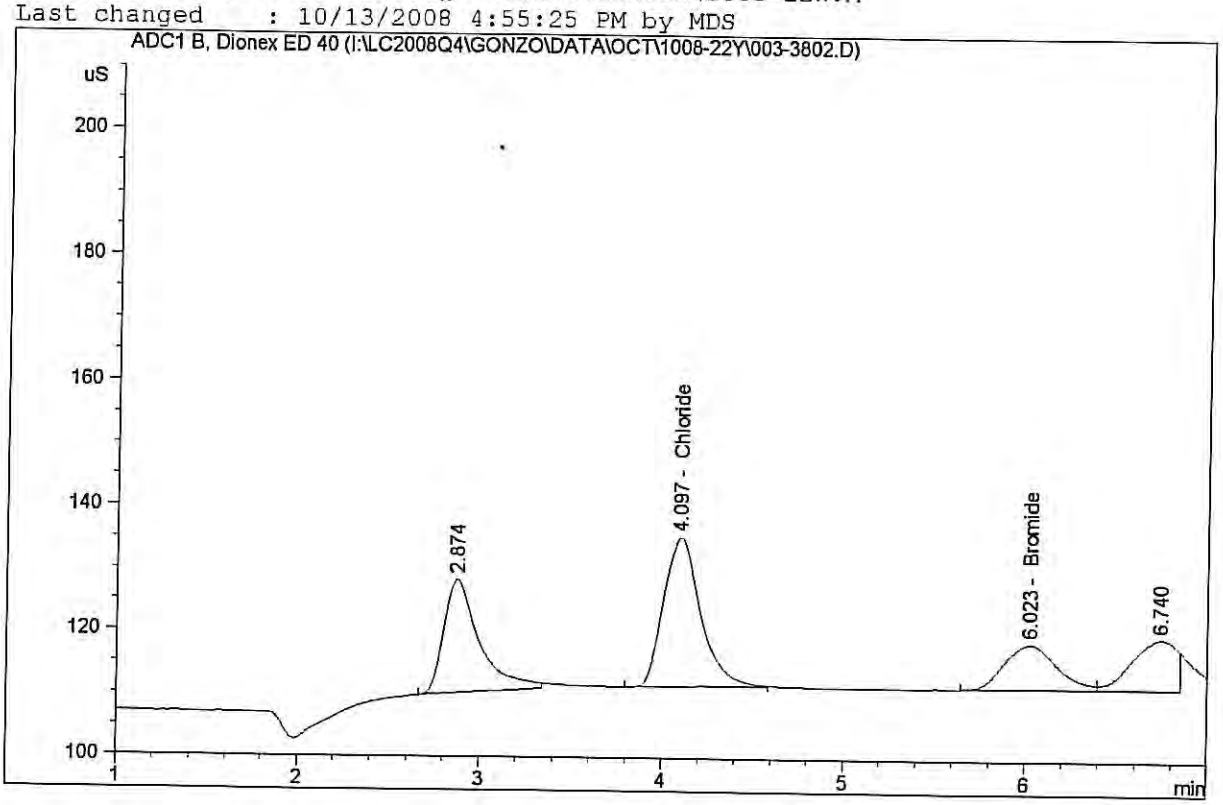
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area     Amount    Grp   Name
 [min]           [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.113 BB      345.01520 1.24286e-2    4.28807     Chloride
  6.027 BV      145.98734 3.04693e-2    4.44814     Bromide

Totals :                                8.73620

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 12:17:28 AM        Seq. Line :  38
Sample Name     : Standard 3                     Location : Vial 3
Acq. Operator   : MDS                                Inj :   2
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

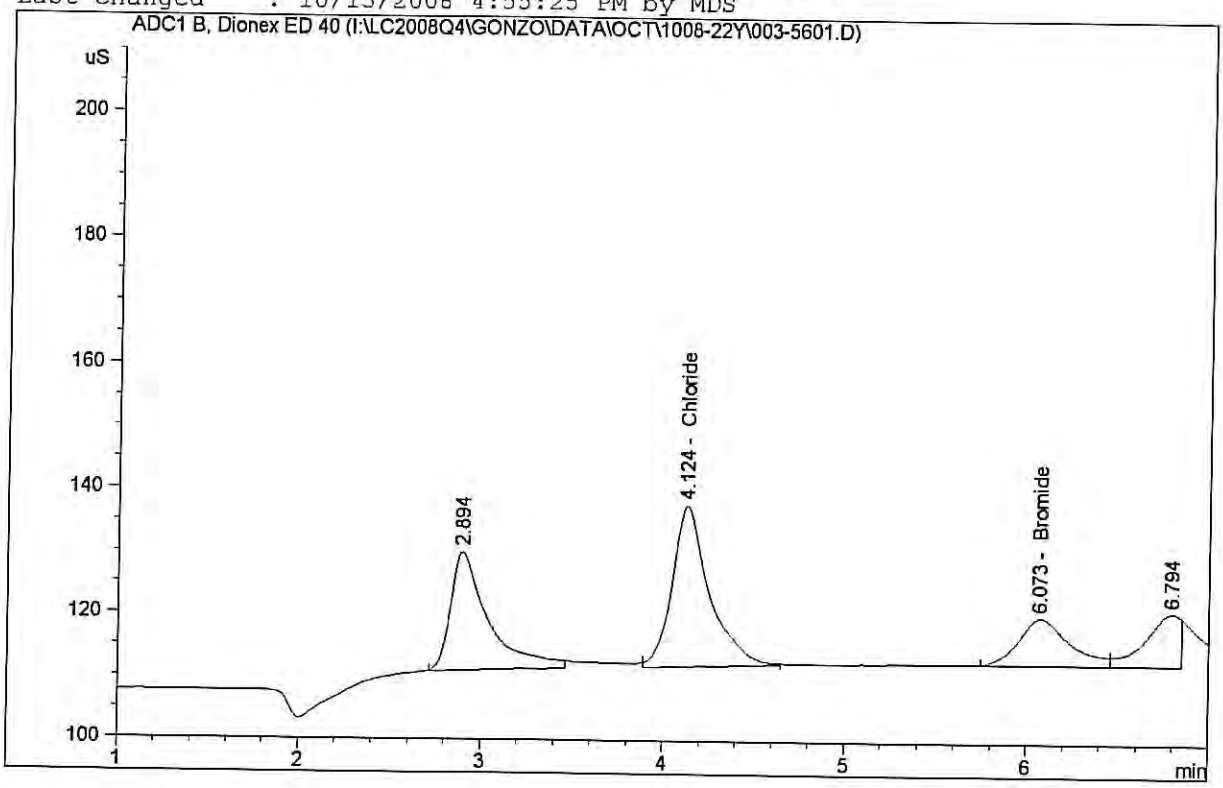
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  4.097 PB      343.13748 1.24290e-2    4.26487     Chloride
  6.023 BV      145.42984 3.04673e-2    4.43086     Bromide

Totals :                                8.69573

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 7:52:14 AM          Seq. Line :  56
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

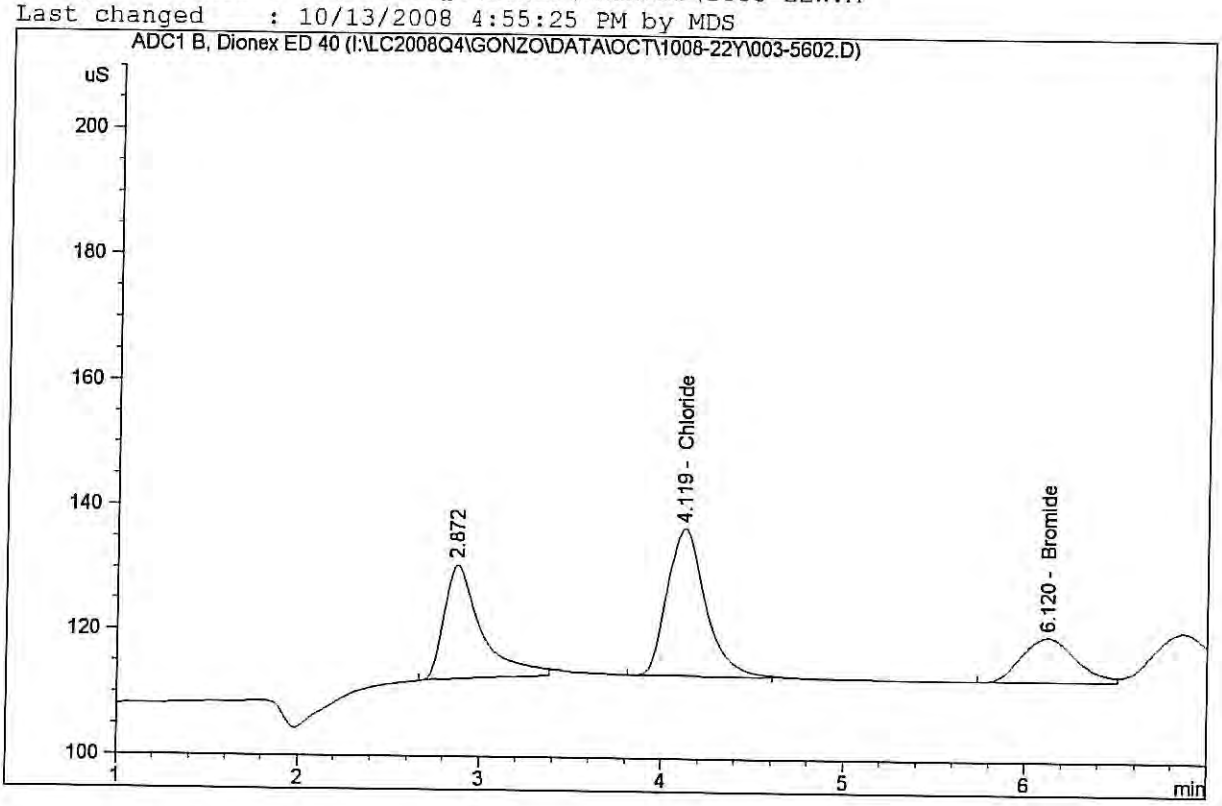
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.124 BB      371.29242 1.24234e-2    4.61272     Chloride
  6.073 BV      148.12151 3.04768e-2    4.51427     Bromide

Totals :                                9.12699

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 8:01:07 AM          Seq. Line :  56
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

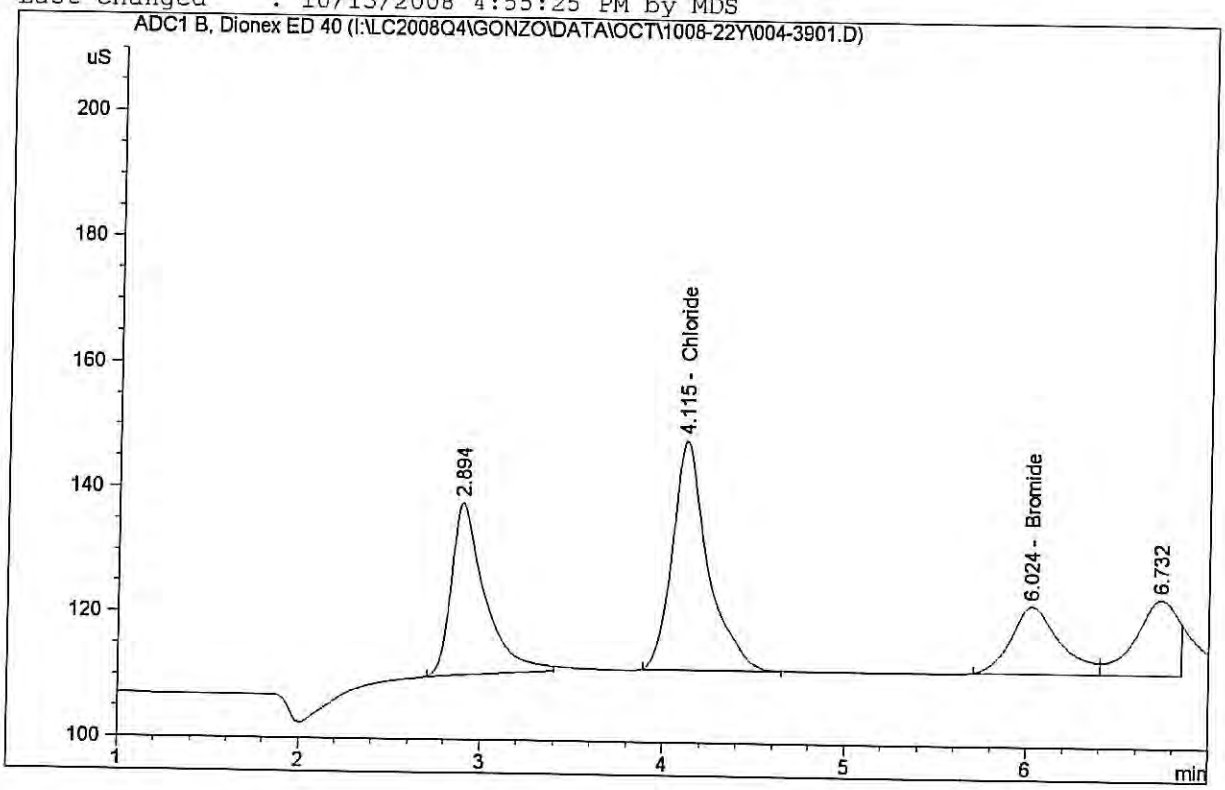
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.119 PB      346.18887 1.24284e-2    4.30257     Chloride
  6.120 BV      147.54430 3.04748e-2    4.49639     Bromide

Totals :                                8.79895

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 12:26:24 AM          Seq. Line :  39
Sample Name     : Standard 4                       Location : Vial 4
Acq. Operator   : MDS                                  Inj :   1
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

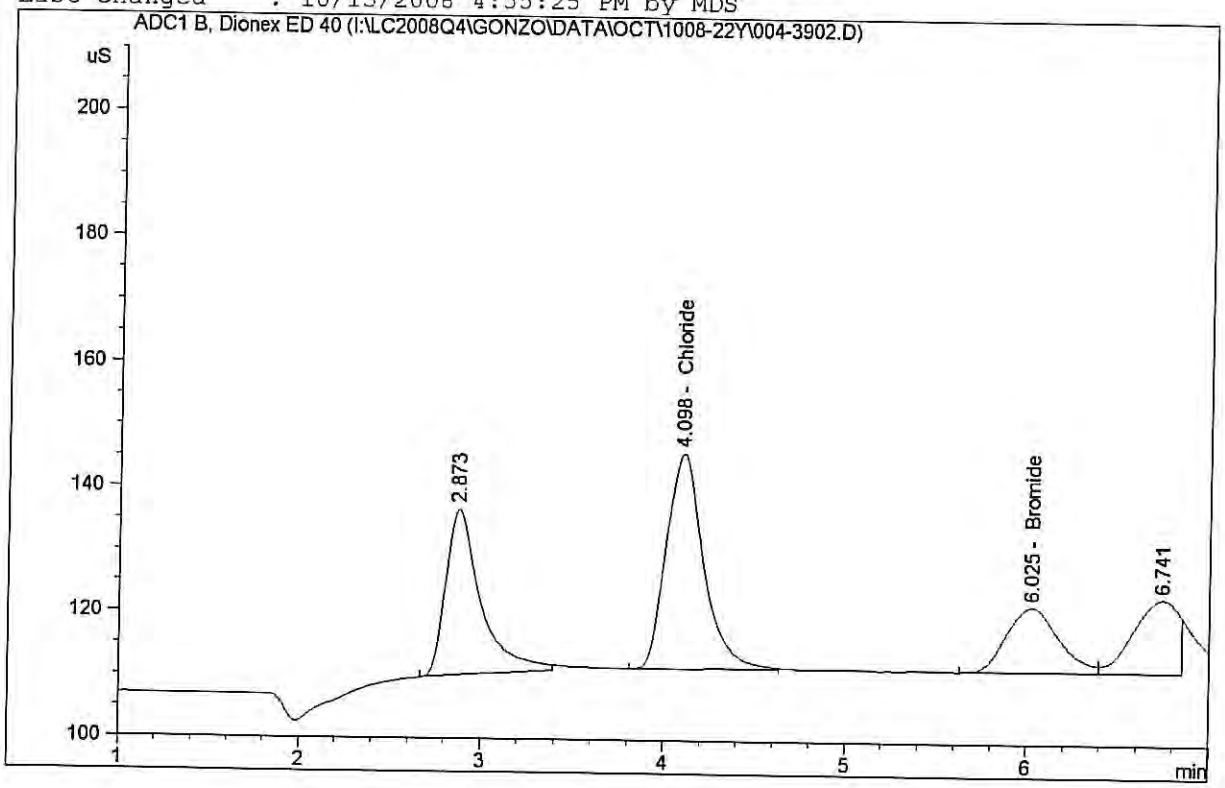
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  4.115 BB      498.02750 1.24060e-2    6.17852      Chloride
  6.024 BV      208.03468 3.06246e-2    6.37097      Bromide

Totals :                                12.54949

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 12:35:14 AM          Seq. Line :  39
Sample Name     : Standard 4                       Location : Vial 4
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

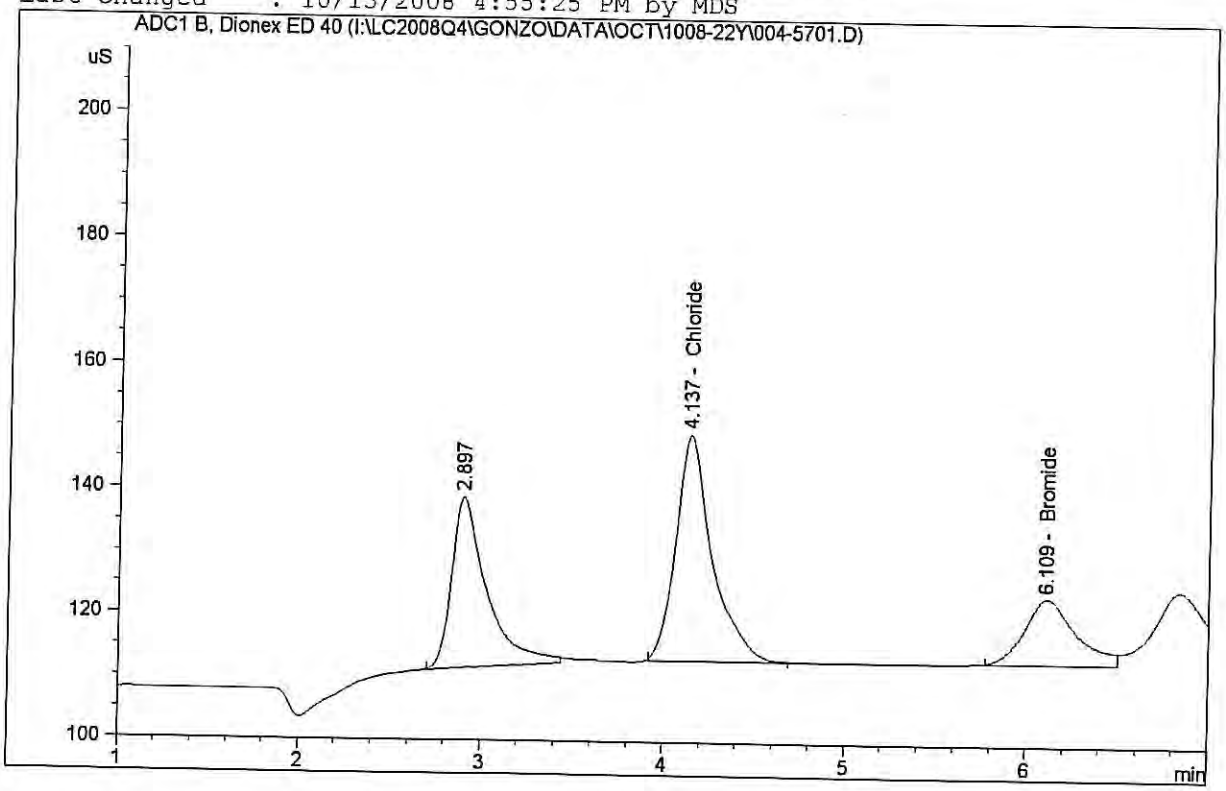
RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.098 PB      496.74710 1.24061e-2    6.16270      Chloride
  6.025 PV      209.76624 3.06276e-2    6.42463      Bromide

Totals :                                12.58733

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

Injection Date : 10/11/2008 8:10:00 AM
Sample Name : Standard 4
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS

Seq. Line : 57
Location : Vial 4
Inj : 1
Inj Volume : 25 µl



External Standard Report

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

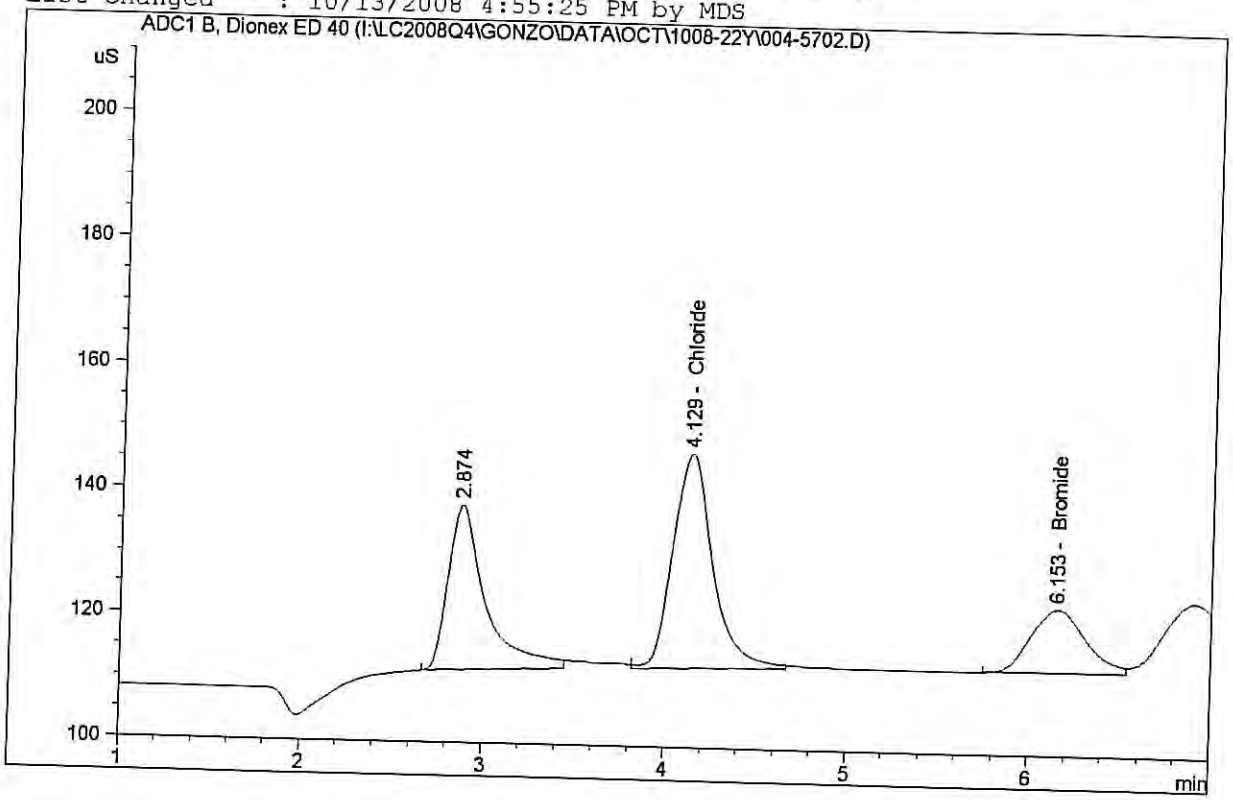
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.137	BB	505.14505	1.24053e-2	6.26646		Chloride
6.109	BV	210.29846	3.06285e-2	6.44113		Bromide
Totals :				12.70758		

Results obtained with enhanced integrator!

*** End of Report ***

Injection Date	: 10/11/2008 8:18:54 AM	Seq. Line :	57
Sample Name	: Standard 4	Location :	Vial 4
Acq. Operator	: MDS	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M		
Last changed	: 10/9/2008 1:53:38 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22W.M		
Last changed	: 10/13/2008 4:55:25 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 4:55:23 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

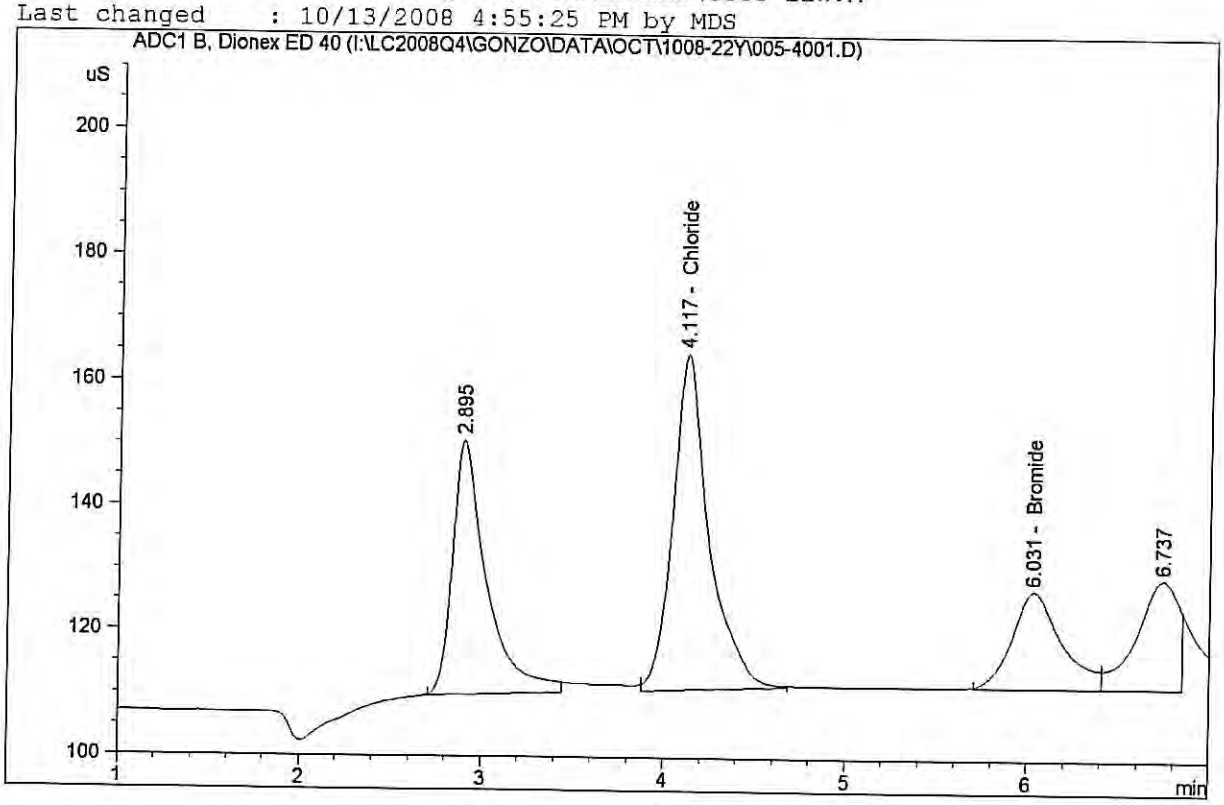
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.129	BB	527.75195	1.24031e-2	6.54576		Chloride
6.153	PV	212.30571	3.06319e-2	6.50333		Bromide
Totals :				13.04909		

Results obtained with enhanced integrator!

*** End of Report ***

```
==========================================================================
Injection Date  : 10/11/2008 12:44:06 AM          Seq. Line :  40
Sample Name     : Standard 5                       Location : Vial 5
Acq. Operator   : MDS                                   Inj :   1
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

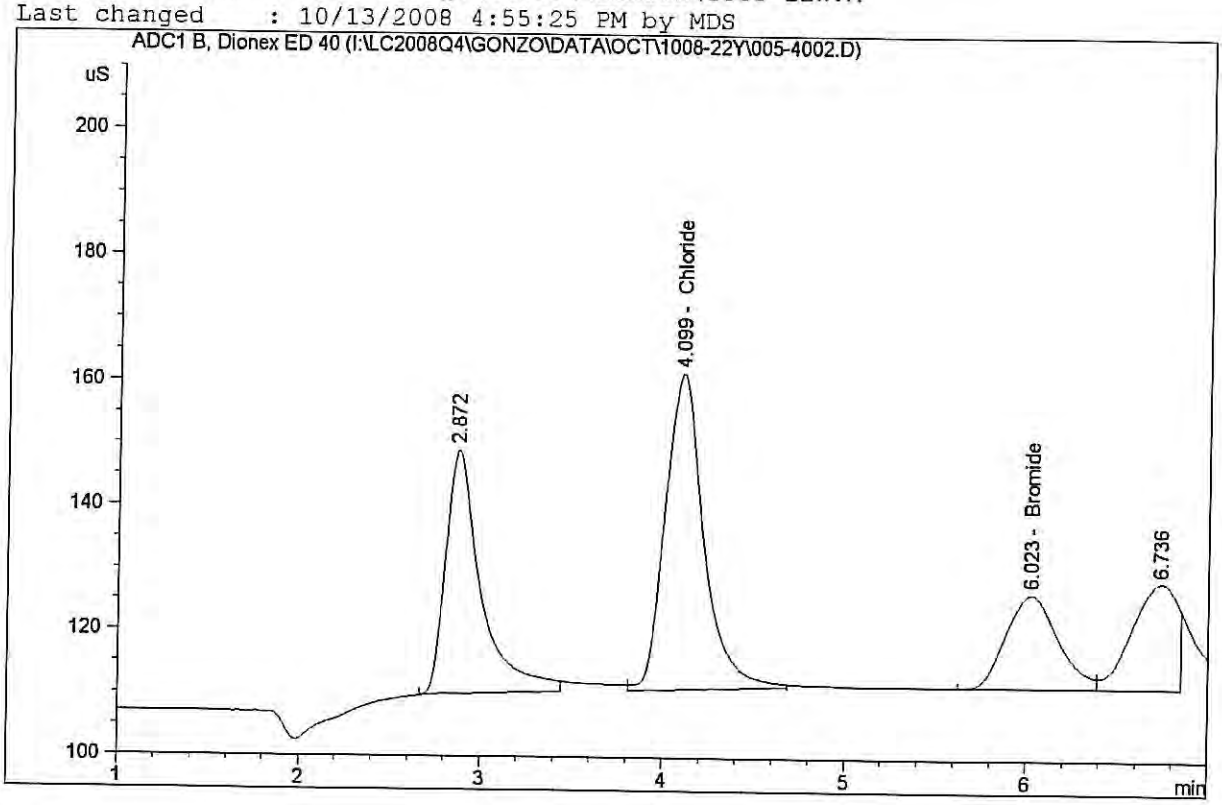
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.117 BB      749.98846 1.23888e-2    9.29148      Chloride
  6.031 BV      297.26187 3.07342e-2    9.13610      Bromide

Totals :                                18.42758

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 12:52:55 AM          Seq. Line :  40
Sample Name     : Standard 5                       Location : Vial 5
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

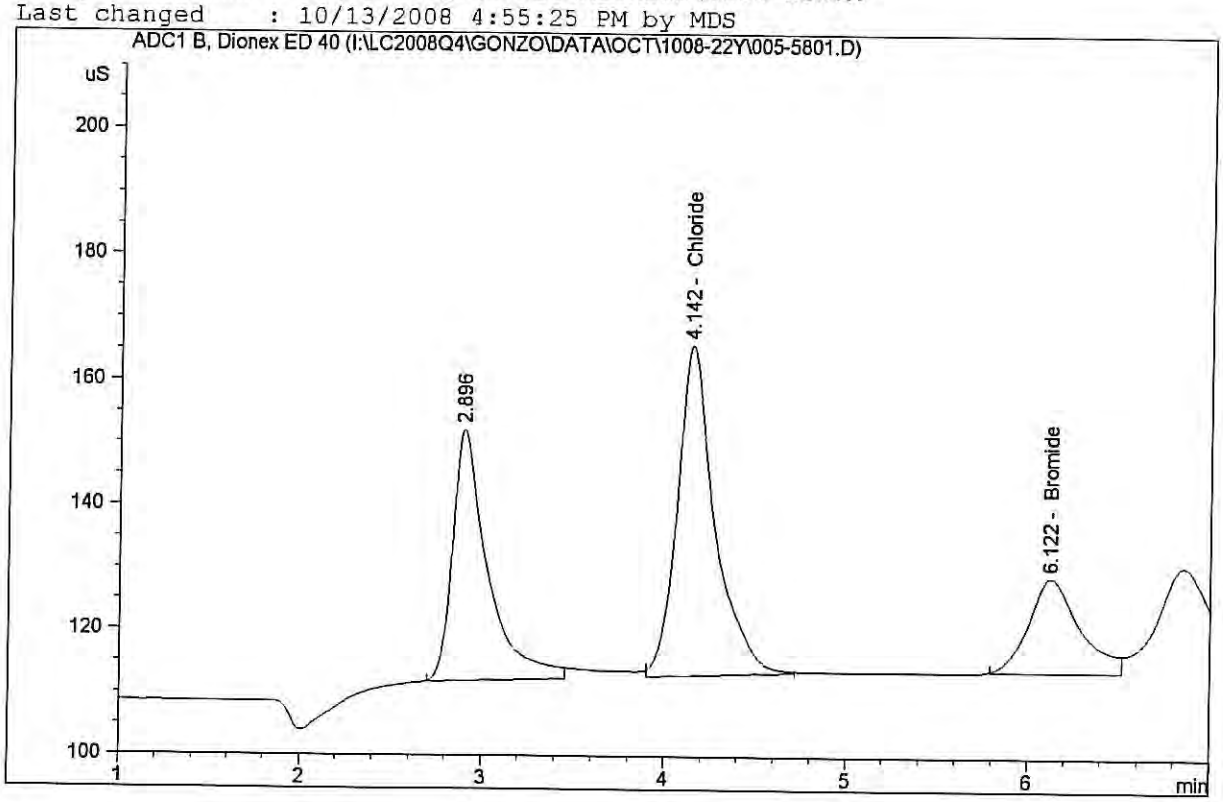
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.099 BB      747.96747 1.23889e-2    9.26651     Chloride
  6.023 BV      300.06107 3.07366e-2    9.22285     Bromide

Totals :                                18.48936

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 8:27:49 AM          Seq. Line :  58
Sample Name     : Standard 5                      Location : Vial 5
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

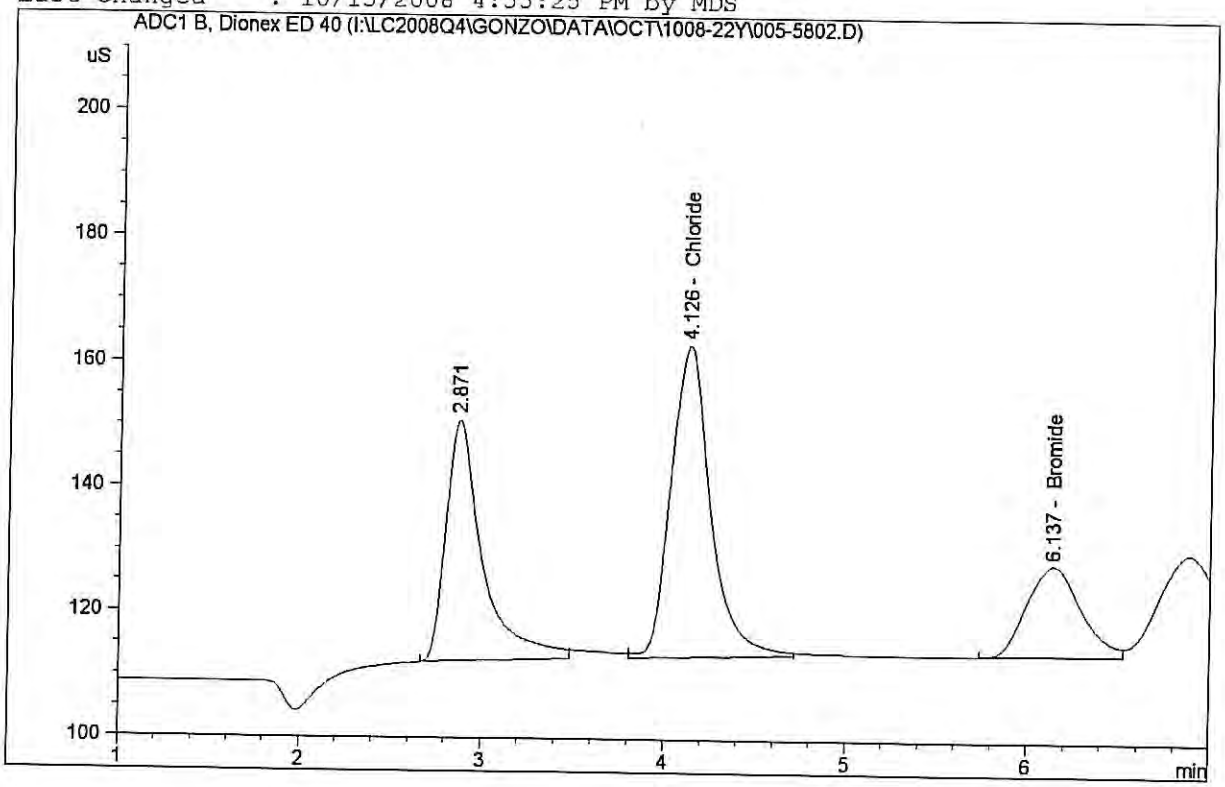
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.142 BB      760.84991 1.23883e-2    9.42567     Chloride
  6.122 BV      302.68381 3.07388e-2    9.30413     Bromide

Totals :                                18.72980

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 8:36:46 AM          Seq. Line :  58
Sample Name     : Standard 5                      Location : Vial 5
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

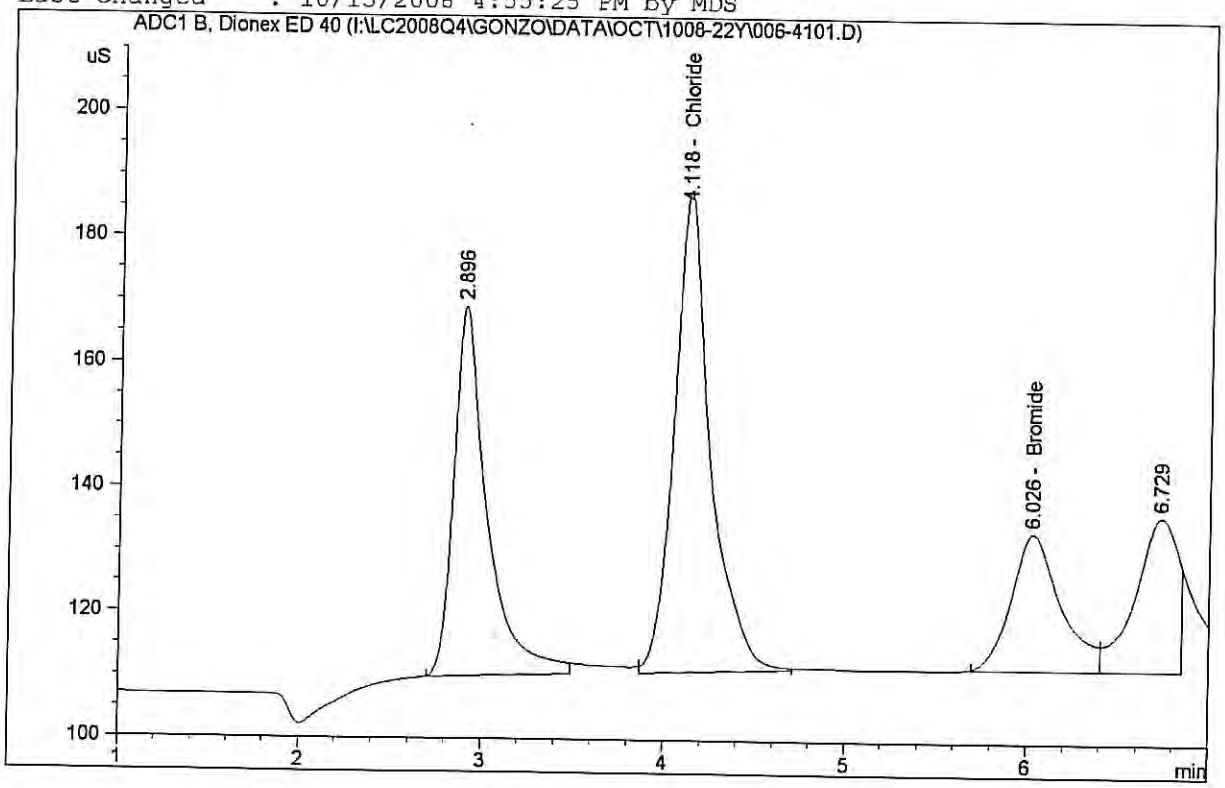
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.126 BB      759.05945 1.23884e-2    9.40355     Chloride
  6.137 BV      303.72614 3.07396e-2    9.33643     Bromide

Totals :                                18.73998

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 1:01:48 AM          Seq. Line :  41
Sample Name     : Standard 6                      Location : Vial 6
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

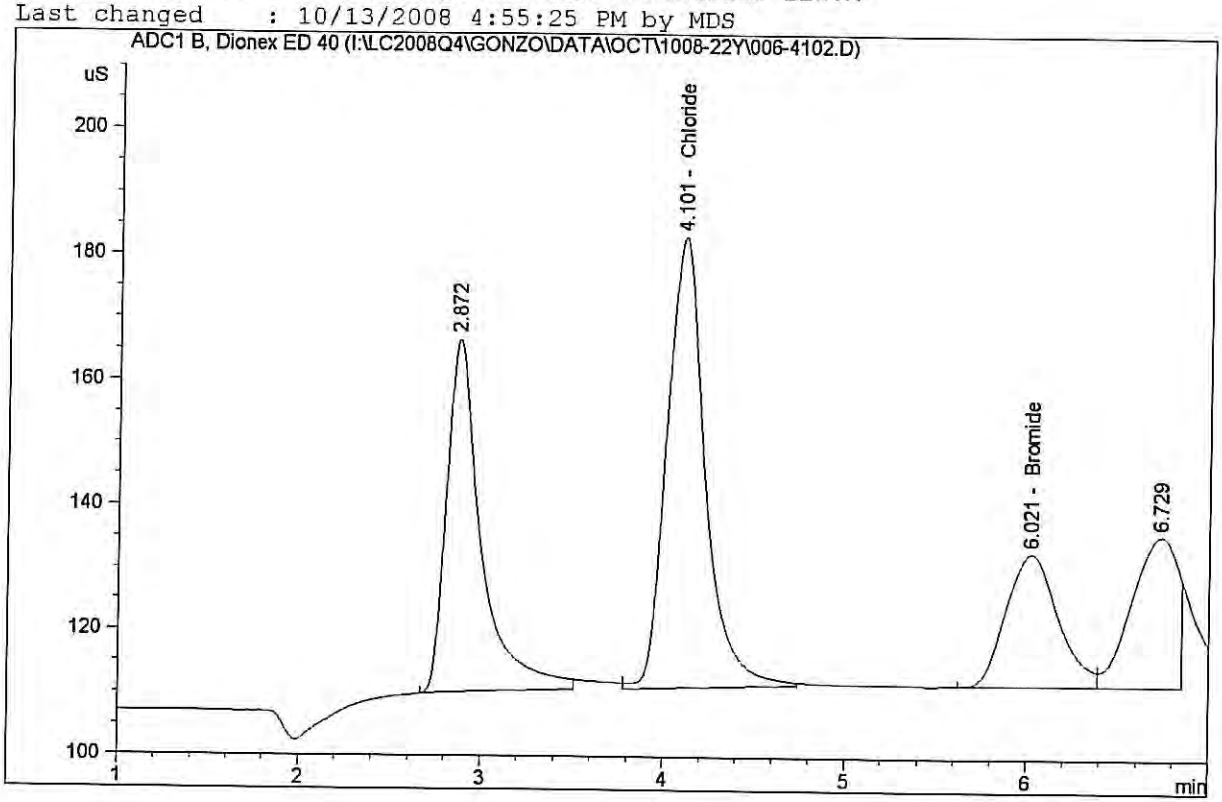
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  4.118 BB     1067.05090 1.23788e-2   13.20876     Chloride
  6.026 BV      420.48590 3.08091e-2   12.95479     Bromide

Totals :                                26.16355

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/11/2008 1:10:42 AM          Seq. Line :  41
Sample Name     : Standard 6                      Location : Vial 6
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

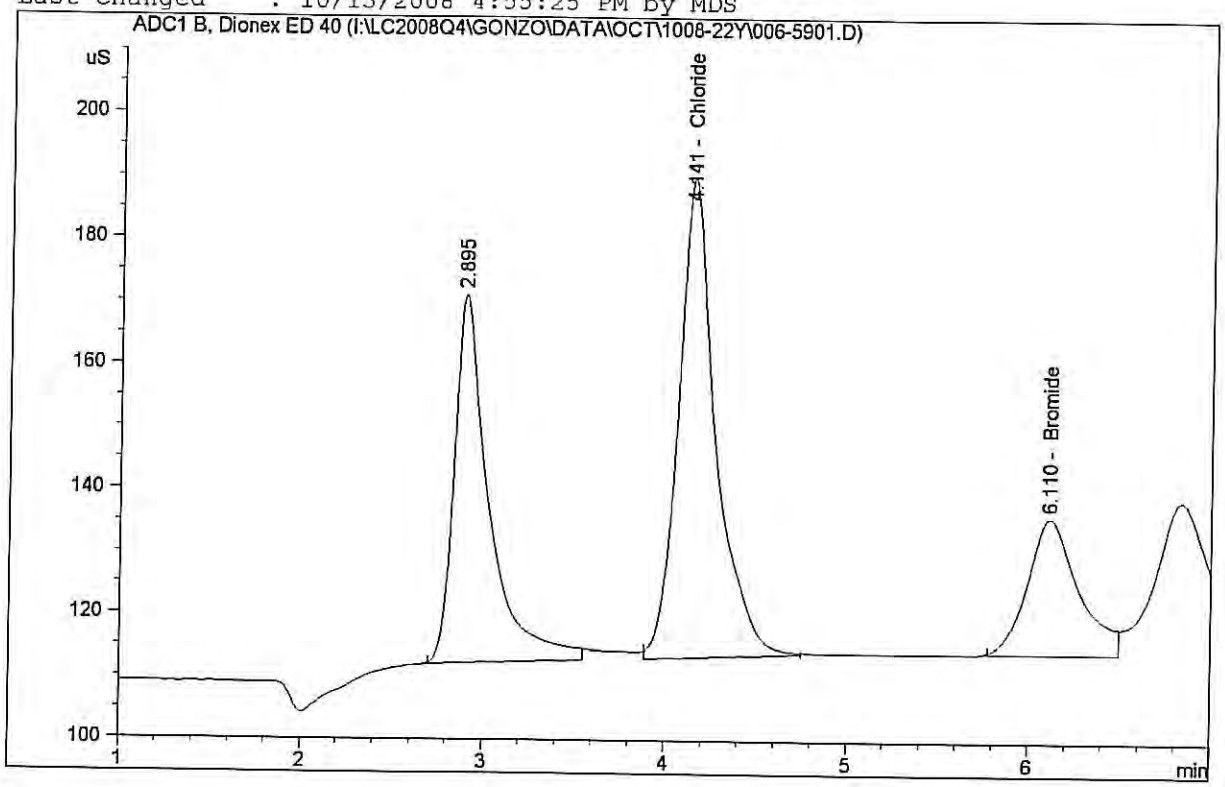
RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.101 BB     1066.51721 1.23788e-2   13.20216     Chloride
  6.021 BV      424.88870 3.08110e-2   13.09123     Bromide

Totals :                               26.29340

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

==========

Injection Date : 10/11/2008 8:45:39 AM Seq. Line : 59
Sample Name : Standard 6 Location : Vial 6
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed : 10/13/2008 4:55:25 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Monday, October 13, 2008 4:55:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.141	BB	1094.45557	1.23782e-2	13.54734		Chloride
6.110	BV	429.04953	3.08127e-2	13.22018		Bromide

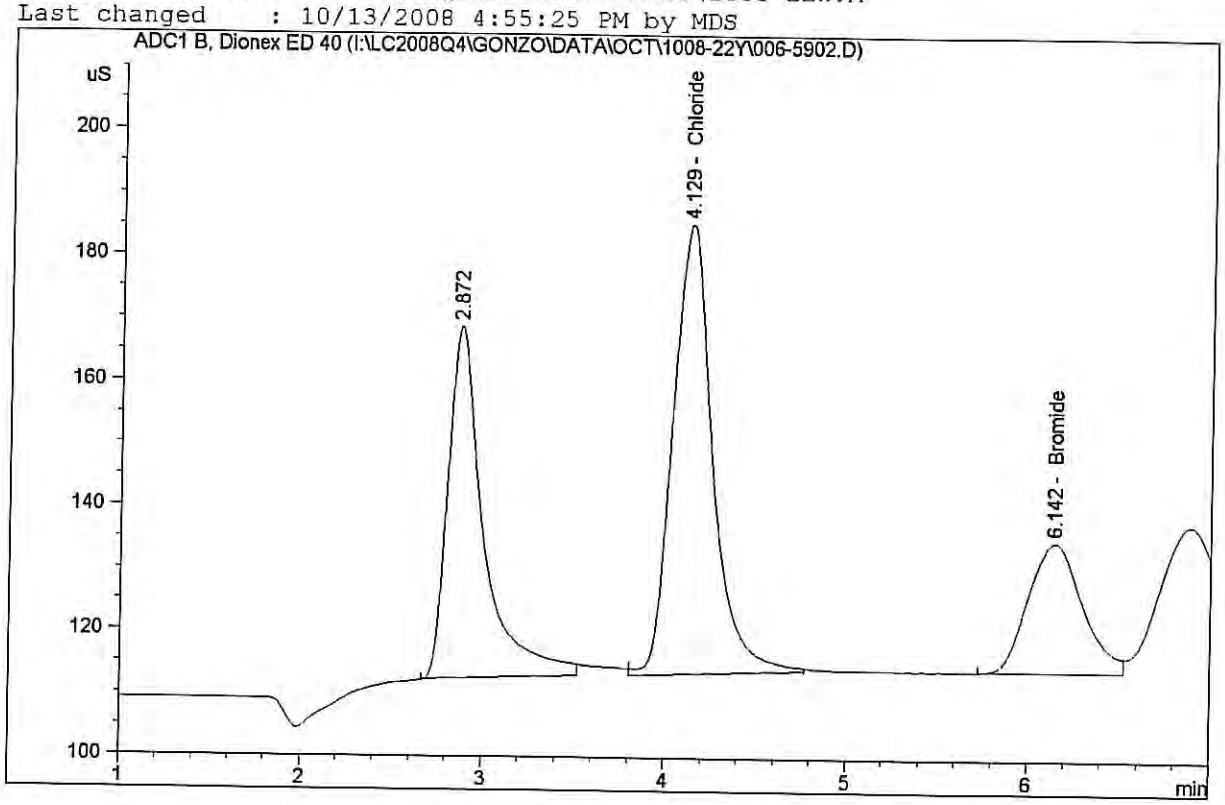
Totals : 26.76752

Results obtained with enhanced integrator!

==========

*** End of Report ***

Injection Date	: 10/11/2008 8:54:31 AM	Seq. Line :	59
Sample Name	: Standard 6	Location :	Vial 6
Acq. Operator	: MDS	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M		
Last changed	: 10/9/2008 1:53:38 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22W.M		
Last changed	: 10/13/2008 4:55:25 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 4:55:23 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

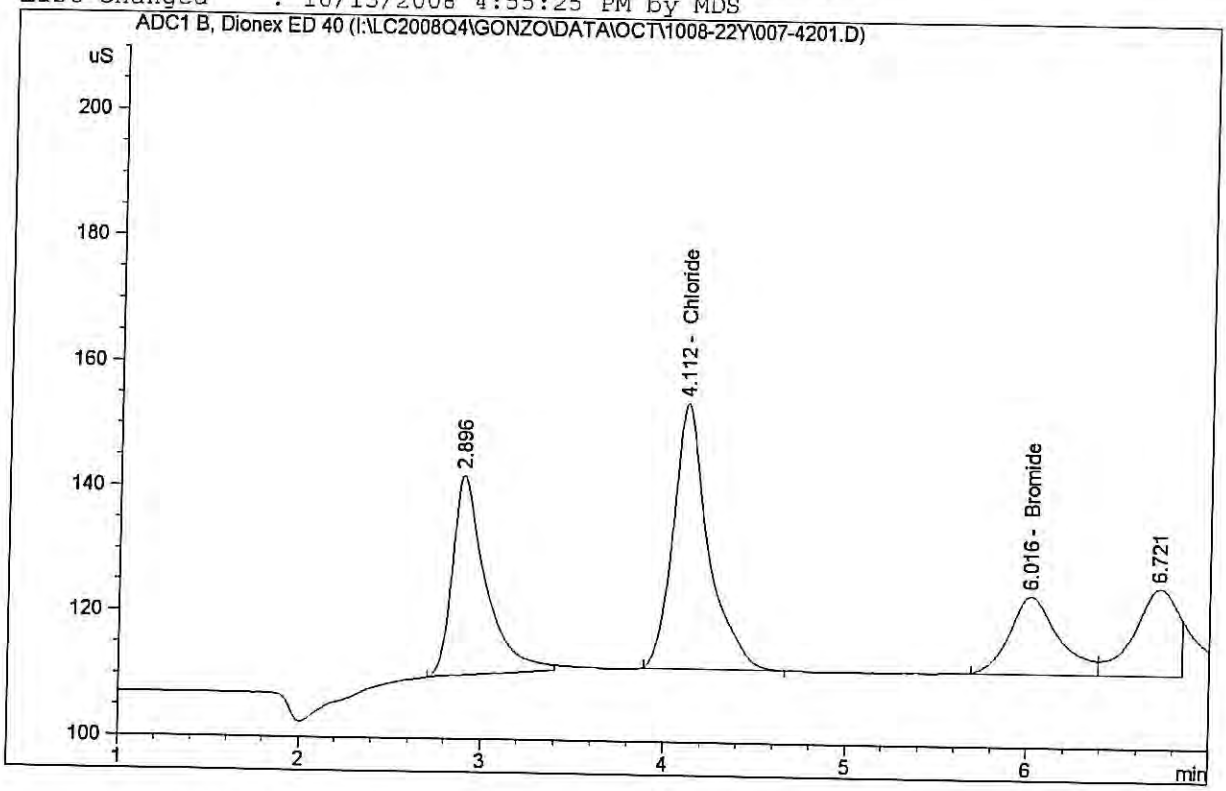
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.129	BB	1094.13391	1.23782e-2	13.54337		Chloride
6.142	PV	433.21414	3.08144e-2	13.34924		Bromide
Totals :				26.89260		

Results obtained with enhanced integrator!

*** End of Report ***

Injection Date	: 10/11/2008 1:19:31 AM	Seq. Line :	42
Sample Name	: Second Source	Location :	Vial 7
Acq. Operator	: MDS	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M		
Last changed	: 10/9/2008 1:53:38 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-22W.M		
Last changed	: 10/13/2008 4:55:25 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Monday, October 13, 2008 4:55:23 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

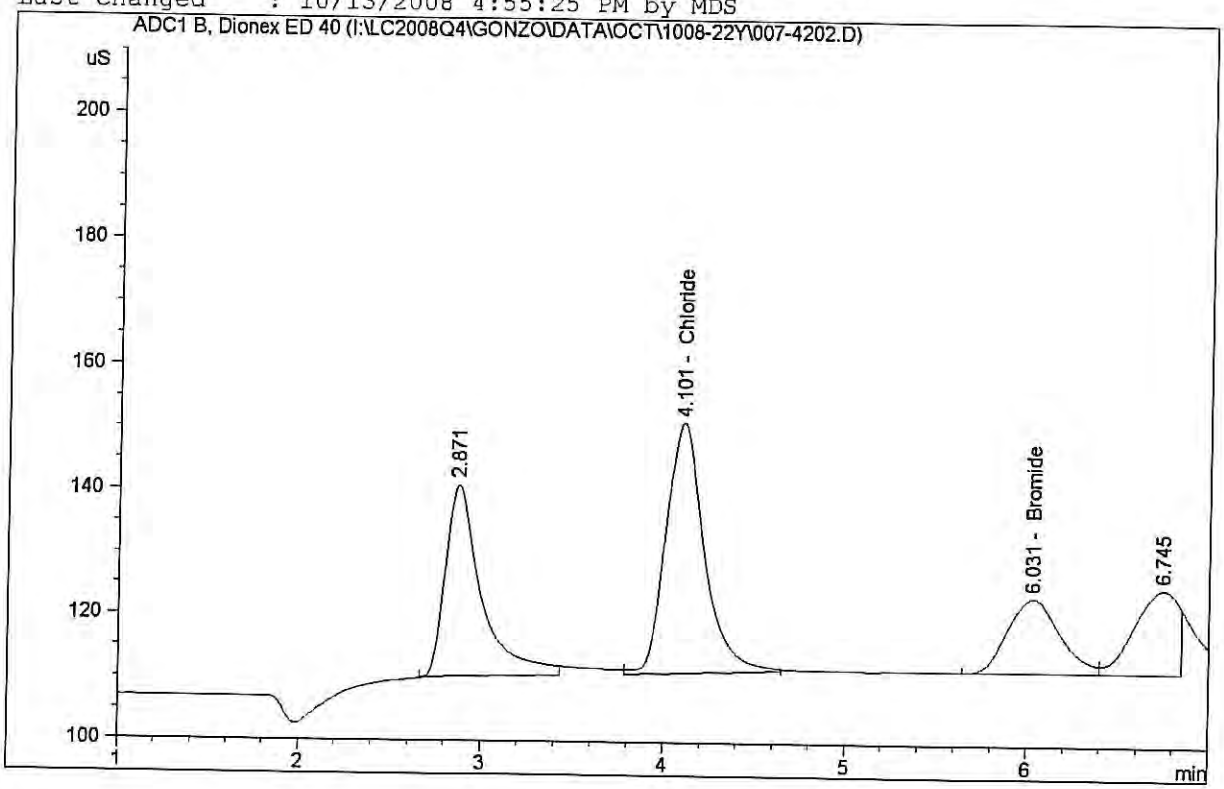
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.112	BB	575.45966	1.23991e-2	7.13519		Chloride
6.016	BV	237.82397	3.06703e-2	7.29414		Bromide
Totals :				14.42932		

Results obtained with enhanced integrator!

*** End of Report ***

```
==================================================================
Injection Date  : 10/11/2008 1:28:27 AM          Seq. Line :  42
Sample Name     : Second Source                   Location : Vial 7
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSWTCH.M
Last changed    : 10/9/2008 1:53:38 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-22W.M
Last changed    : 10/13/2008 4:55:25 PM by MDS
```




```
==================================================================
                    External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Monday, October 13, 2008 4:55:23 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area     Amount   Grp   Name
 [min]           [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  4.101 BB      596.61646 1.23975e-2    7.39658     Chloride
  6.031 BV      240.11308 3.06734e-2    7.36507     Bromide

Totals :                                14.76165

 Results obtained with enhanced integrator!
==================================================================
                    *** End of Report ***
```

Method Information

Dionex IonPac AS-14A 4-mm analytical (4x250mm) column.
Flow rate 1.2 mL/min
8mM Na2CO3/1mM NaHCO3 mobile phase
Suppressed anion conductivity detection

==========

ANALOG DIGITAL CONVERTER

==========

	Signal 1
Description:	Dionex ED 40
Source:	Signal
Unit:	uS
Units/Volt:	1000.000
Peakwidth (Data Rate):	0.027 Min (10.00 Hz)
Stop Time:	No Limit
Data Storage:	All

Start Signal Source: External Device Will Start 35900

Timed Event Table:
<no events>

1100 Quaternary Pump 1

Control

Column Flow	:	1.200 ml/min
Stoptime	:	7.00 min
Posttime	:	Off

Solvents

Solvent A	:	100.0 % (8.0mM Na2CO3/1.0mM NaHCO3)
Solvent B	:	Off
Solvent C	:	0.0 % (8.0mM Na2CO3/1.0mM NaHCO3)
Solvent D	:	Off

PressureLimits

Minimum Pressure	:	0 bar
Maximum Pressure	:	400 bar

Auxiliary

Maximal Flow Ramp	:	100.00 ml/min^2
Primary Channel	:	Auto
Compressibility	:	83*10^-6/bar
Minimal Stroke	:	Auto

Store Parameters

Store Ratio A	:	Yes
Store Ratio B	:	Yes
Store Ratio C	:	Yes
Store Ratio D	:	Yes
Store Flow	:	Yes
Store Pressure	:	Yes

Agilent 1100 Contacts Option

Contact 1	:	Open
Contact 2	:	Open
Contact 3	:	Open
Contact 4	:	Open

1100 Quaternary Pump 2

Control

Column Flow	:	1.200 ml/min
Stoptime	:	7.00 min
Posttime	:	Off

Solvents

Solvent A	:	0.0 % ( )
Solvent B	:	Off
Solvent C	:	Off
Solvent D	:	100.0 % (8mMNa2CO3\1mMNaHCO3)

PressureLimits

Minimum Pressure	:	0 bar
Maximum Pressure	:	400 bar

Auxiliary

Maximal Flow Ramp	:	100.00 ml/min^2
Primary Channel	:	Auto

Compressibility	:	100*10^-6/bar
Minimal Stroke	:	Auto

Store Parameters

Store Ratio A	:	Yes
Store Ratio B	:	Yes
Store Ratio C	:	Yes
Store Ratio D	:	Yes
Store Flow	:	Yes
Store Pressure	:	Yes

Agilent 1100 Contacts Option
==========

Contact 1	:	Open
Contact 2	:	Open
Contact 3	:	Open
Contact 4	:	Open

==========
Agilent 1100 Autosampler 1
==========

Injection

Injection Mode	:	Needle Wash
Injector volume	:	25.00 µl
Wash Vial	:	100
Optimization	:	none

Auxiliary

Drawspeed	:	100 µl/min
Ejectspeed	:	1000 µl/min
Draw position	:	2.0 mm

Time

Stoptime	:	As Pump
Posttime	:	Off

==========
Agilent 1100 Column Thermostat 1
==========

Temperature settings

Left temperature	:	30.0°C
Right temperature	:	Same as left
Enable analysis	:	When Temp. is within setpoint +/- 0.8°C
Store left temperature	:	No
Store right temperature	:	No

Time

Stoptime	:	As pump
Posttime	:	Off

Column Switching Valve	:	Use current

Method Information

Dionex IonPac AS-14A 4-mm analytical (4x250mm) column.
Flow rate 1.2 mL/min
8mM Na2CO3/1mM NaHCO3 mobile phase
Suppressed anion conductivity detection

==========

ANALOG DIGITAL CONVERTER

==========

	Signal 1
Description:	Dionex ED 40
Source:	Signal
Unit:	uS
Units/Volt:	1000.000
Peakwidth (Data Rate):	0.027 Min (10.00 Hz)
Stop Time:	No Limit
Data Storage:	All

Start Signal Source: External Device Will Start 35900

Timed Event Table:
<no events>

1100 Quaternary Pump 1

Control

Column Flow	:	1.200 ml/min
Stoptime	:	15.00 min
Posttime	:	Off

Solvents

Solvent A	:	100.0 % (8.0mM Na2CO3/1.0mM NaHCO3)
Solvent B	:	Off
Solvent C	:	0.0 % (8.0mM Na2CO3/1.0mM NaHCO3)
Solvent D	:	Off

PressureLimits

Minimum Pressure	:	0 bar
Maximum Pressure	:	400 bar

Auxiliary

Maximal Flow Ramp	:	100.00 ml/min^2
Primary Channel	:	Auto
Compressibility	:	83*10^-6/bar
Minimal Stroke	:	Auto

Store Parameters

Store Ratio A	:	Yes
Store Ratio B	:	Yes
Store Ratio C	:	Yes
Store Ratio D	:	Yes
Store Flow	:	Yes
Store Pressure	:	Yes

Agilent 1100 Contacts Option

Contact 1	:	Open
Contact 2	:	Open
Contact 3	:	Open
Contact 4	:	Open

1100 Quaternary Pump 2

Control

Column Flow	:	1.200 ml/min
Stoptime	:	15.00 min
Posttime	:	Off

Solvents

Solvent A	:	0.0 % ( )
Solvent B	:	Off
Solvent C	:	Off
Solvent D	:	100.0 % (8mMNa2CO3\1mMNaHCO3)

PressureLimits

Minimum Pressure	:	0 bar
Maximum Pressure	:	400 bar

Auxiliary

Maximal Flow Ramp	:	100.00 ml/min^2
Primary Channel	:	Auto

Compressibility	:	100*10^-6/bar
Minimal Stroke	:	Auto

Store Parameters

Store Ratio A	:	Yes
Store Ratio B	:	Yes
Store Ratio C	:	Yes
Store Ratio D	:	Yes
Store Flow	:	Yes
Store Pressure	:	Yes

Agilent 1100 Contacts Option
==========

Contact 1	:	Open
Contact 2	:	Open
Contact 3	:	Open
Contact 4	:	Open

==========

Agilent 1100 Autosampler 1

==========

Injection

Injection Mode	:	Needle Wash
Injector volume	:	25.00 µl
Wash Vial	:	100
Optimization	:	none

Auxiliary

Drawspeed	:	100 µl/min
Ejectspeed	:	1000 µl/min
Draw position	:	2.0 mm

Time

Stoptime	:	As Pump
Posttime	:	Off

==========

Agilent 1100 Column Thermostat 1

==========

Temperature settings

Left temperature	:	30.0°C
Right temperature	:	Same as left
Enable analysis	:	When Temp. is within setpoint +/- 0.8°C
Store left temperature	:	No
Store right temperature	:	No

Time

Stoptime	:	As pump
Posttime	:	Off

Column Switching Valve	:	Use current

Sequence Table:

Method and Injection Info Part:

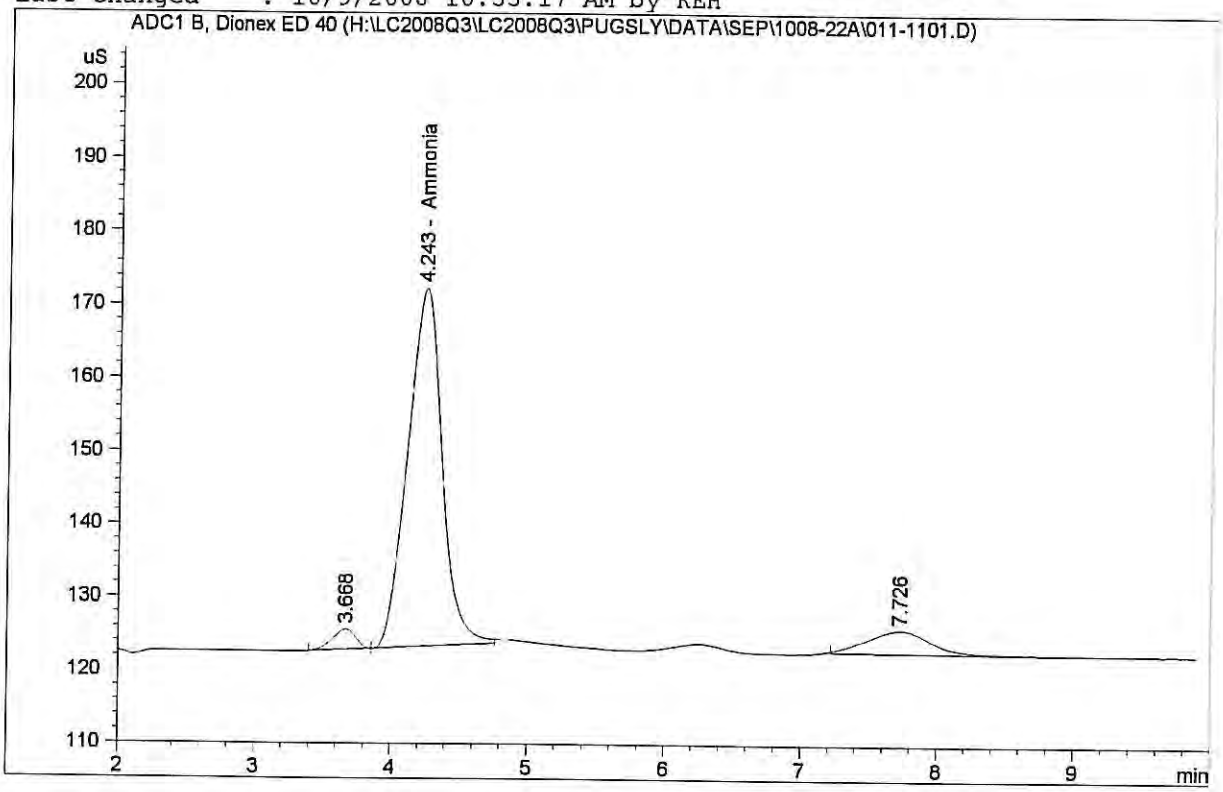
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 1	Standard 1	COLSWTCH	2	Sample		
2	Vial 2	Standard 2	COLSWTCH	2	Sample		
3	Vial 3	Standard 3	COLSWTCH	2	Sample		
4	Vial 4	Standard 4	COLSWTCH	2	Sample		
5	Vial 5	Standard 5	COLSWTCH	2	Sample		
6	Vial 6	Standard 6	COLSWTCH	2	Sample		
7	Vial 7	Second Source	COLSWTCH	2	Sample		
8	Vial 8	H2SO4 Lab Blank	COLSWTCH	2	Sample		
9	Vial 9	DI H2O Lab Blank	COLSWTCH	2	Sample		
10	Vial 11	In R1 C3*1.0009	COLSWTCH	2	Sample		
11	Vial 12	In R2 C3*1.0397	COLSWTCH	2	Sample		
12	Vial 13	In R3 C3*1.0577	COLSWTCH	2	Sample		
13	Vial 14	Stk R1 C3*1.0126	COLSWTCH	2	Sample		
14	Vial 15	Stk R2 C3*1.038	COLSWTCH	2	Sample		
15	Vial 16	Stk R3 C3*1.0471	COLSWTCH	2	Sample		
16	Vial 17	In C6*1.061	COLSWTCH	2	Sample		
17	Vial 18	Stk C6*1.0399	COLSWTCH	2	Sample		
18	Vial 19	MS/In R1 C3	COLSWTCH	2	Sample		
19	Vial 20	T-1*1.1245	COLSWTCH	2	Sample		
20	Vial 3	Standard 3	COLSWTCH	2	Sample		
21	Vial 4	Standard 4	COLSWTCH	2	Sample		
22	Vial 21	T-2*1.1288	COLSWTCH	2	Sample		
23	Vial 22	T-3*1.1384	COLSWTCH	2	Sample		
24	Vial 23	T-4*1.1461	COLSWTCH	2	Sample		
25	Vial 24	MS/T-1	COLSWTCH	2	Sample		
26	Vial 25	Cl- A25	COLSWTCH	2	Sample		
27	Vial 26	Cl- A26	COLSWTCH	2	Sample		
28	Vial 27	Cl- A27	COLSWTCH	2	Sample		
29	Vial 28	Cl- A28	COLSWTCH	2	Sample		
30	Vial 1	Standard 1	COLSWTCH	2	Sample		
31	Vial 2	Standard 2	COLSWTCH	2	Sample		
32	Vial 3	Standard 3	COLSWTCH	2	Sample		
33	Vial 4	Standard 4	COLSWTCH	2	Sample		
34	Vial 5	Standard 5	COLSWTCH	2	Sample		
35	Vial 6	Standard 6	COLSWTCH	2	Sample		
36	Vial 1	Standard 1	COLSWTCH	2	Sample		
37	Vial 2	Standard 2	COLSWTCH	2	Sample		
38	Vial 3	Standard 3	COLSWTCH	2	Sample		
39	Vial 4	Standard 4	COLSWTCH	2	Sample		
40	Vial 5	Standard 5	COLSWTCH	2	Sample		
41	Vial 6	Standard 6	COLSWTCH	2	Sample		
42	Vial 7	Second Source	COLSWTCH	2	Sample		
43	Vial 8	NaOH Lab Blank	COLSWTCH	2	Sample		
44	Vial 9	DI H2O Lab Blank	COLSWTCH	2	Sample		
45	Vial 31	In R1 C4*4.018	CHLSWTCH	2	Sample		
46	Vial 32	In R2 C4*4.018	CHLSWTCH	2	Sample		
47	Vial 33	In R3 C4*4.018	CHLSWTCH	2	Sample		
48	Vial 34	Stk R1 C4*4.01	CHLSWTCH	2	Sample		
49	Vial 35	Stk R2 C4*4.01	CHLSWTCH	2	Sample		
50	Vial 36	Stack R3 C4*4.01	CHLSWTCH	2	Sample		
51	Vial 37	In C7*4.1	CHLSWTCH	2	Sample		
52	Vial 38	Stk C7*4.1	CHLSWTCH	2	Sample		
53	Vial 39	MS/In R1 C4	CHLSWTCH	2	Sample		
54	Vial 1	Standard 1	COLSWTCH	2	Sample		
55	Vial 2	Standard 2	COLSWTCH	2	Sample		
56	Vial 3	Standard 3	COLSWTCH	2	Sample		
57	Vial 4	Standard 4	COLSWTCH	2	Sample		
58	Vial 5	Standard 5	COLSWTCH	2	Sample		
59	Vial 6	Standard 6	COLSWTCH	2	Sample		
60	Vial 9	DI H2O Lab Blank	SHUTDOWN	2	Sample		

Sample Chromatograms

1008-22

==========

Injection Date : 10/7/2008 2:44:35 PM Seq. Line : 11
Sample Name : Run 1*20 Location : -
Acq. Operator : KEH Inj : 1
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.243	VB	863.07153	9.46062e-3	8.16519		Ammonia

Totals : 8.16519

Results obtained with enhanced integrator!

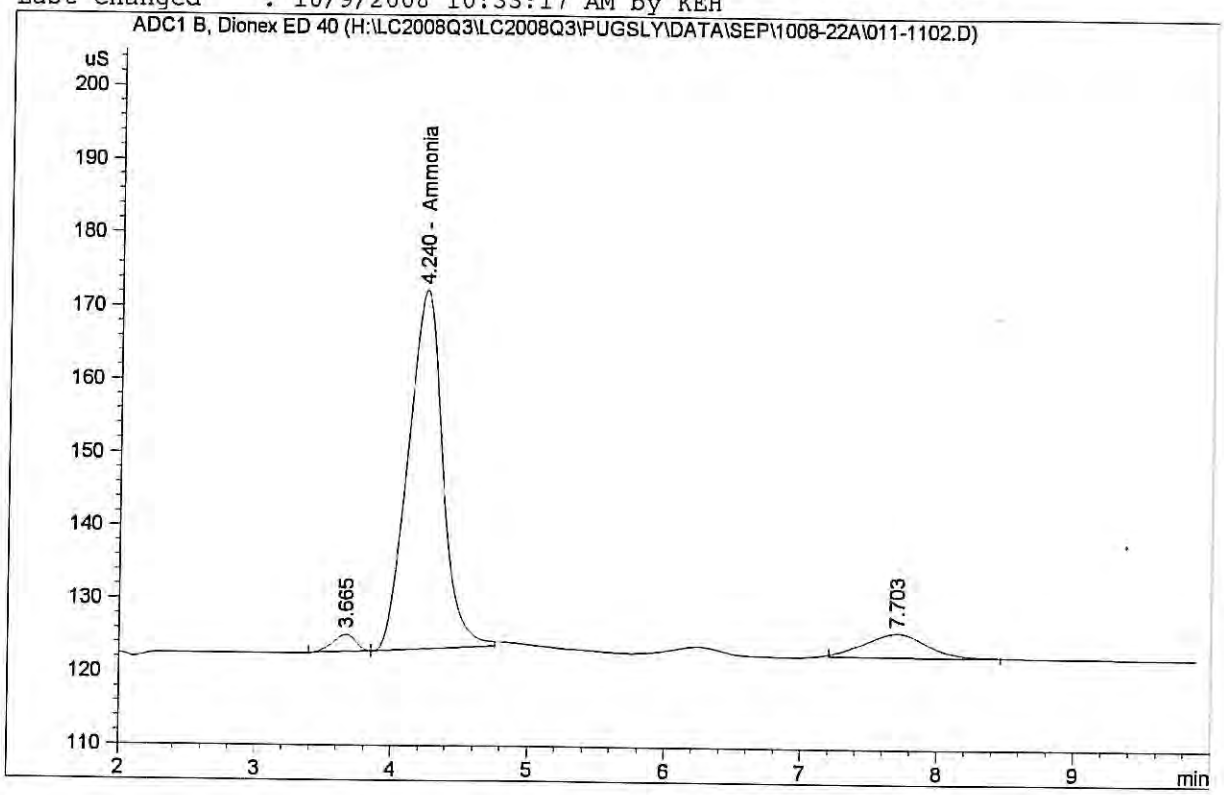
==========

*** End of Report ***

1008-22

==========

Injection Date : 10/7/2008 2:54:53 PM Seq. Line : 11
Sample Name : Run 1*20 Location : -
Acq. Operator : KEH Inj : 2
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.240	VB	867.43628	9.47557e-3	8.21945		Ammonia

Totals : 8.21945

Results obtained with enhanced integrator!

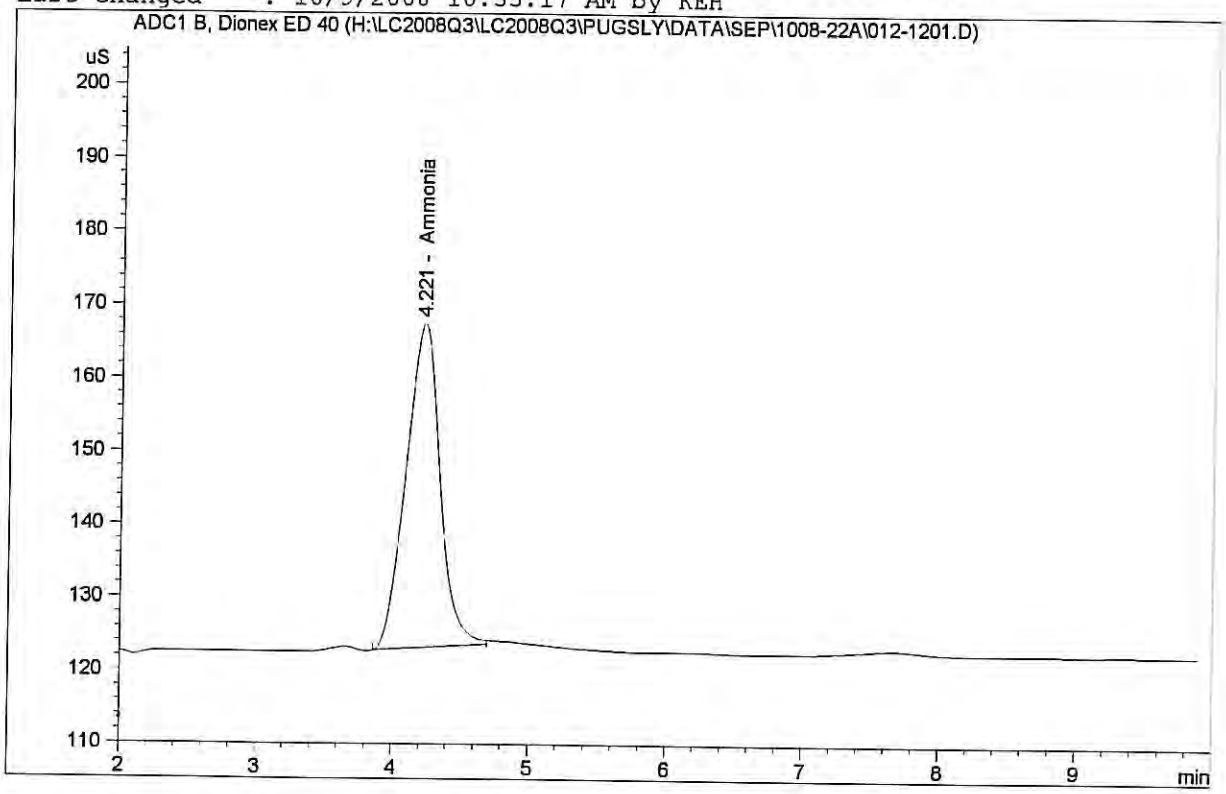
==========

*** End of Report ***

1008-22

==========

Injection Date : 10/7/2008 3:05:45 PM Seq. Line : 12
Sample Name : Run 2*10 Location : -
Acq. Operator : KEH Inj : 1
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.221	PB	772.10083	9.16790e-3	7.07854		Ammonia

Totals : 7.07854

Results obtained with enhanced integrator!

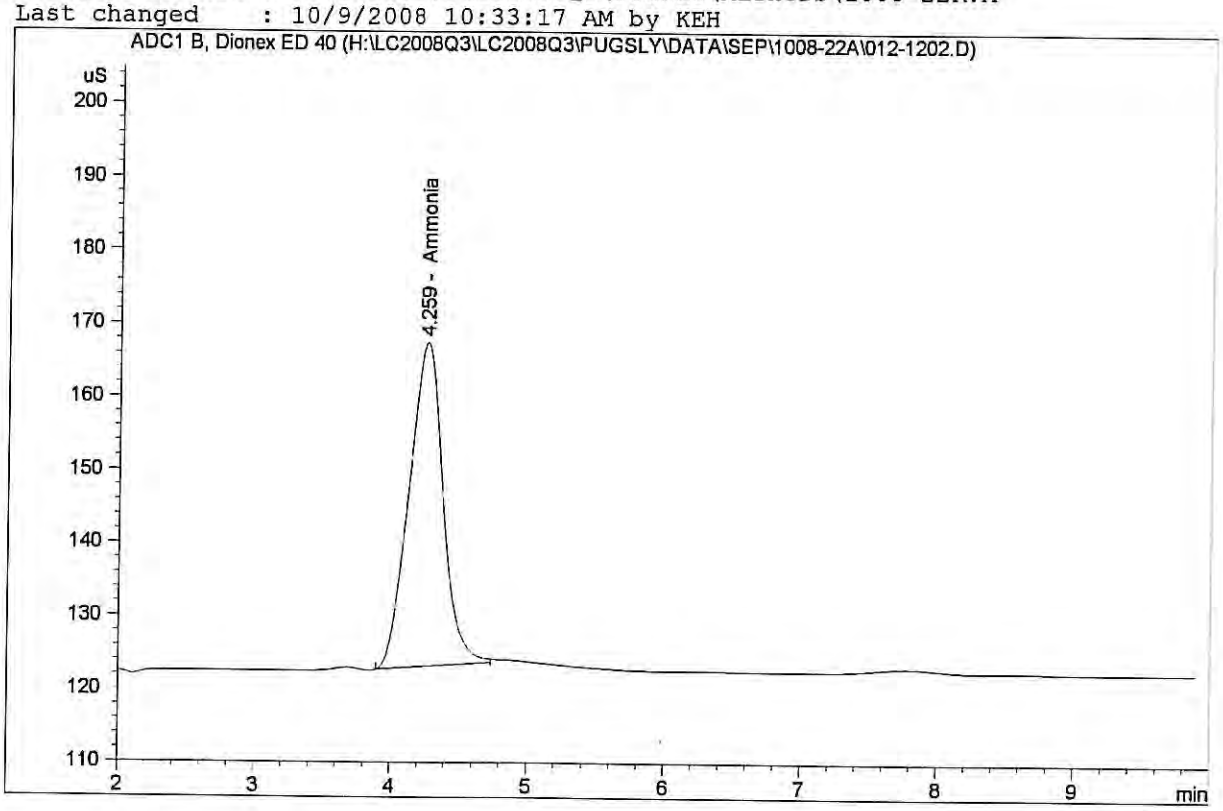
==========

*** End of Report ***

1008-22

==========

Injection Date : 10/7/2008 3:16:03 PM Seq. Line : 12
Sample Name : Run 2*10 Location : -
Acq. Operator : KEH Inj : 2
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.259	PB	774.01965	9.17374e-3	7.10065		Ammonia

Totals : 7.10065

Results obtained with enhanced integrator!

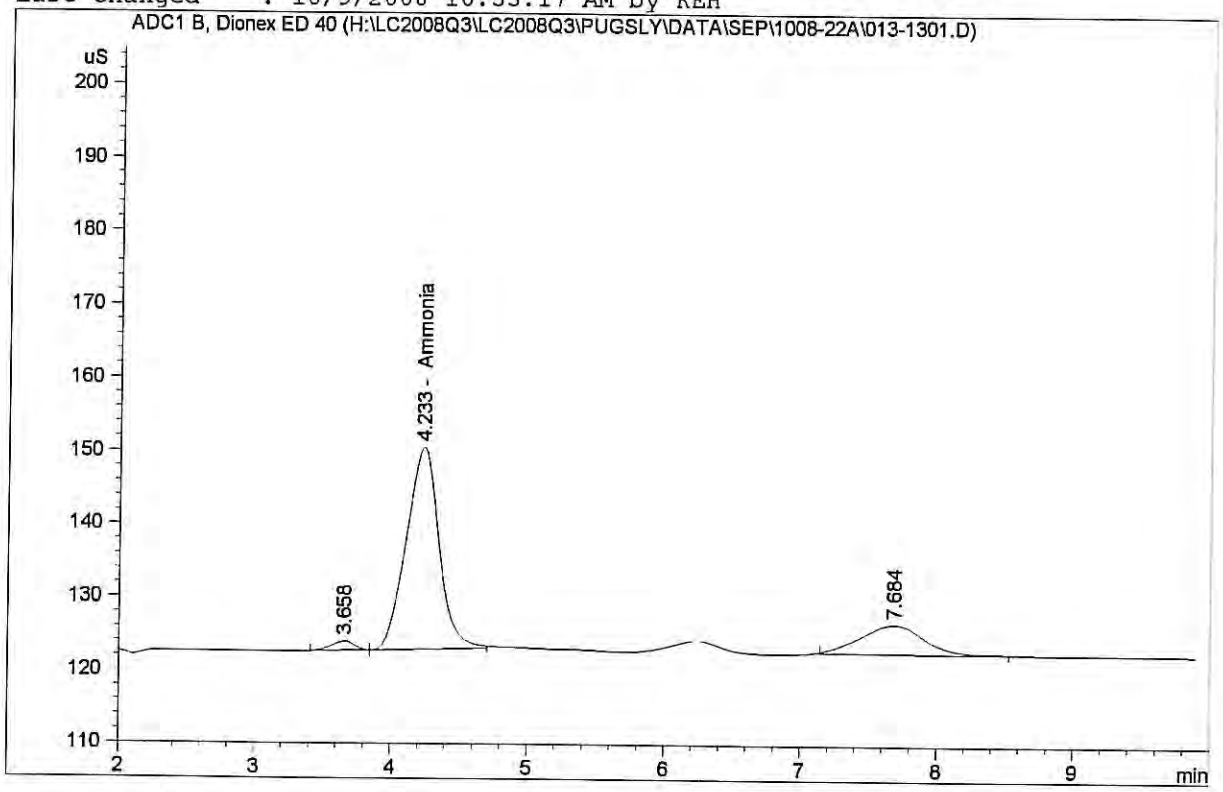
==========

*** End of Report ***

1008-22

==========

Injection Date : 10/7/2008 3:26:55 PM Seq. Line : 13
Sample Name : Run 3*10 Location : -
Acq. Operator : KEH Inj : 1
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.233	VB	464.03357	8.34330e-3	3.87157		Ammonia

Totals : 3.87157

Results obtained with enhanced integrator!

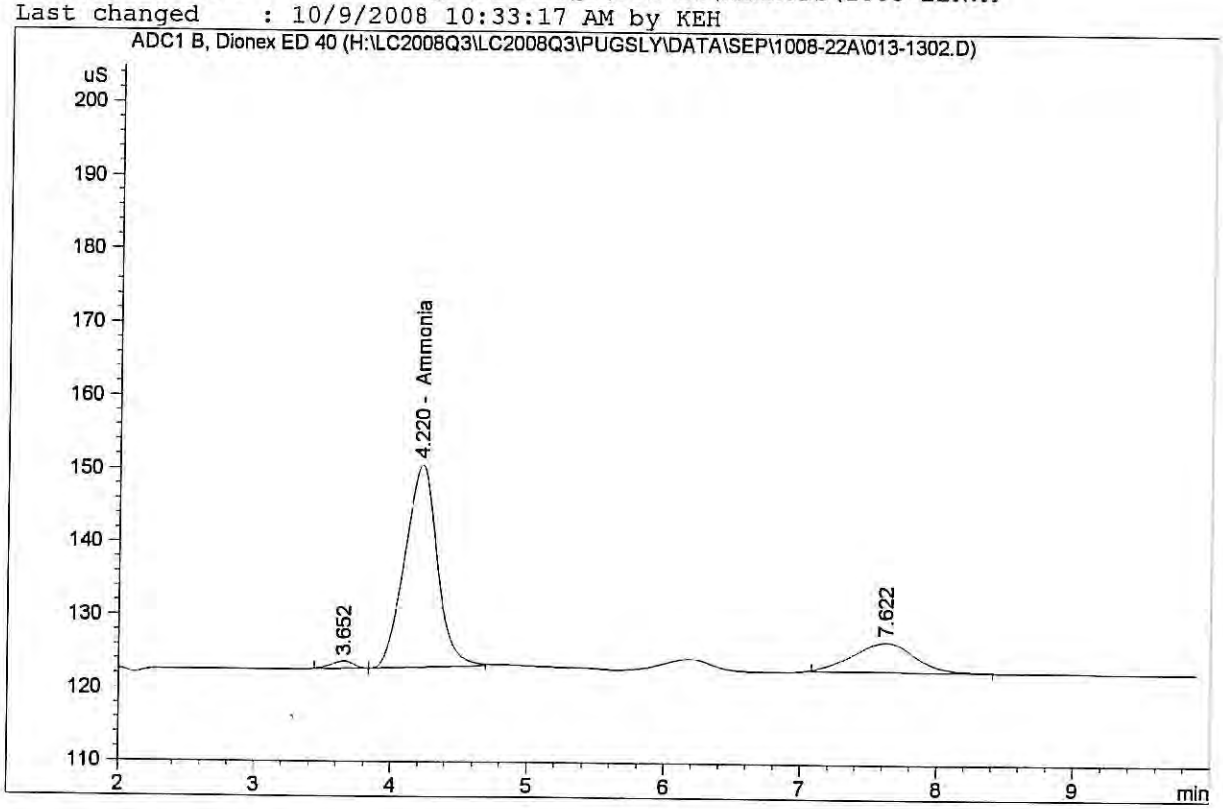
==========

*** End of Report ***

1008-22

==========

Injection Date : 10/7/2008 3:37:13 PM Seq. Line : 13
Sample Name : Run 3*10 Location : -
Acq. Operator : KEH Inj : 2
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.220	VB	464.12021	8.34352e-3	3.87239		Ammonia

Totals : 3.87239

Results obtained with enhanced integrator!

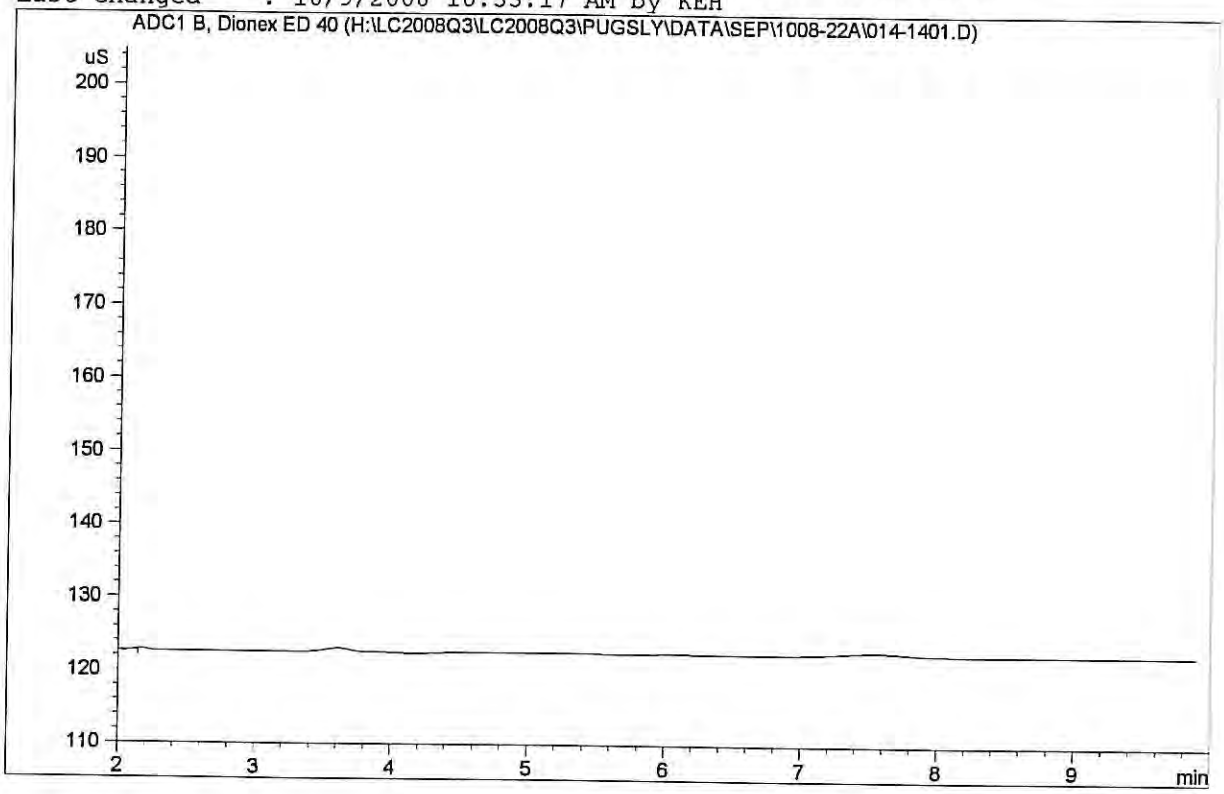
==========

*** End of Report ***

1008-22 Sample Blank

==========

Injection Date : 10/7/2008 3:48:03 PM Seq. Line : 14
Sample Name : H2SO4 Blank Location : -
Acq. Operator : KEH Inj : 1
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.224		-	-	-		Ammonia

Totals : 0.00000

Results obtained with enhanced integrator!
1 Warnings or Errors :

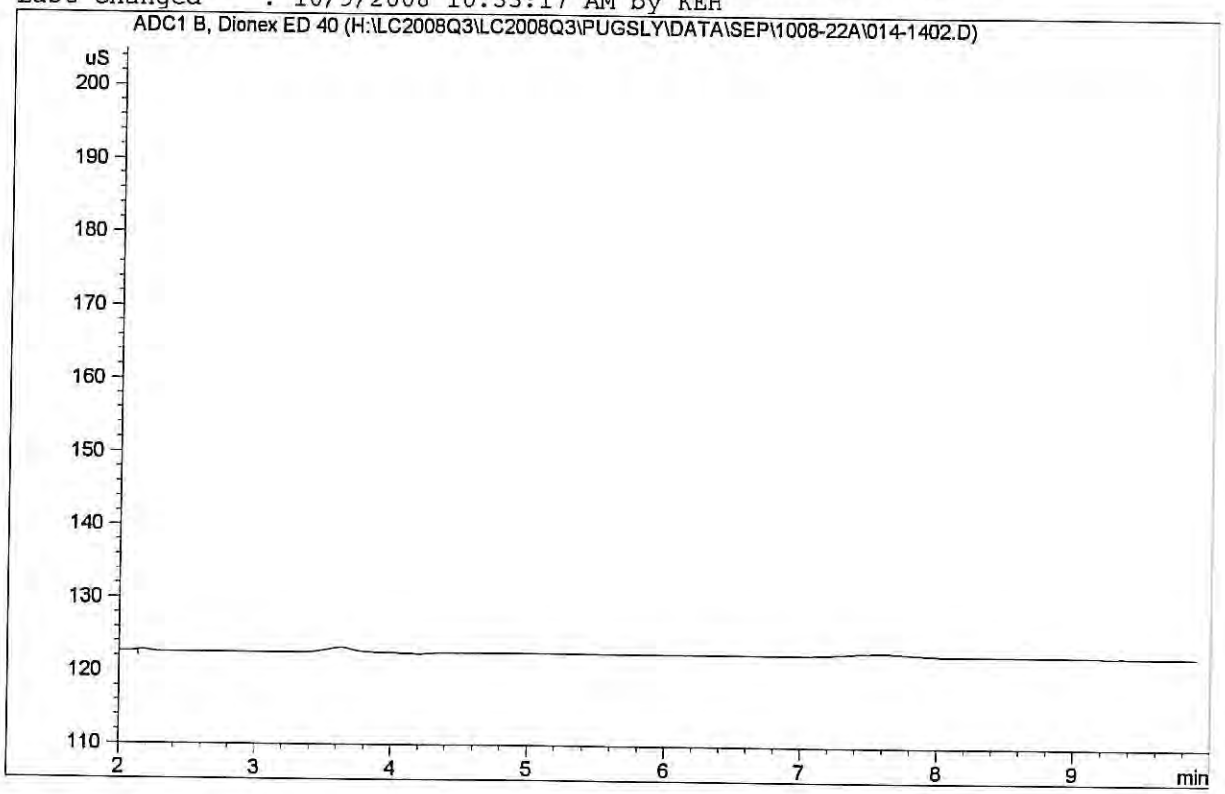
Warning : Calibrated compound(s) not found

==========

1008-22 Sample Blank

==========

Injection Date : 10/7/2008 3:58:20 PM Seq. Line : 14
Sample Name : H2SO4 Blank Location : -
Acq. Operator : KEH Inj : 2
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.224		-	-	-		Ammonia

Totals : 0.00000

Results obtained with enhanced integrator!
1 Warnings or Errors :

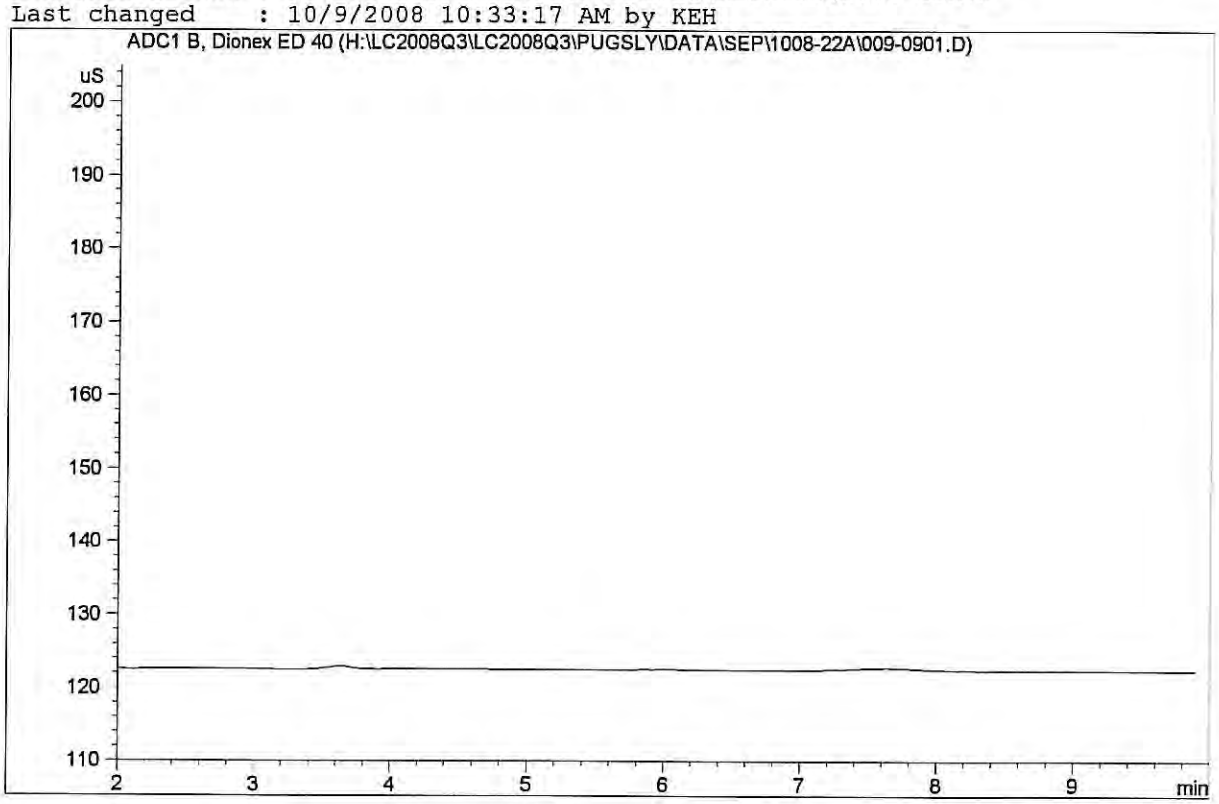
Warning : Calibrated compound(s) not found

==========

Lab Blank 0.04N H2SO4

==========

Injection Date : 10/7/2008 2:02:17 PM Seq. Line : 9
Sample Name : 0.04N H2SO4 Location : -
Acq. Operator : KEH Inj : 1
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.224		-	-	-		Ammonia

Totals : 0.00000

Results obtained with enhanced integrator!
1 Warnings or Errors :

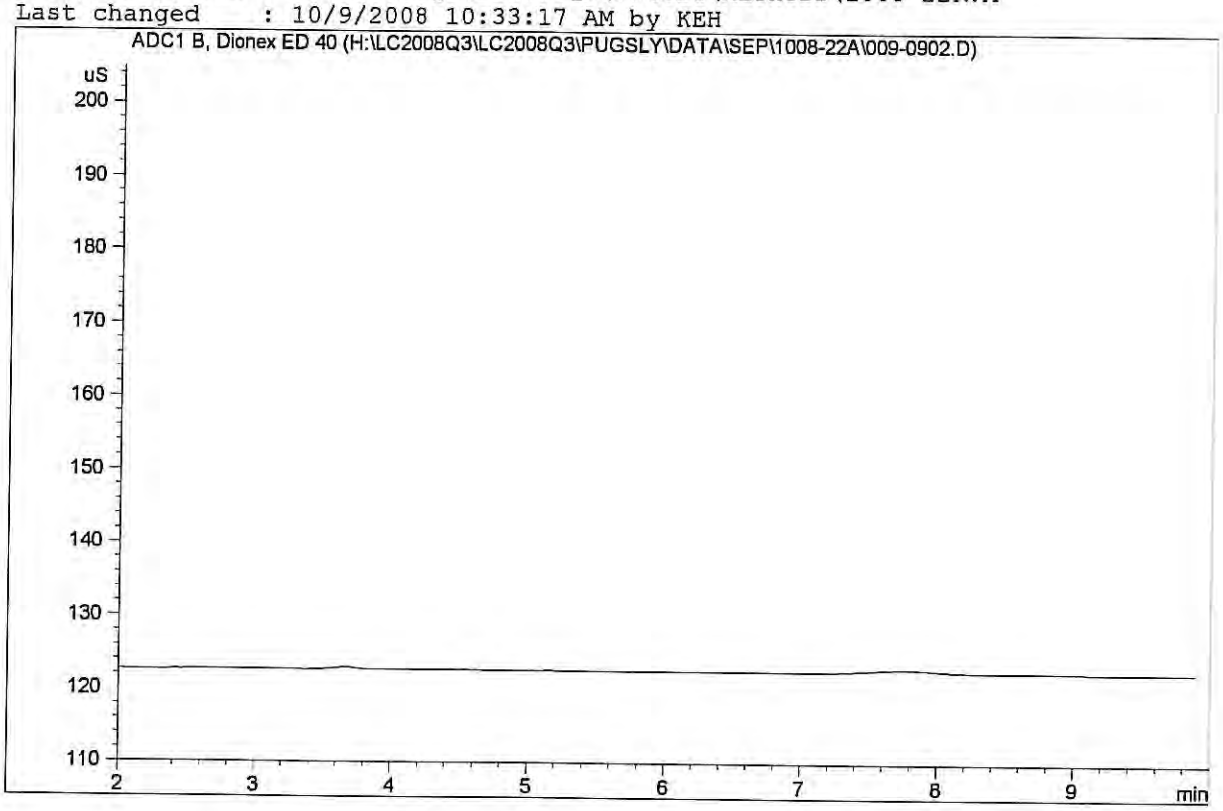
Warning : Calibrated compound(s) not found

==========

Lab Blank 0.04N H2SO4

==========

Injection Date : 10/7/2008 2:12:35 PM Seq. Line : 9
Sample Name : 0.04N H2SO4 Location : -
Acq. Operator : KEH Inj : 2
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.224		-	-	-		Ammonia

Totals : 0.00000

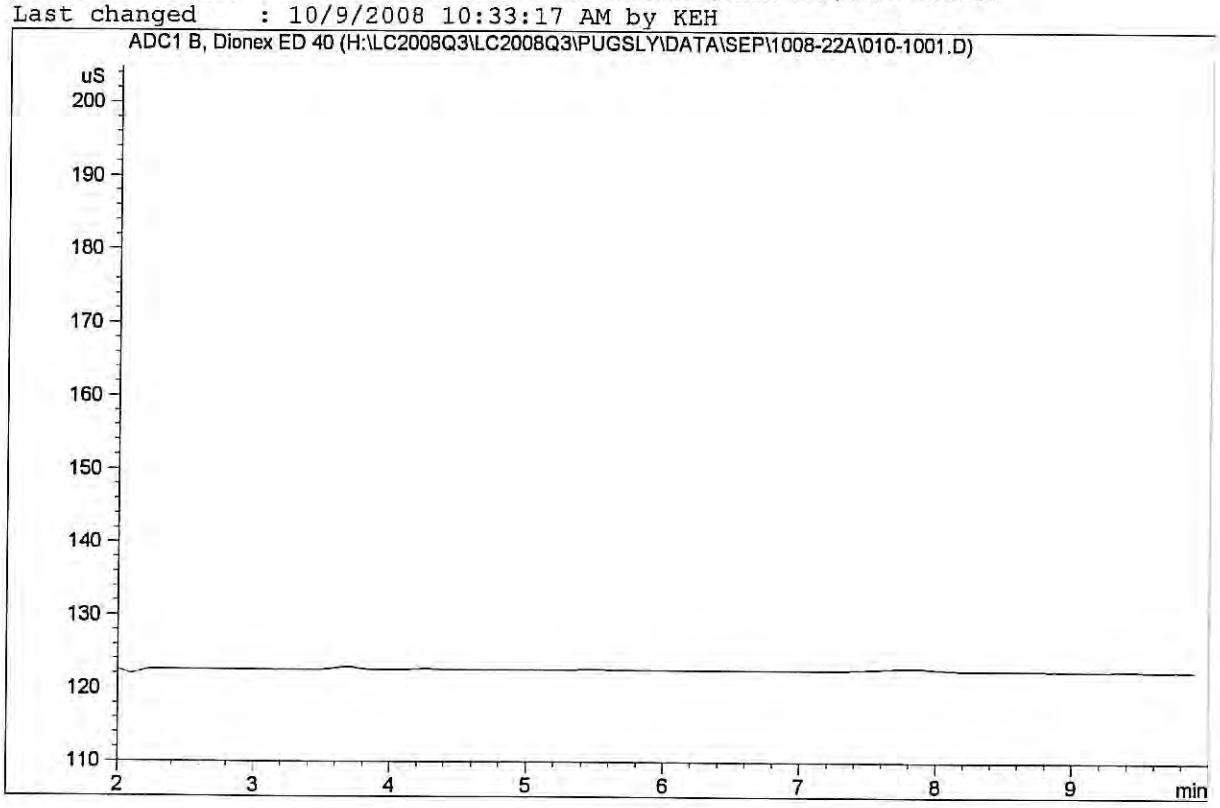
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

Lab Blank DI H2O

```
==================================================================
Injection Date  : 10/7/2008 2:23:27 PM          Seq. Line :  10
Sample Name     : DI H2O                         Location :   -
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==================================================================
                      External Standard Report
==================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, October 09, 2008 10:32:46 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.224            -          -          -          Ammonia

Totals :                                0.00000

 Results obtained with enhanced integrator!
1 Warnings or Errors :

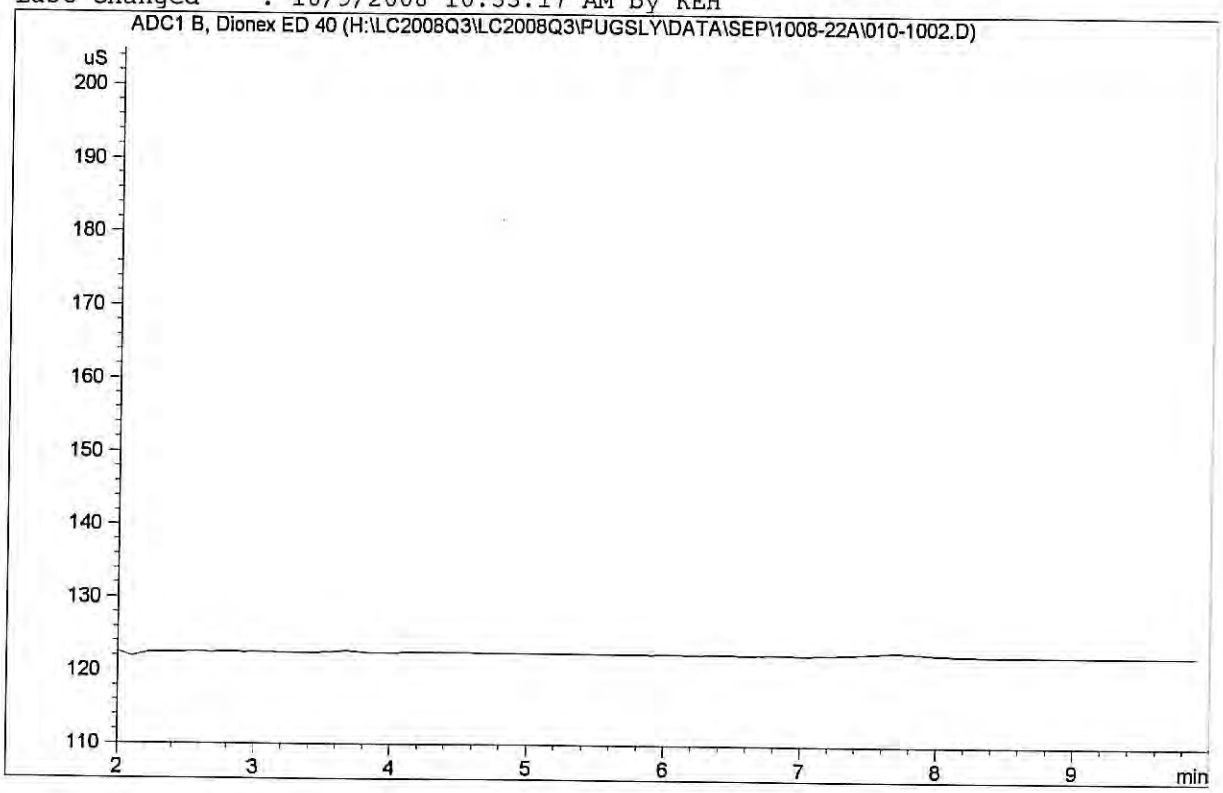
Warning : Calibrated compound(s) not found

==================================================================
```

Lab Blank DI H2O

==========

Injection Date : 10/7/2008 2:33:44 PM Seq. Line : 10
Sample Name : DI H2O Location : -
Acq. Operator : KEH Inj : 2
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.224		-	-	-		Ammonia

Totals : 0.00000

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

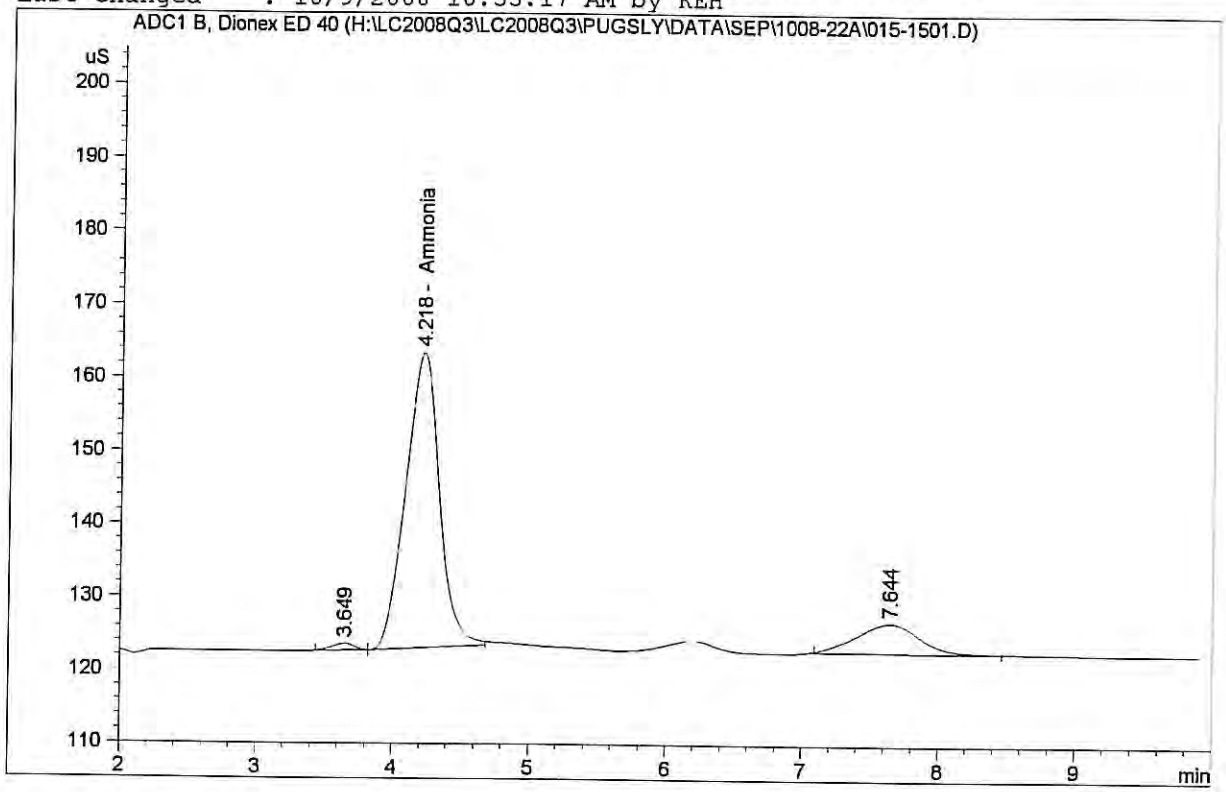
==========

1008-22 Matrix Spike

==========

Injection Date : 10/7/2008 4:09:12 PM
Sample Name : MS/Run 3
Acq. Operator : KEH
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH

Seq. Line : 15
Location : -
Inj : 1



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.218	VB	697.63959	8.95040e-3	6.24415		Ammonia

Totals : 6.24415

Results obtained with enhanced integrator!

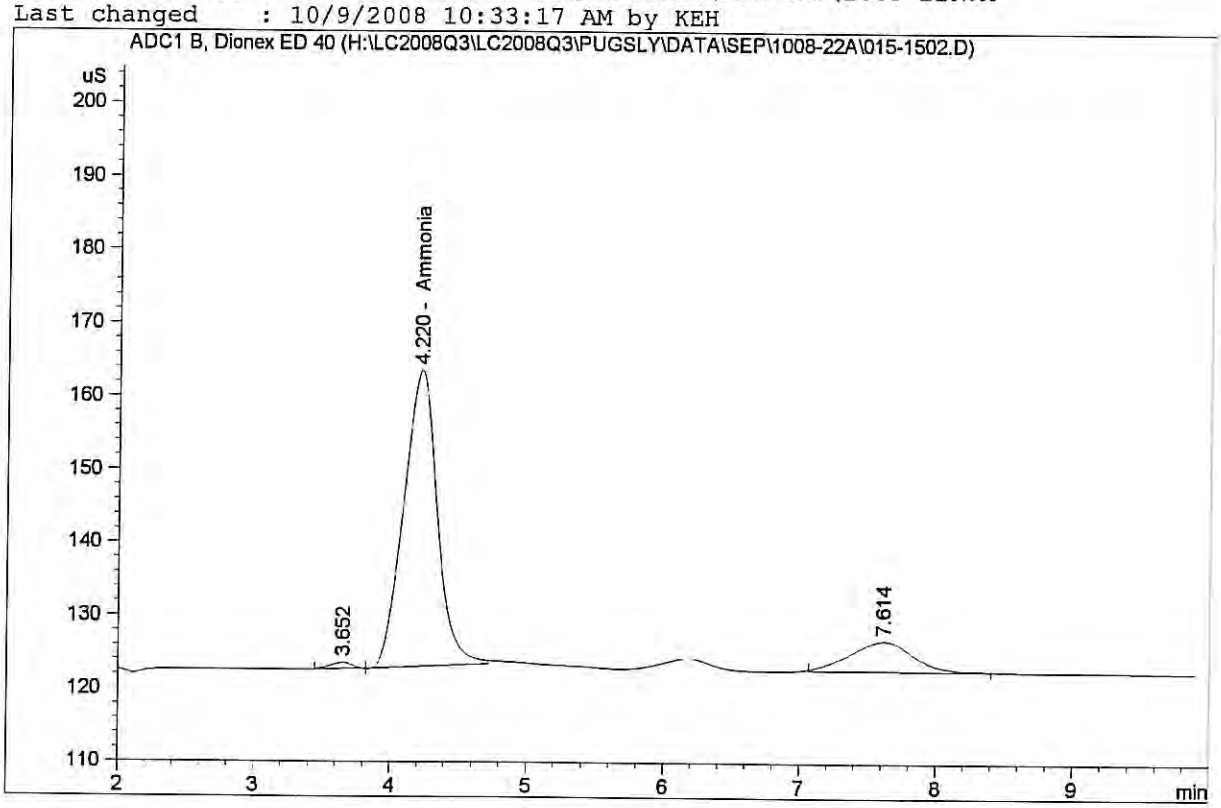
==========

*** End of Report ***

1008-22 Matrix Spike

==========

Injection Date : 10/7/2008 4:19:30 PM Seq. Line : 15
Sample Name : MS/Run 3 Location : -
Acq. Operator : KEH Inj : 2
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.220	VB	702.77374	8.96487e-3	6.30028		Ammonia

Totals : 6.30028

Results obtained with enhanced integrator!

==========

*** End of Report ***

Curve(s)/QA Point(s) Chromatograms

Calibration Table

Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM

Calculate : External Standard
Based on : Peak Area

Rel. Reference Window : 20.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 20.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : Yes, identified peaks are recalibrated
Correct All Ret. Times: No, only for identified peaks

Curve Type : Quadratic (some peaks differ, see below)
Origin : Connected (some peaks differ, see below)
Weight : Quadratic (Amnt) (some peaks differ, see below)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Sig	Lvl	Amount [ug/mL]	Area	Amt/Area	Ref	Grp	Name
4.224	1	1	2.35000e-1	40.28906	5.83285e-3			Ammonia
		2	4.70000e-1	69.88351	6.72548e-3			
		3	1.85000	246.67548	7.49973e-3			
		4	4.50000	532.46573	8.45125e-3			
		5	6.59000	724.44119	9.09667e-3			
		6	8.58000	891.72534	9.62180e-3			
		7	10.50000	1039.37384	1.01022e-2			

More compound-specific settings:

Compound: Ammonia
Curve Type : Quadratic
Origin : Connected
Calibration Level Weights:/
Level 1 : 1
Level 2 : 1
Level 3 : 1
Level 4 : 1
Level 5 : 1
Level 6 : 1
Level 7 : 1

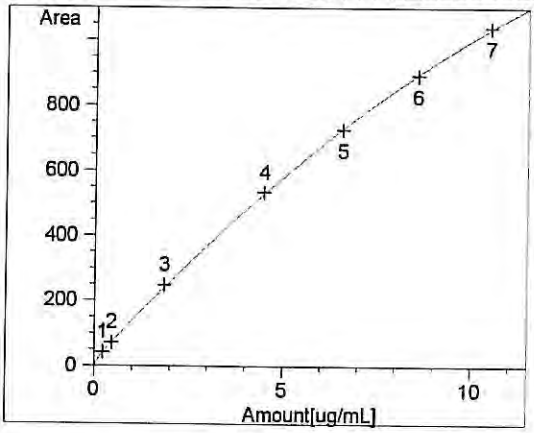
Peak Sum Table

No Entries in table

==========

Calibration Curves

==========



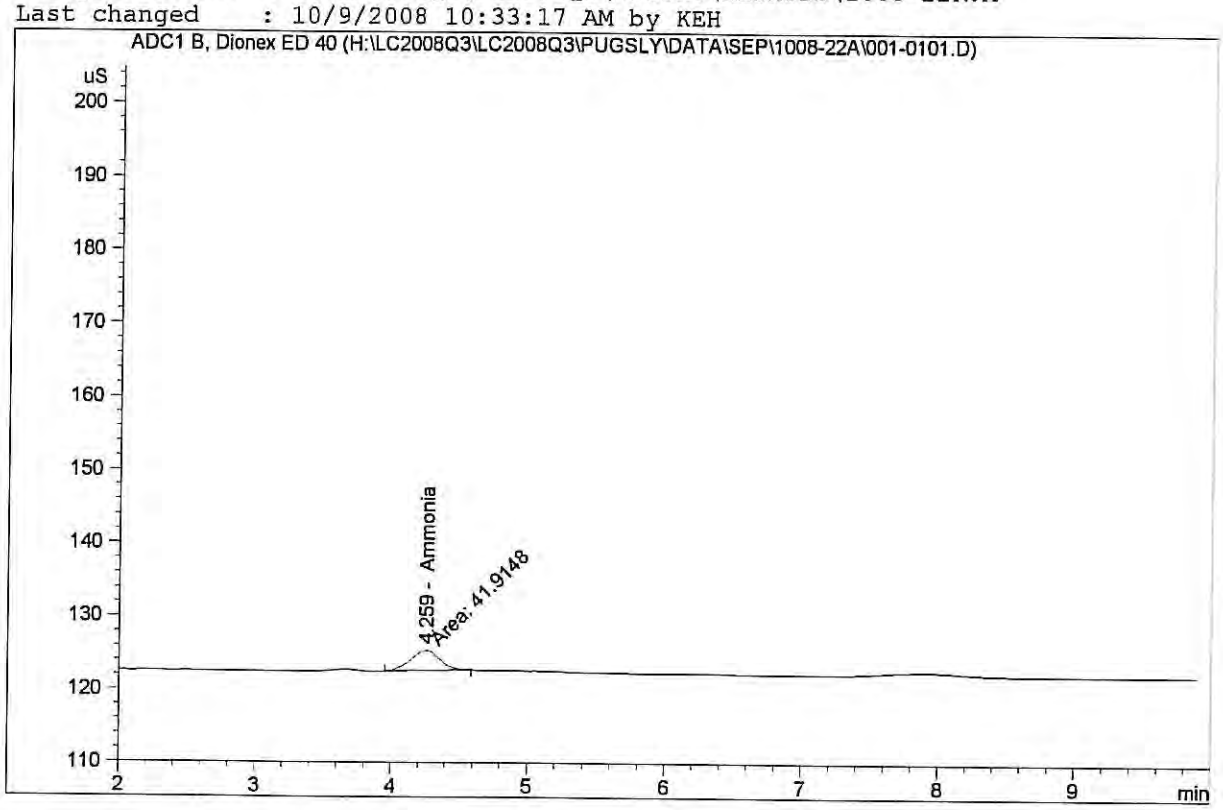
Ammonia at exp. RT: 4.224
ADC1 B, Dionex ED 40
Correlation: 0.99993
Residual Std. Dev.: 5.15949
Formula: $y = ax^2 + bx + c$
a: -2.87518
b: 127.54534
c: 13.32901
x: Amount[ug/mL]
y: Area

Calibration Level Weights:

Level 1	: 1
Level 2	: 1
Level 3	: 1
Level 4	: 1
Level 5	: 1
Level 6	: 1
Level 7	: 1

==========

```
==================================================================
Injection Date  : 10/7/2008 11:12:59 AM          Seq. Line :   1
Sample Name     : Standard 1                      Location :   -
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==================================================================
                     External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

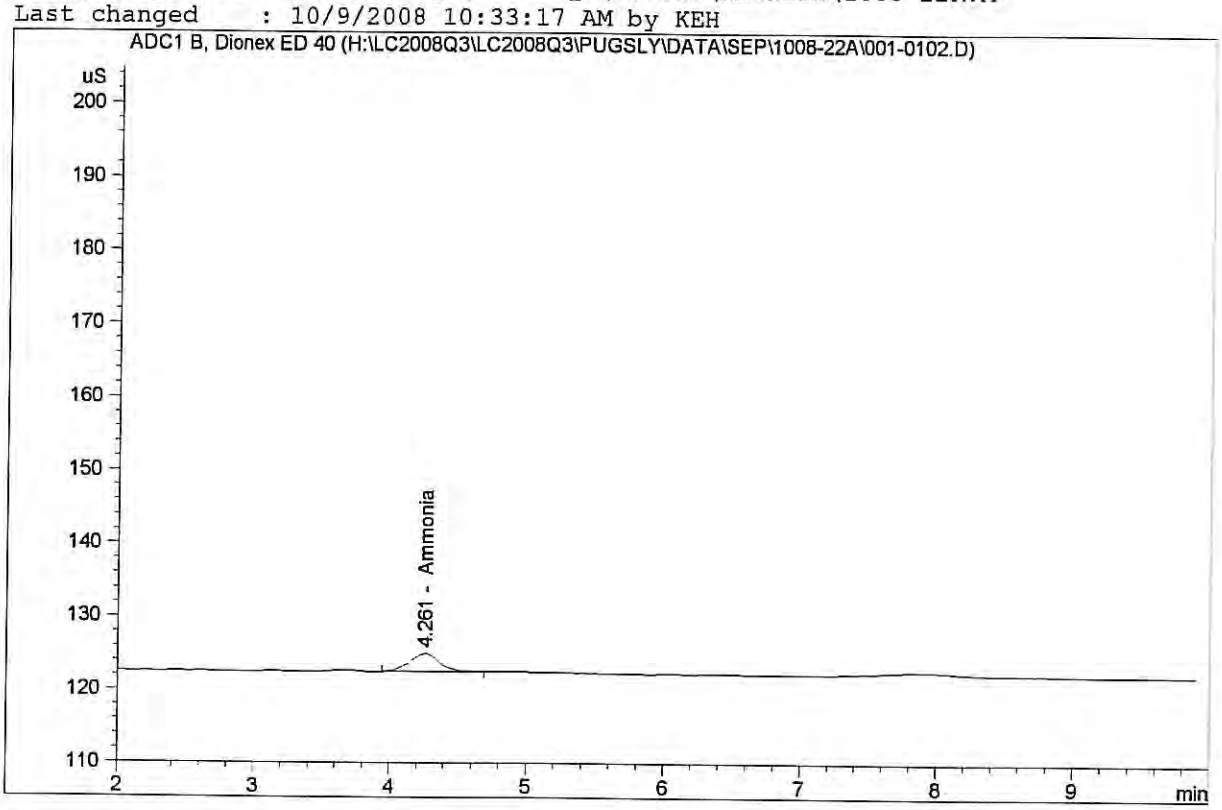
RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.259 MM       41.91478 5.44695e-3 2.28308e-1     Ammonia

Totals :                               2.28308e-1

 Results obtained with enhanced integrator!
==================================================================
                     *** End of Report ***
```

==========

Injection Date : 10/7/2008 11:23:17 AM Seq. Line : 1
Sample Name : Standard 1 Location : -
Acq. Operator : KEH Inj : 2
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.261	PB	38.71529	5.44695e-3	2.10880e-1		Ammonia

Totals : 2.10880e-1

Results obtained with enhanced integrator!

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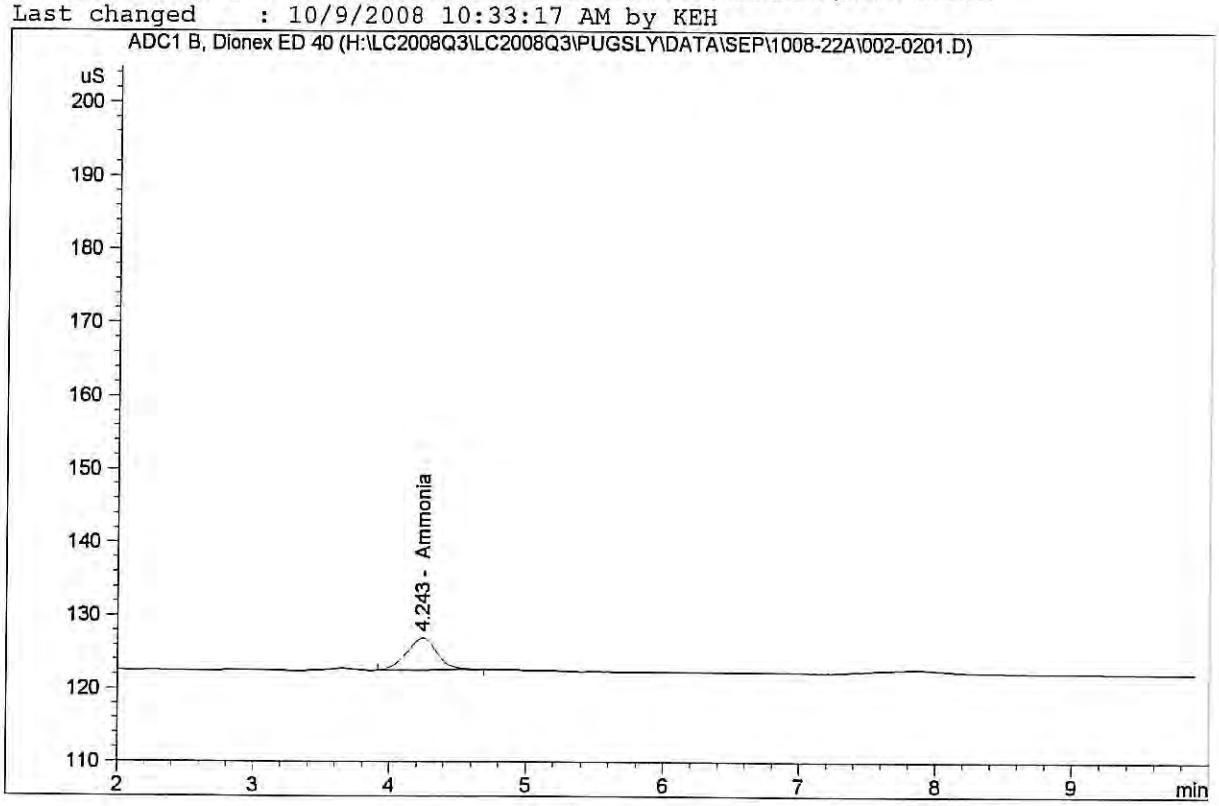
*** End of Report ***

```
==================================================================
Injection Date  : 10/7/2008 11:34:10 AM          Seq. Line :   2
Sample Name     : Standard 2                      Location :   -
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==================================================================
                      External Standard Report
==================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, October 09, 2008 10:32:46 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

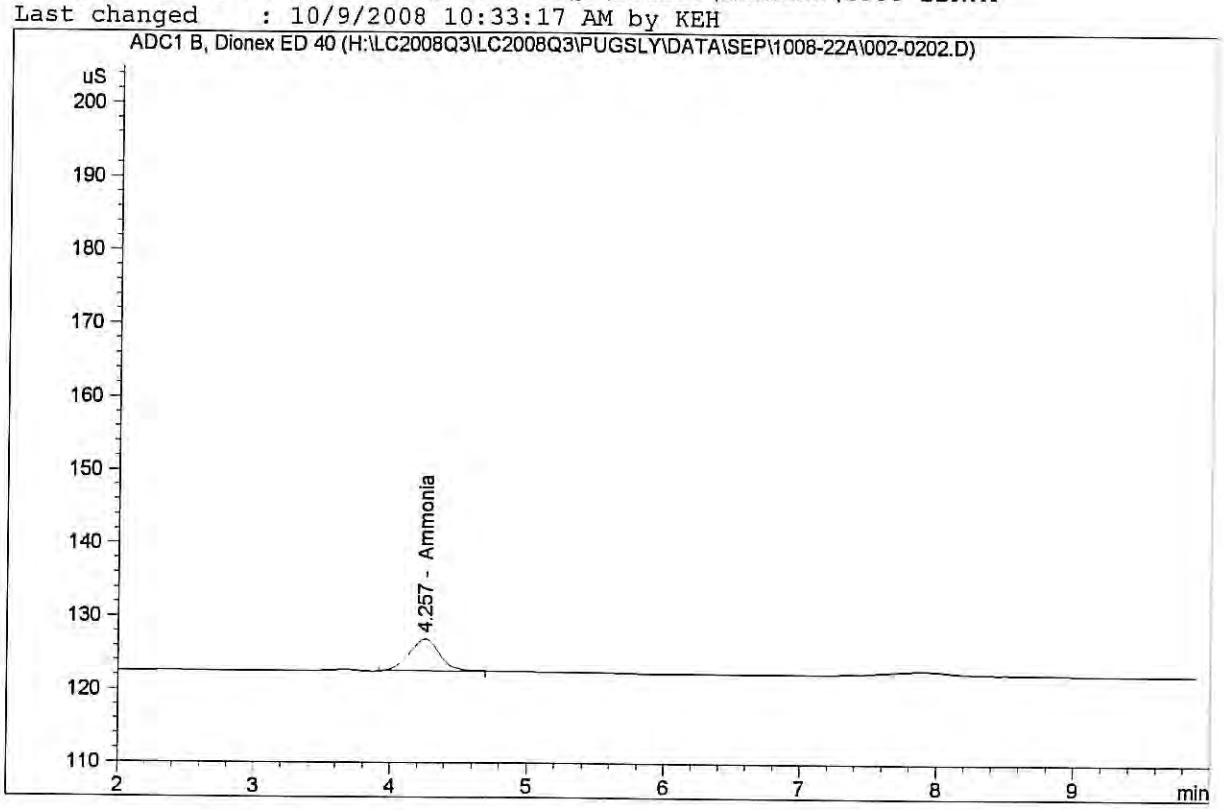
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.243 PB       69.55766 6.40221e-3 4.45323e-1     Ammonia

Totals :                               4.45323e-1

 Results obtained with enhanced integrator!
==================================================================
                         *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/7/2008 11:44:28 AM          Seq. Line :   2
Sample Name     : Standard 2                      Location :   -
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

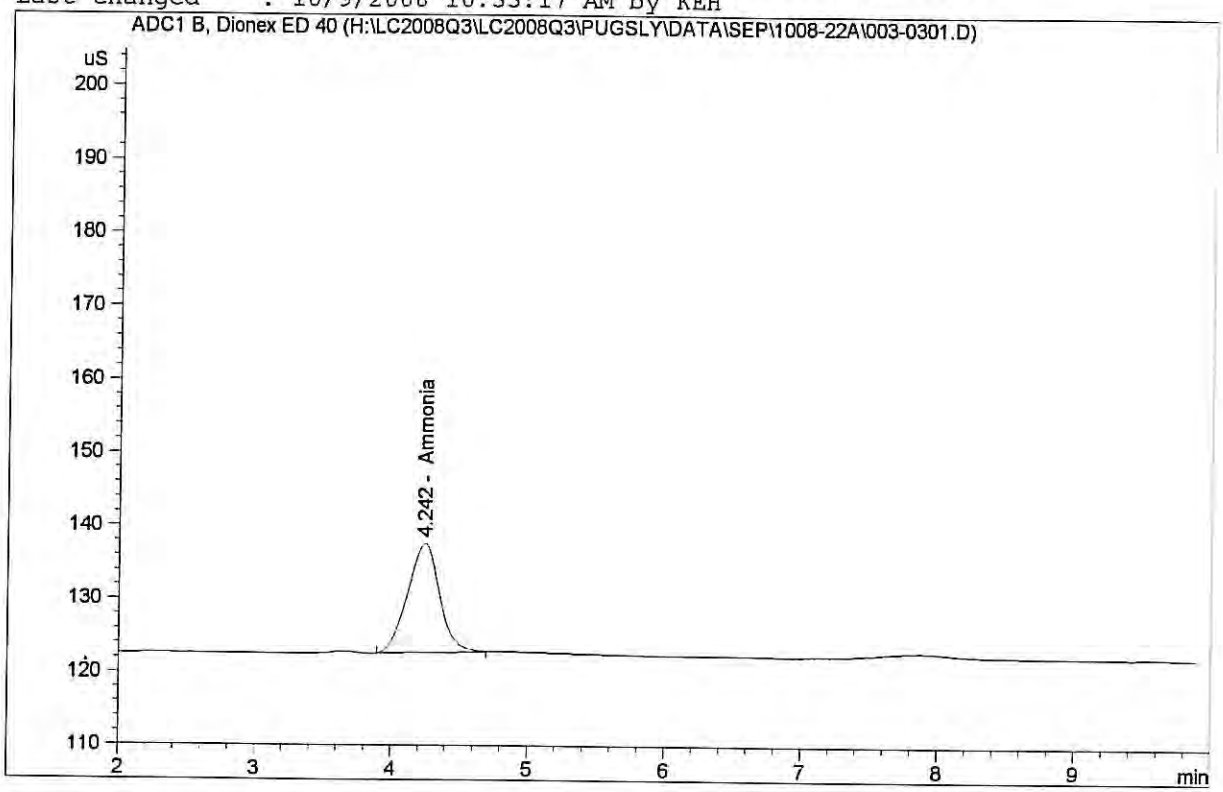
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.257 PB       70.20935 6.41706e-3 4.50538e-1     Ammonia

Totals :                                4.50538e-1

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/7/2008 11:55:19 AM          Seq. Line :   3
Sample Name     : Standard 3                      Location :   -
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

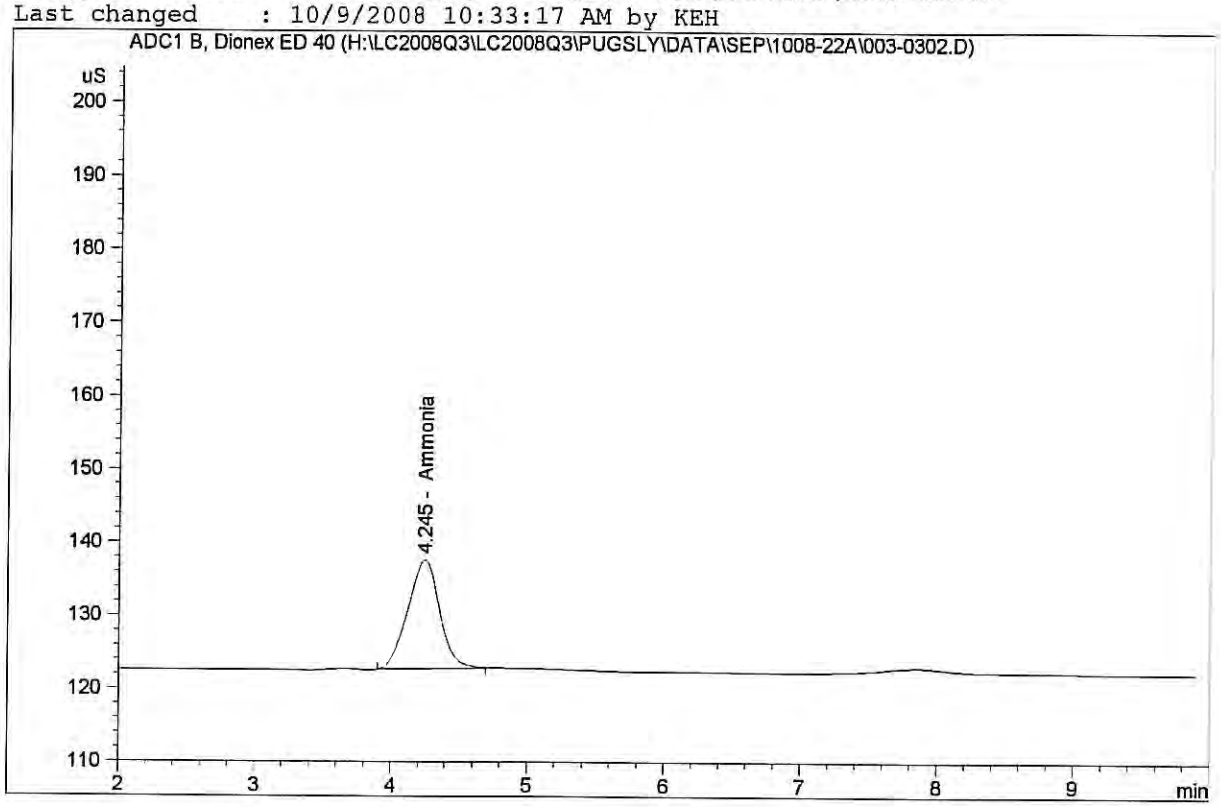
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.242 PB      246.22917 7.74925e-3    1.90809     Ammonia

Totals :                                1.90809

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/7/2008 12:05:38 PM          Seq. Line :   3
Sample Name     : Standard 3                      Location :   -
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.245 PB      247.12180 7.75225e-3    1.91575     Ammonia

Totals :                                1.91575

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

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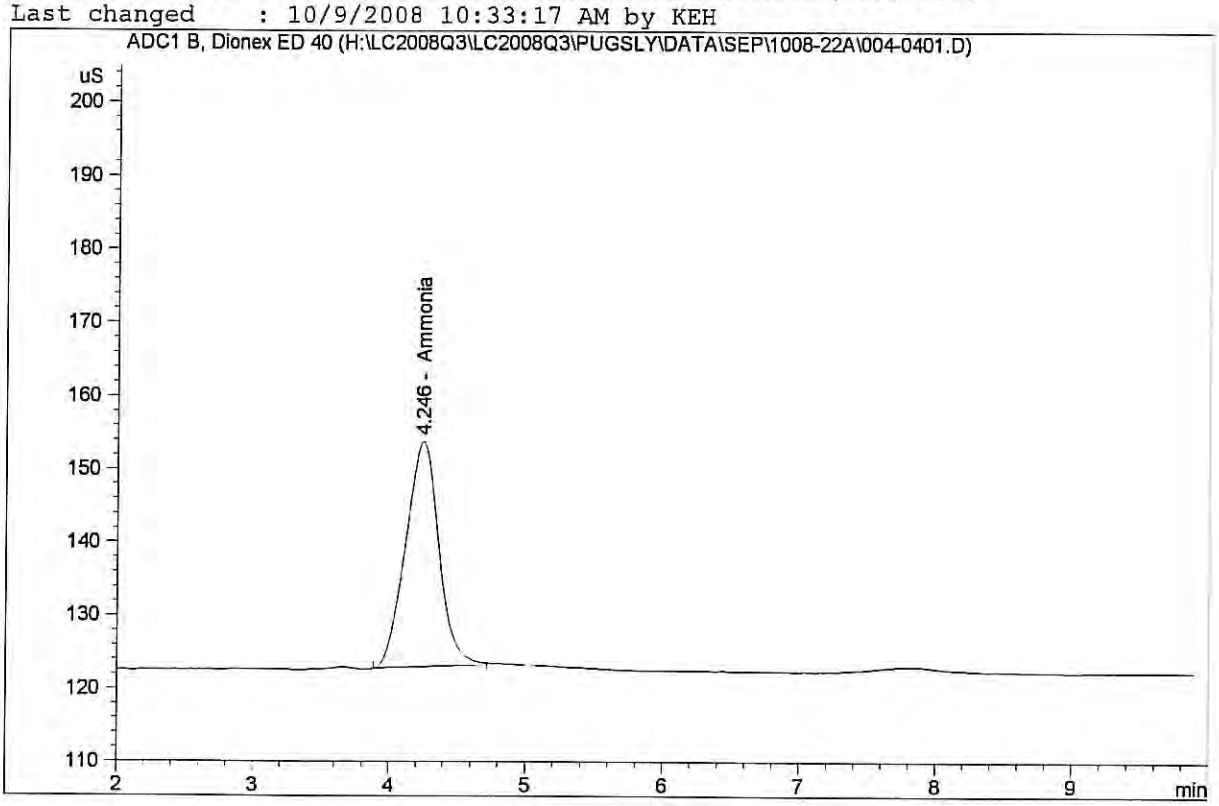
Injection Date : 10/7/2008 12:16:29 PM Seq. Line : 4
Sample Name : Standard 4 Location : -
Acq. Operator : KEH Inj : 1
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.246	PB	531.84253	8.51264e-3	4.52738		Ammonia

Totals : 4.52738

Results obtained with enhanced integrator!

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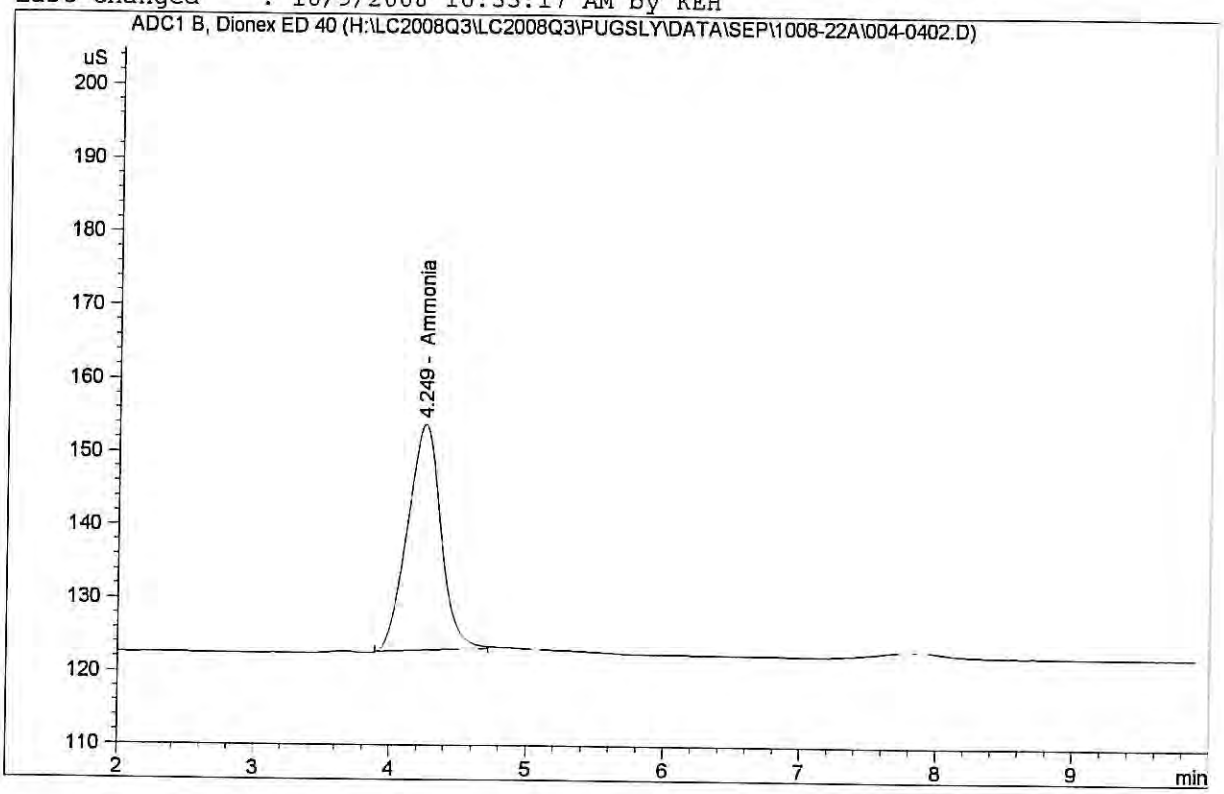
*** End of Report ***

==========

Injection Date : 10/7/2008 12:26:47 PM Seq. Line : 4
Sample Name : Standard 4 Location : -
Acq. Operator : KEH Inj : 2
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.249	PB	533.08893	8.51578e-3	4.53967		Ammonia

Totals : 4.53967

Results obtained with enhanced integrator!

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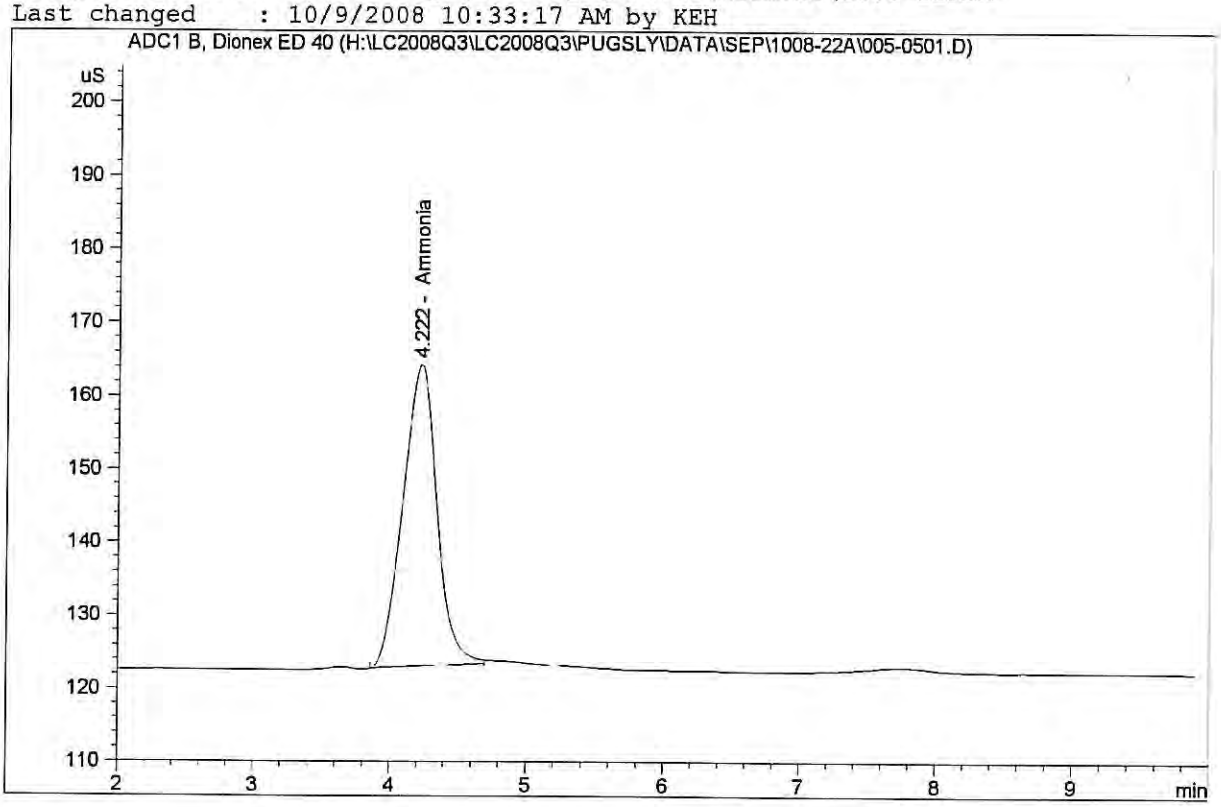
*** End of Report ***

```
==========================================================================
Injection Date  : 10/7/2008 12:37:39 PM          Seq. Line :   5
Sample Name     : Standard 5                      Location :   -
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

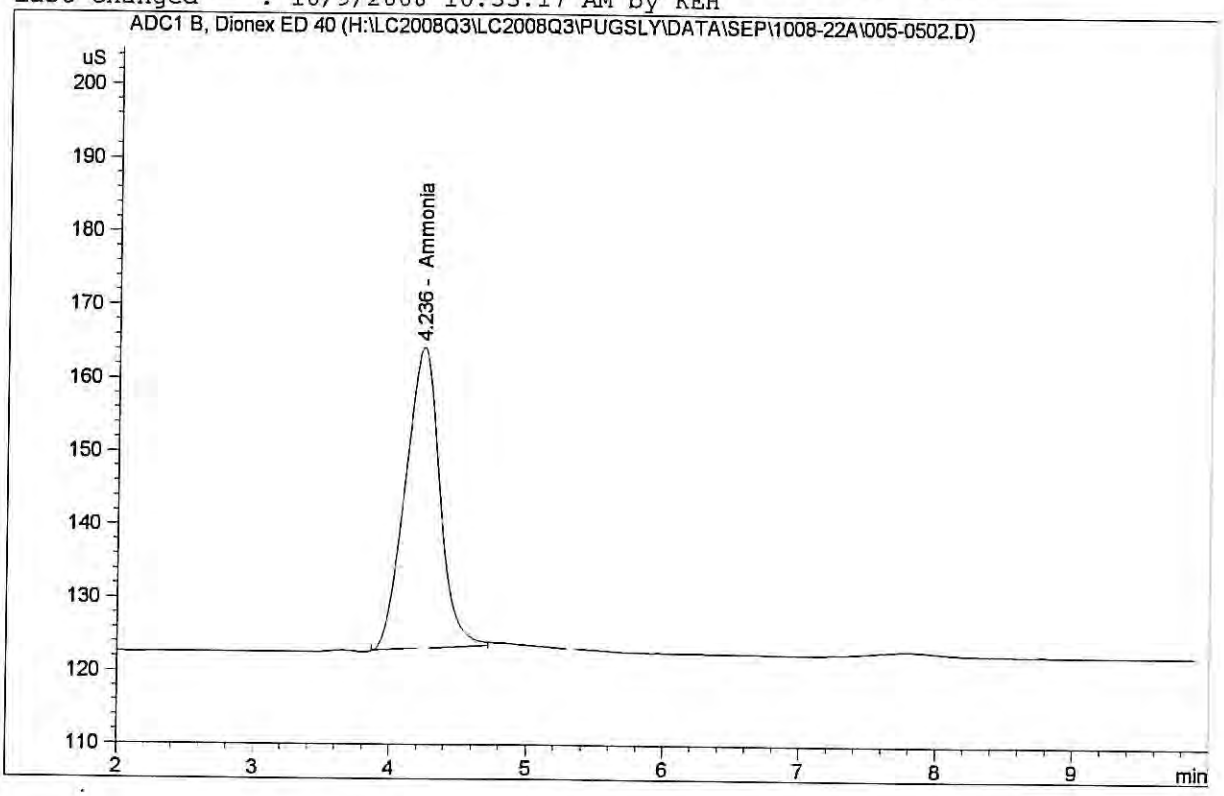
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.222 PB      722.57794 9.02138e-3    6.51865     Ammonia

Totals :                                6.51865

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/7/2008 12:47:57 PM          Seq. Line :   5
Sample Name     : Standard 5                      Location :   -
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```

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==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.236 PB      726.30444 9.03214e-3    6.56008     Ammonia

Totals :                                6.56008

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

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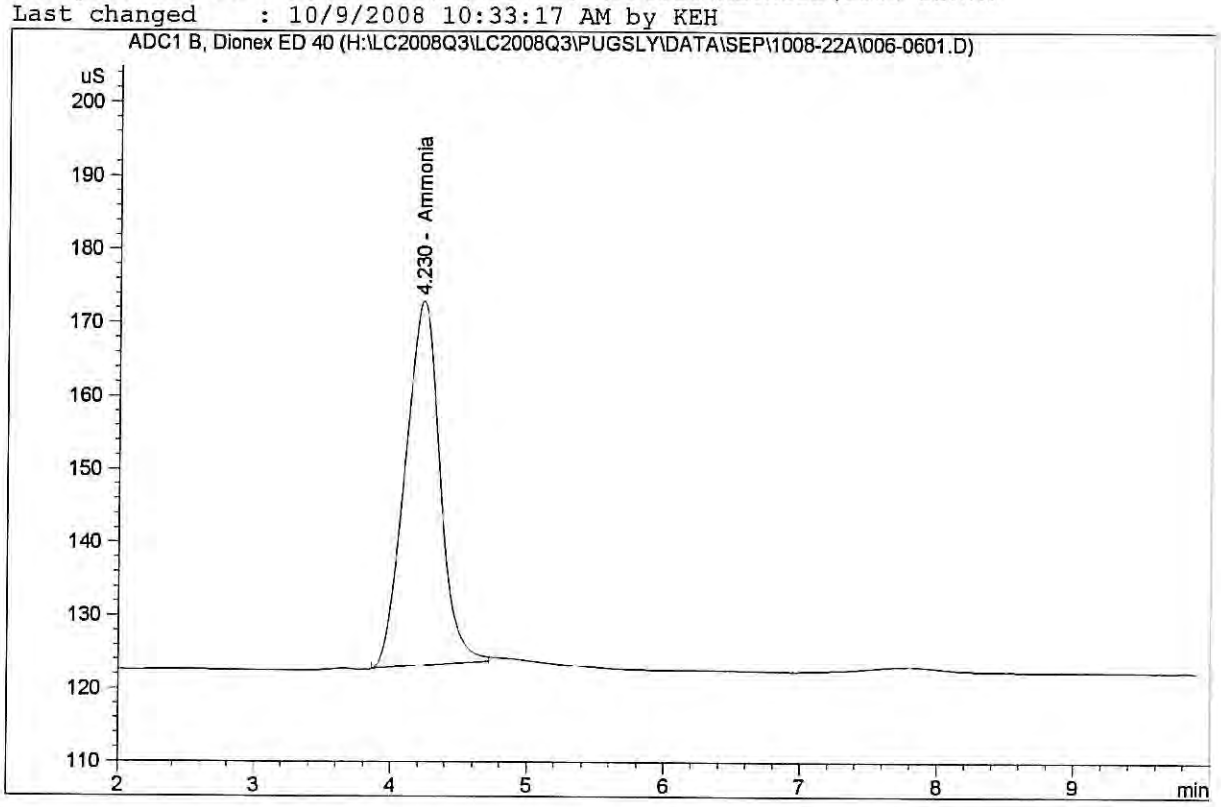
Injection Date : 10/7/2008 12:58:49 PM Seq. Line : 6
Sample Name : Standard 6 Location : -
Acq. Operator : KEH Inj : 1
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.230	PB	890.45709	9.55601e-3	8.50922		Ammonia

Totals : 8.50922

Results obtained with enhanced integrator!

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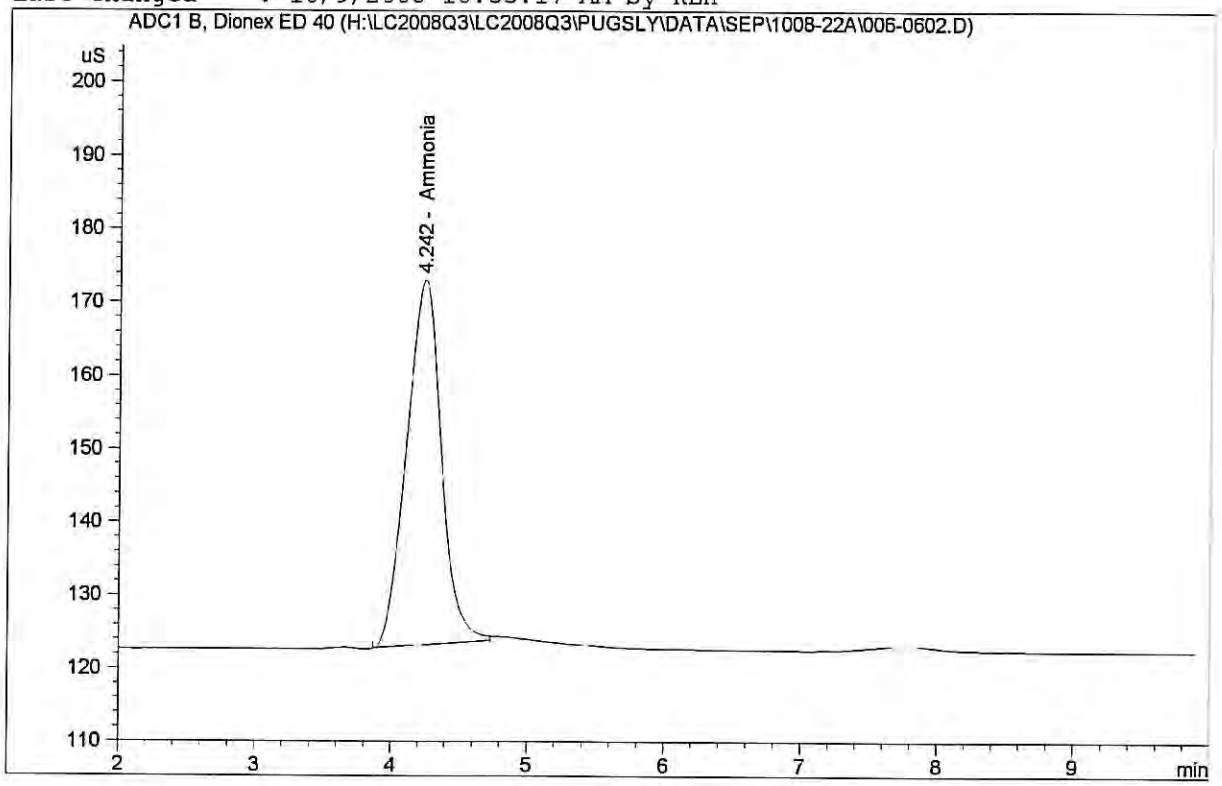
*** End of Report ***

```
==========================================================================
Injection Date  : 10/7/2008 1:09:06 PM          Seq. Line :   6
Sample Name     : Standard 6                     Location :   -
Acq. Operator   : KEH                                Inj :   2
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

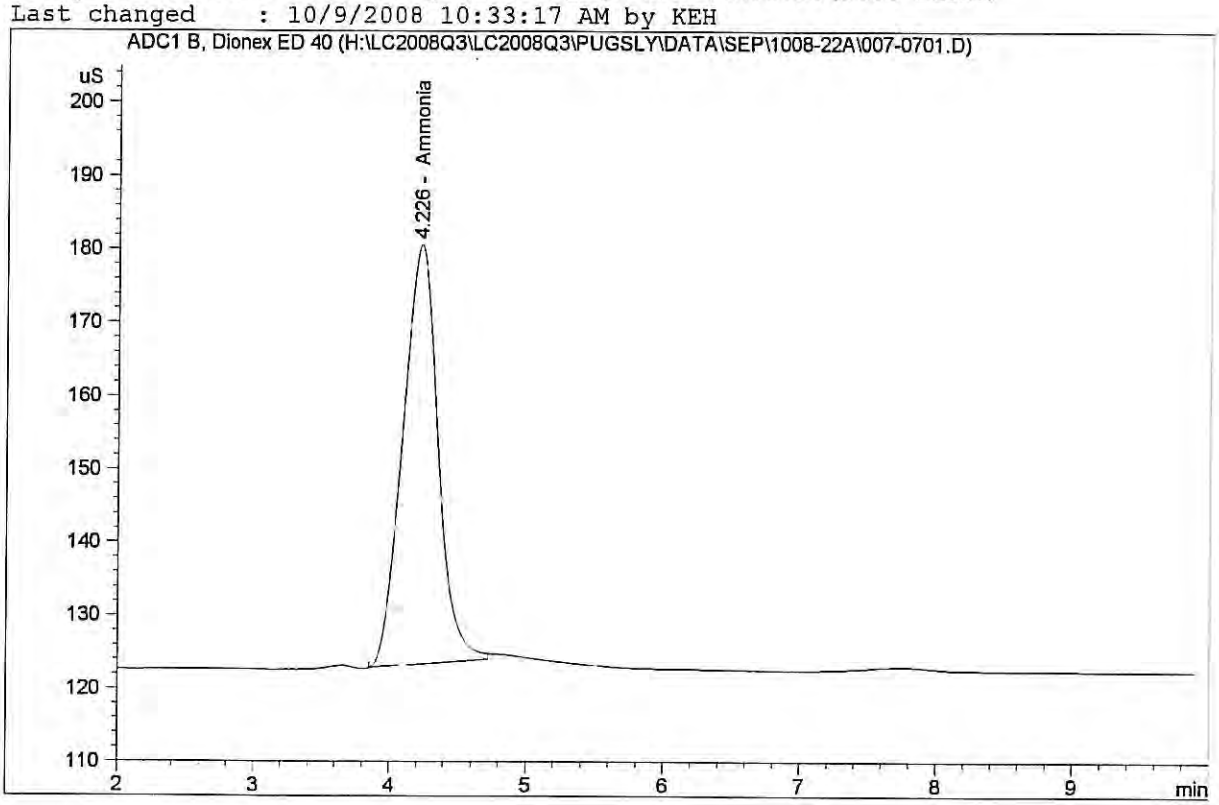
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.242 PB      892.99359 9.56504e-3    8.54152     Ammonia

Totals :                                8.54152

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/7/2008 1:19:59 PM          Seq. Line :   7
Sample Name     : Standard 7                     Location :   -
Acq. Operator   : KEH                                Inj :   1
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

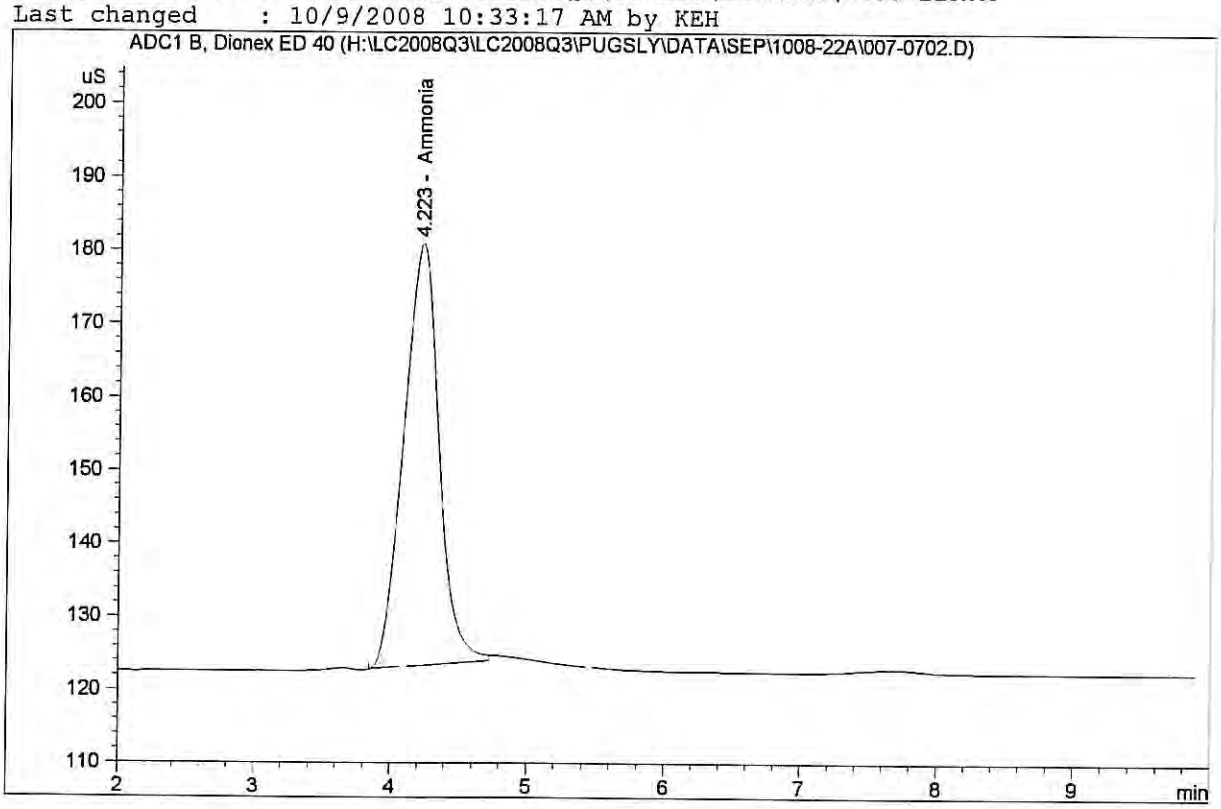
RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.226 PB     1036.91321 1.01456e-2   10.52007     Ammonia

Totals :                                10.52007

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

==========

Injection Date : 10/7/2008 1:30:16 PM Seq. Line : 7
Sample Name : Standard 7 Location : -
Acq. Operator : KEH Inj : 2
Acq. Instrument : Pugsly
Acq. Method : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed : 10/9/2008 10:33:17 AM by KEH



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Thursday, October 09, 2008 10:32:46 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.223	PB	1041.83447	1.01683e-2	10.59370		Ammonia

Totals : 10.59370

Results obtained with enhanced integrator!

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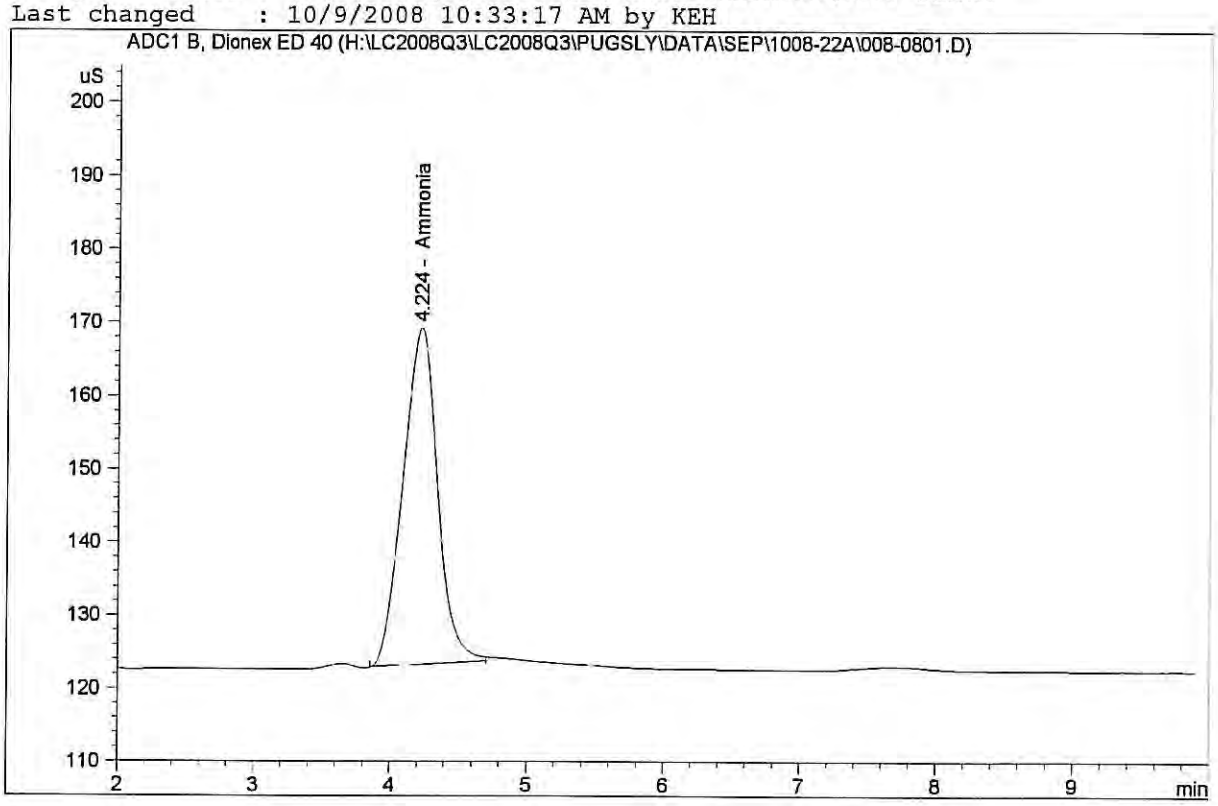
*** End of Report ***

```
==================================================================
Injection Date  : 10/7/2008 1:41:07 PM          Seq. Line :   8
Sample Name     : Second Source                  Location :   -
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==================================================================
                      External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

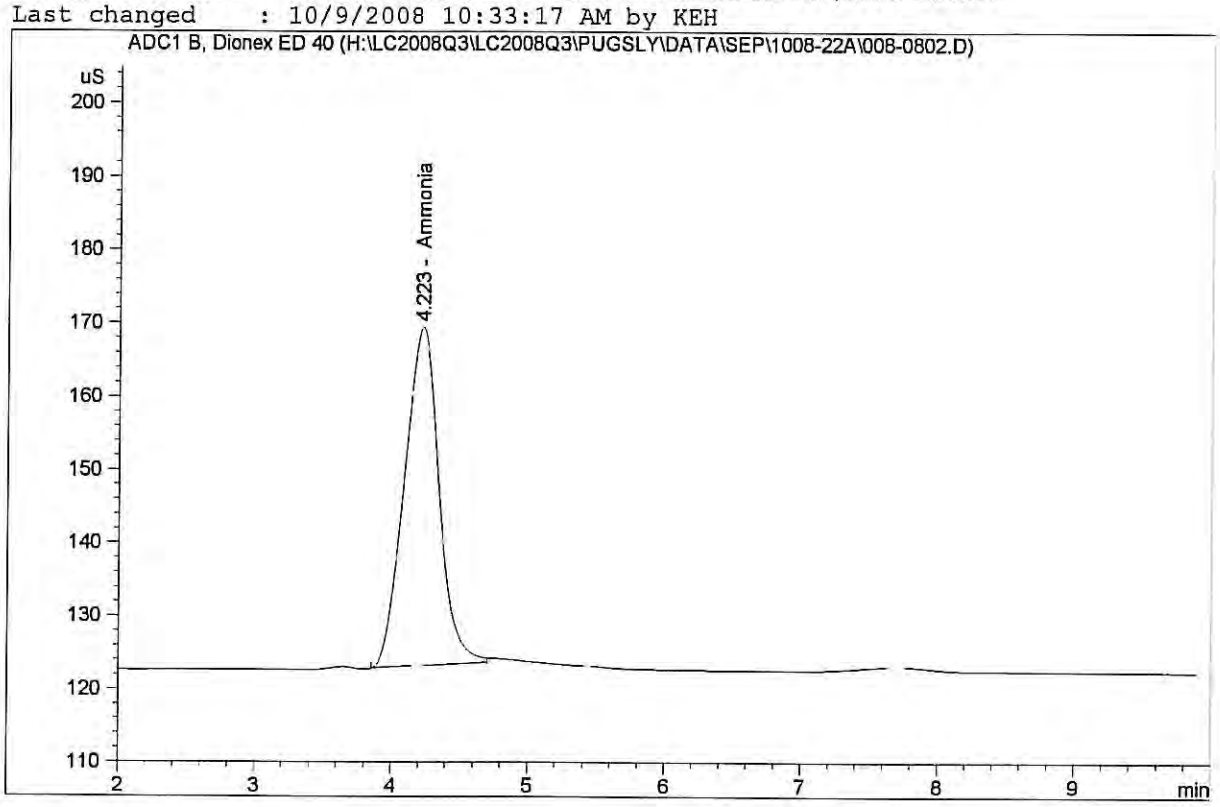
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.224 PB      816.23181 9.30566e-3    7.59557     Ammonia

Totals :                                7.59557

 Results obtained with enhanced integrator!
==================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/7/2008 1:51:25 PM          Seq. Line :   8
Sample Name     : Second Source                  Location :   -
Acq. Operator   : KEH                                Inj :   2
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

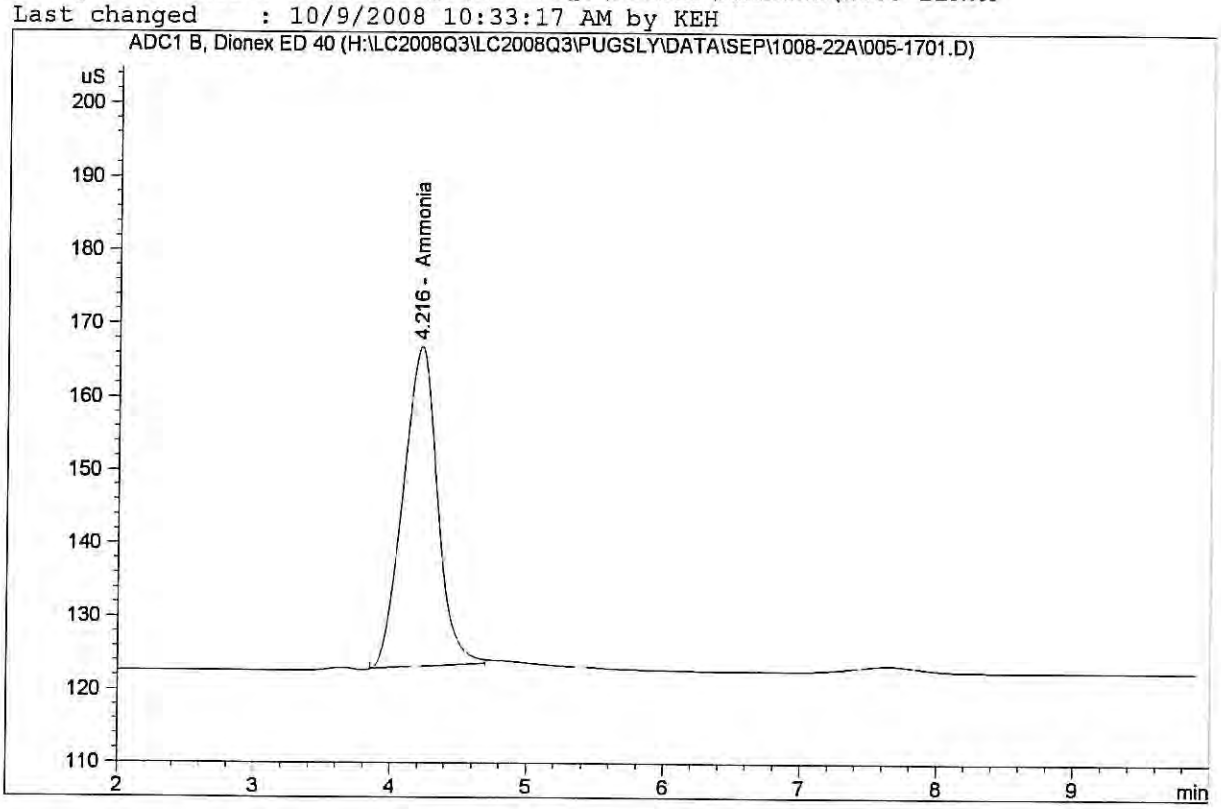
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.223 PB      820.77649 9.32028e-3    7.64986     Ammonia

Totals :                                7.64986

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/7/2008 4:51:28 PM          Seq. Line :  17
Sample Name     : Standard 5                     Location :   -
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

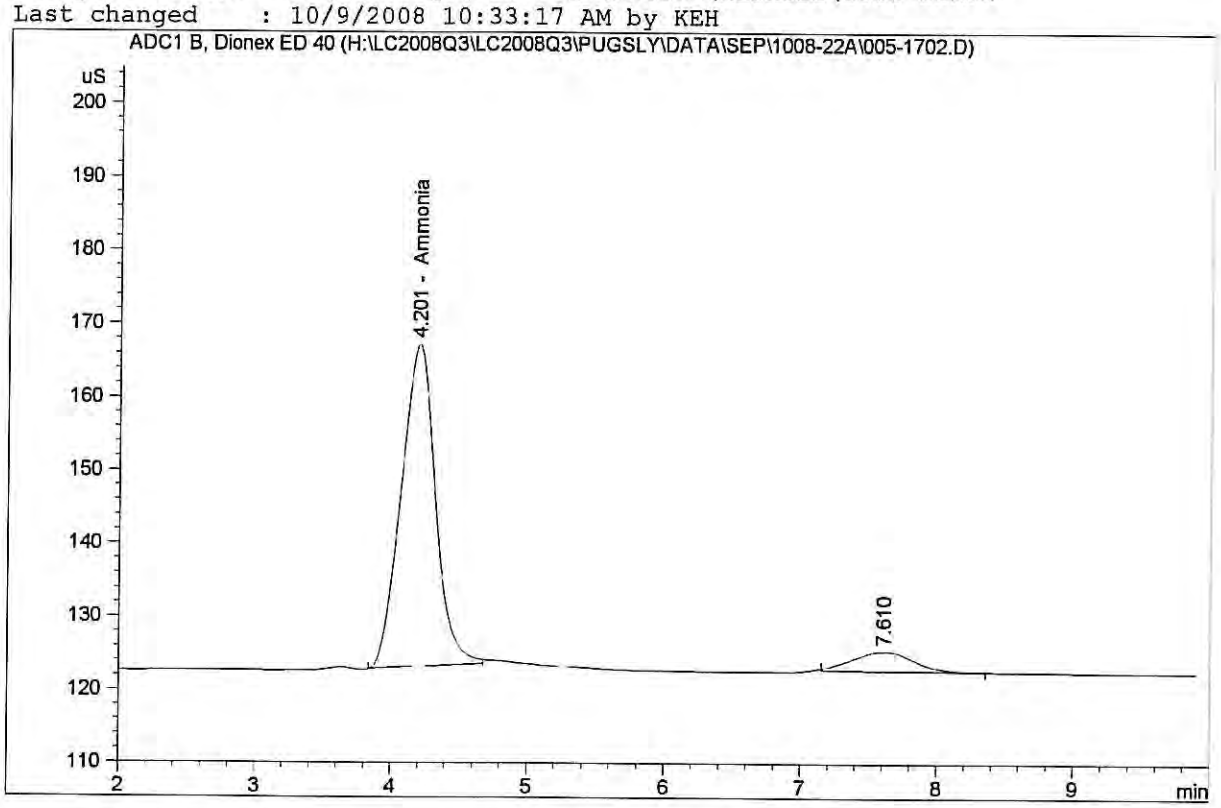
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.216 PB      775.57562 9.17848e-3    7.11861     Ammonia

Totals :                                7.11861

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/7/2008 5:01:46 PM          Seq. Line :  17
Sample Name     : Standard 5                     Location :   -
Acq. Operator   : KEH                                Inj :   2
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

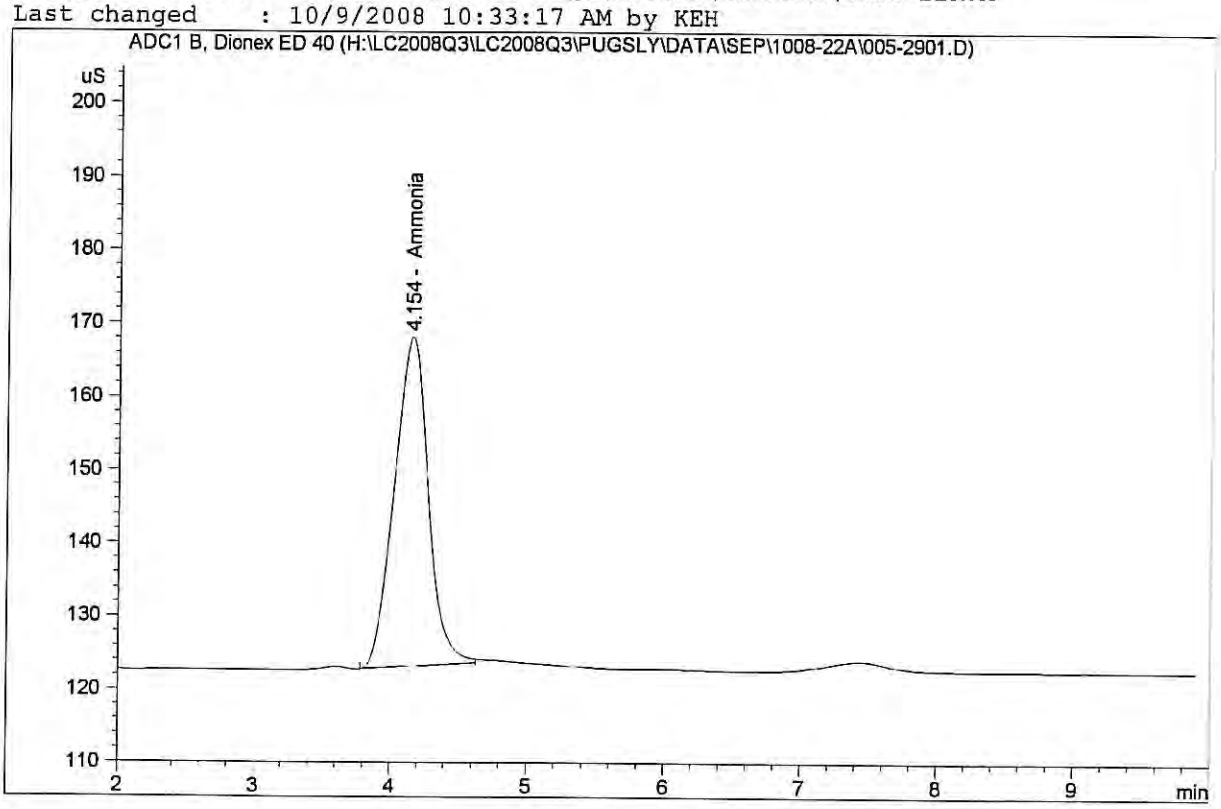
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.201 PB      776.92407 9.18260e-3    7.13419     Ammonia

Totals :                                7.13419

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/7/2008 9:05:21 PM          Seq. Line :  29
Sample Name     : Standard 5                     Location :   -
Acq. Operator   : KEH                                Inj :   1
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Thursday, October 09, 2008 10:32:46 AM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

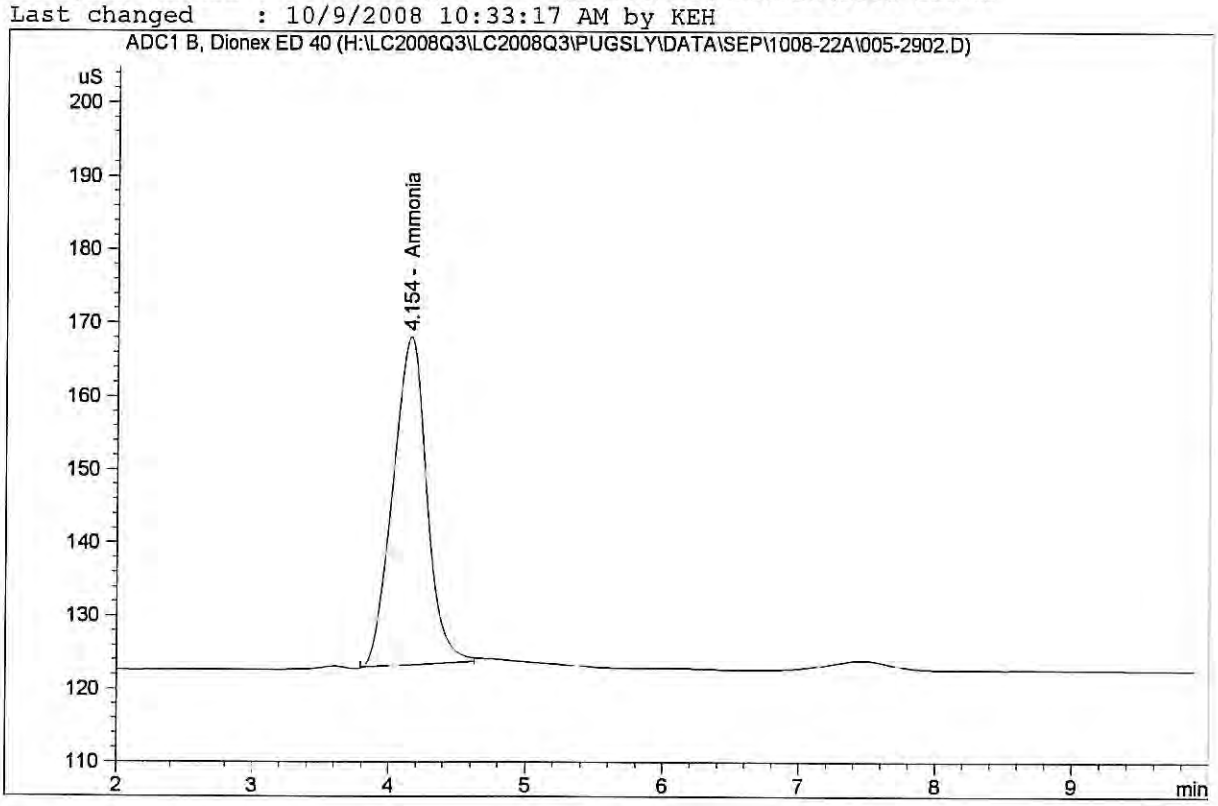
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.154 PB      784.62061 9.20624e-3    7.22341     Ammonia

Totals :                                7.22341

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==================================================================
Injection Date  : 10/7/2008 9:15:39 PM          Seq. Line :  29
Sample Name     : Standard 5                     Location :   -
Acq. Operator   : KEH                                Inj :   2
Acq. Instrument : Pugsly
Acq. Method     : H:\LC2008Q1\PUGSLY\METHODS\IC2.M
Last changed    : 1/8/2008 10:15:12 AM by RMB
Analysis Method : H:\LC2008Q3\LC2008Q3\PUGSLY\METHODS\1008-22R.M
Last changed    : 10/9/2008 10:33:17 AM by KEH
```




```
==================================================================
                      External Standard Report
==================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, October 09, 2008 10:32:46 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.154 PB      781.69250 9.19722e-3    7.18940     Ammonia

Totals :                                7.18940

 Results obtained with enhanced integrator!
==================================================================
                        *** End of Report ***
```

Sequence Table:

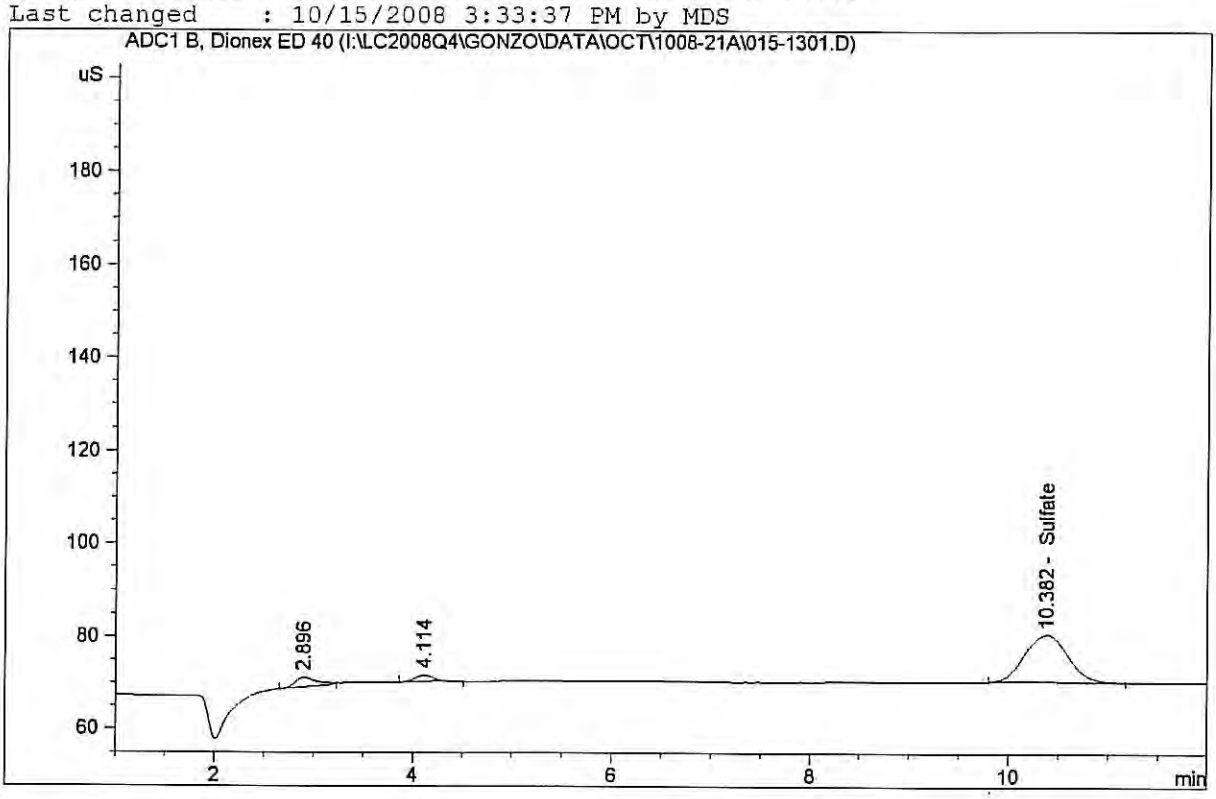
Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 1	Standard 1	IC2	2	Sample		
2	Vial 2	Standard 2	IC2	2	Sample		
3	Vial 3	Standard 3	IC2	2	Sample		
4	Vial 4	Standard 4	IC2	2	Sample		
5	Vial 5	Standard 5	IC2	2	Sample		
6	Vial 6	Standard 6	IC2	2	Sample		
7	Vial 7	Standard 7	IC2	2	Sample		
8	Vial 8	Second Source	IC2	2	Sample		
9	Vial 9	0.04N H2SO4	IC2	2	Sample		
10	Vial 10	DI H2O	IC2	2	Sample		
11	Vial 11	Run 1*20	IC2	2	Sample		
12	Vial 12	Run 2*10	IC2	2	Sample		
13	Vial 13	Run 3*10	IC2	2	Sample		
14	Vial 14	H2SO4 Blank	IC2	2	Sample		
15	Vial 15	MS/Run 3	IC2	2	Sample		
16	Vial 4	Standard 4	IC2	2	Sample		
17	Vial 5	Standard 5	IC2	2	Sample		
18	Vial 16	Run 1	IC2	2	Sample		
19	Vial 17	Run 2	IC2	2	Sample		
20	Vial 18	Run 3	IC2	2	Sample		
21	Vial 19	Run 4	IC2	2	Sample		
22	Vial 20	Run 5	IC2	2	Sample		
23	Vial 21	Run 6	IC2	2	Sample		
24	Vial 22	Run 7	IC2	2	Sample		
25	Vial 23	Run 8	IC2	2	Sample		
26	Vial 24	Run 9	IC2	2	Sample		
27	Vial 25	Blank	IC2	2	Sample		
28	Vial 4	Standard 4	IC2	2	Sample		
29	Vial 5	Standard 5	IC2	2	Sample		

Sample Chromatograms

1008-22

```
==========================================================================
Injection Date  : 10/13/2008 4:19:58 PM          Seq. Line :  13
Sample Name     : In R1 C2*20                     Location : Vial 15
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed    : 10/15/2008 3:33:37 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      10/15/2008 3:33:29 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

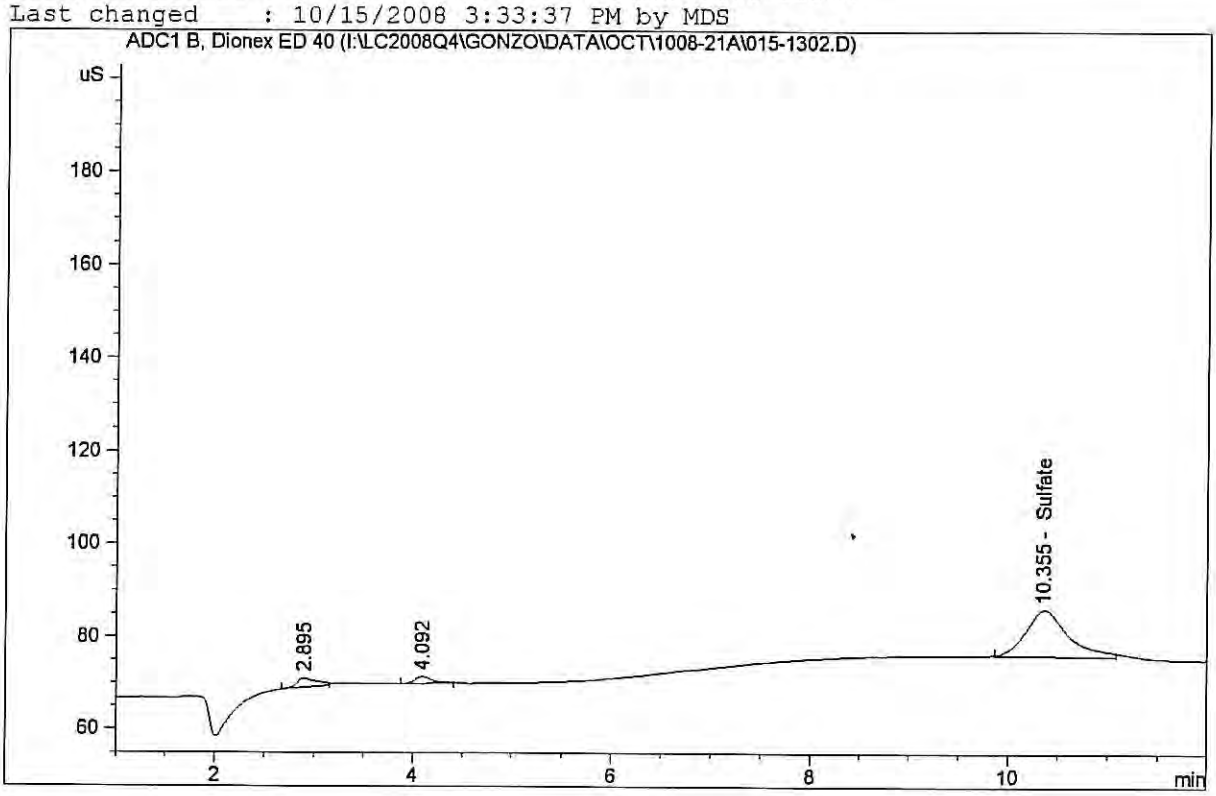
RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.382 BB      315.21292 1.72966e-2    5.45212     Sulfate

Totals :                                5.45212

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

1008-22

```
==========================================================================
Injection Date  : 10/13/2008 4:33:51 PM          Seq. Line :  13
Sample Name     : In R1 C2*20                     Location : Vial 15
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed    : 10/15/2008 3:33:37 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      10/15/2008 3:33:29 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

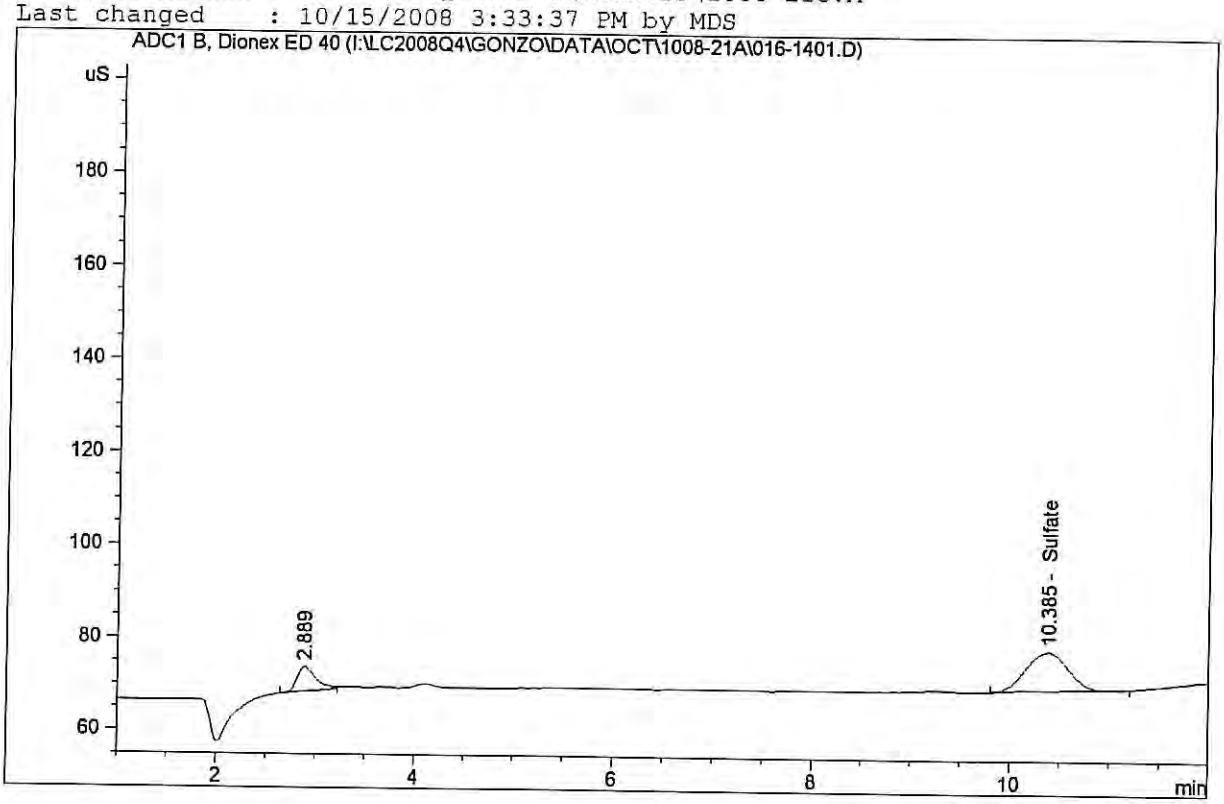
RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.355 BB      308.12167 1.72915e-2    5.32789     Sulfate

Totals :                                5.32789

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

1008-22

```
==========================================================================
Injection Date  : 10/13/2008 4:47:42 PM          Seq. Line :  14
Sample Name     : In R2 C2*100                    Location : Vial 16
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed    : 10/15/2008 3:33:37 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      10/15/2008 3:33:29 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

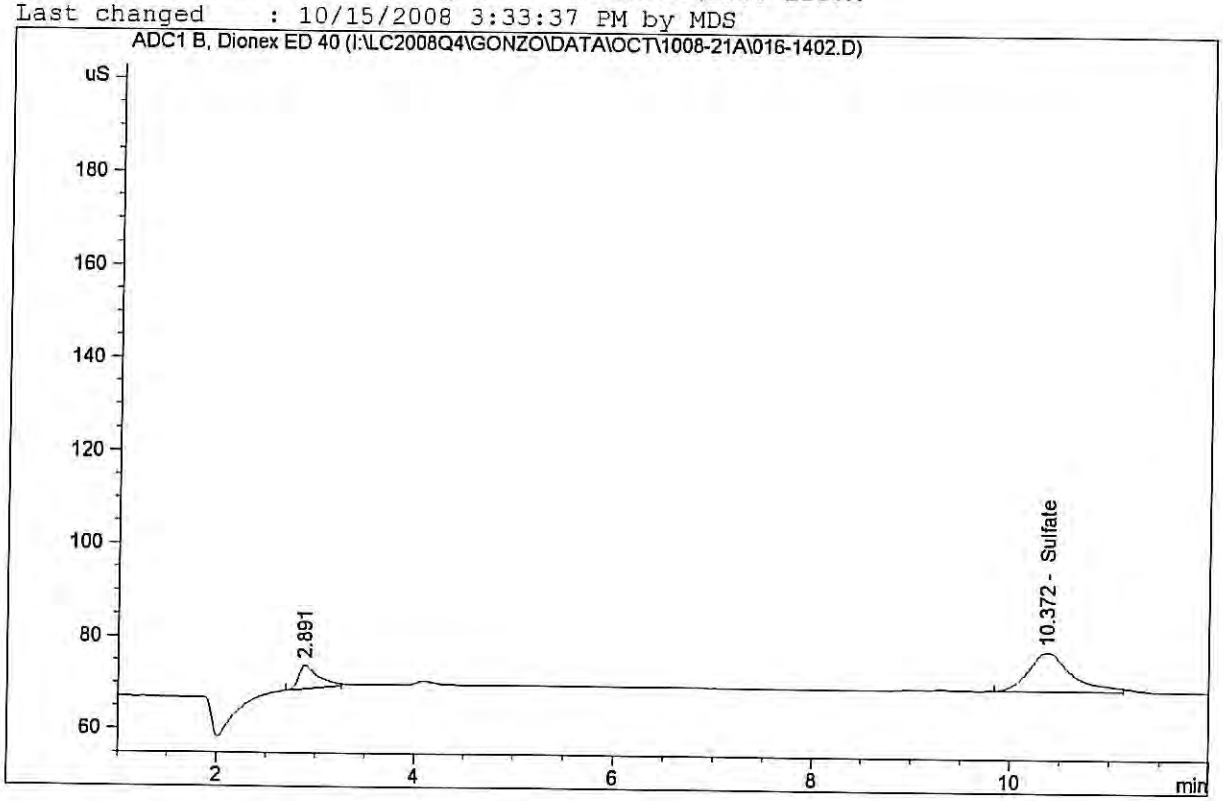
RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.385 PP      245.60313 1.72335e-2    4.23260      Sulfate

Totals :                                4.23260

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

1008-22

```
==========================================================================
Injection Date  : 10/13/2008 5:01:33 PM          Seq. Line :  14
Sample Name     : In R2 C2*100                    Location : Vial 16
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed    : 10/15/2008 3:33:37 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      10/15/2008 3:33:29 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|-----------------
 10.372 BB      261.49002 1.72509e-2    4.51093     Sulfate

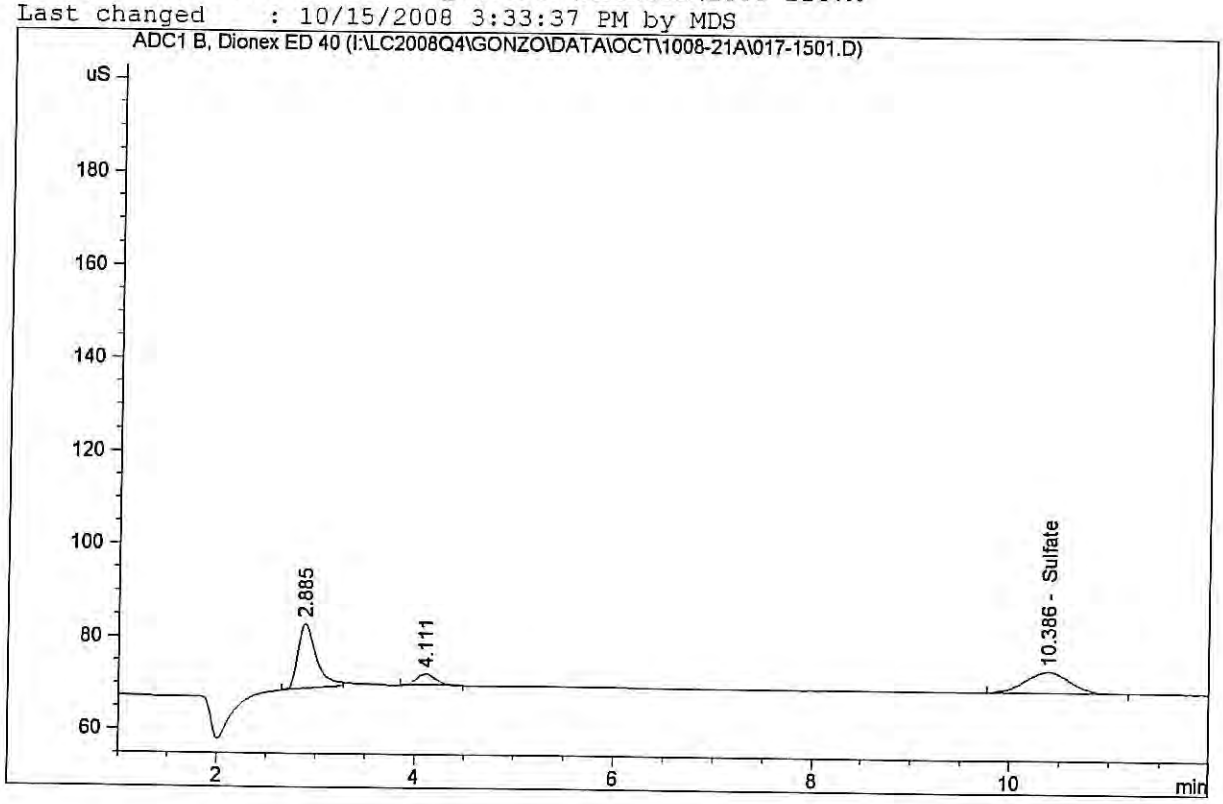
Totals :                                4.51093

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

1008-22

==========

Injection Date : 10/13/2008 5:15:29 PM Seq. Line : 15
Sample Name : In R3 C2*10 Location : Vial 17
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.386	BB	144.81442	1.70344e-2	2.46683		Sulfate
Totals :				2.46683		

Results obtained with enhanced integrator!

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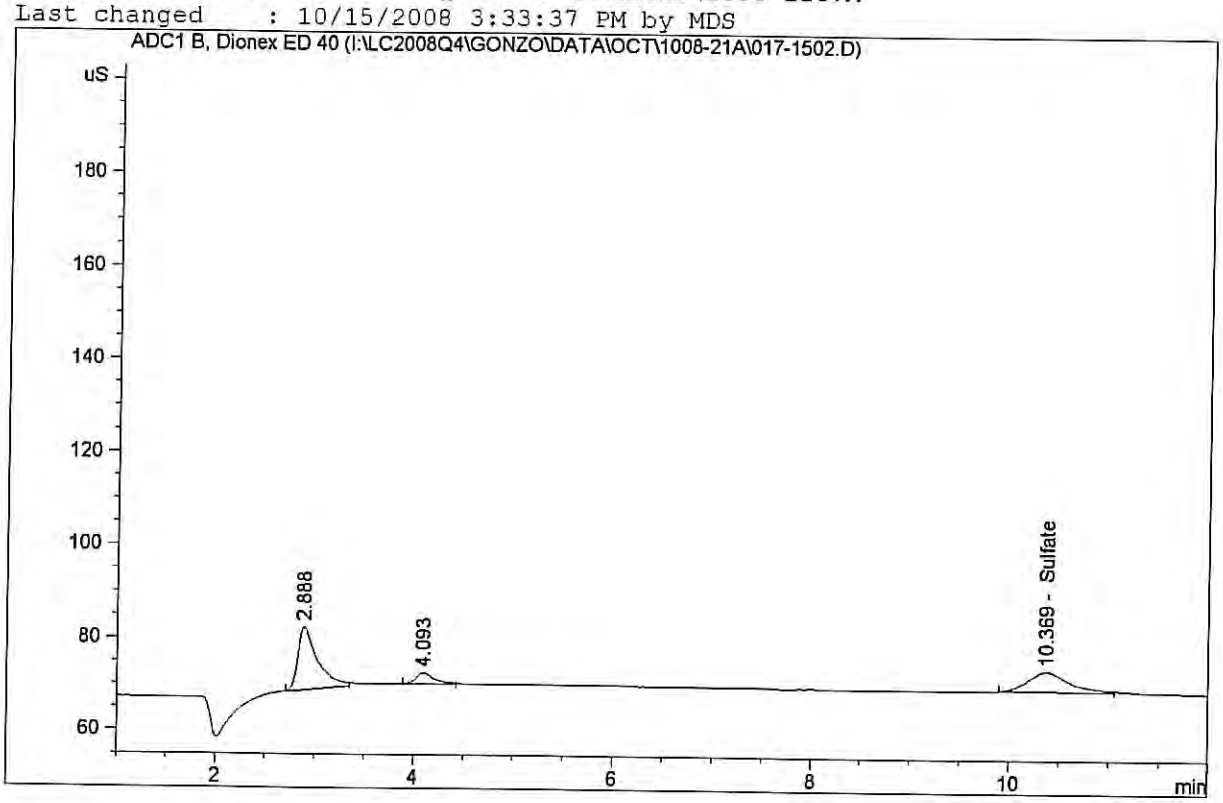
*** End of Report ***

1008-22

```
==========================================================================
Injection Date  : 10/13/2008 5:29:09 PM          Seq. Line :  15
Sample Name     : In R3 C2*10                     Location : Vial 17
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed    : 10/15/2008 3:33:37 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      10/15/2008 3:33:29 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

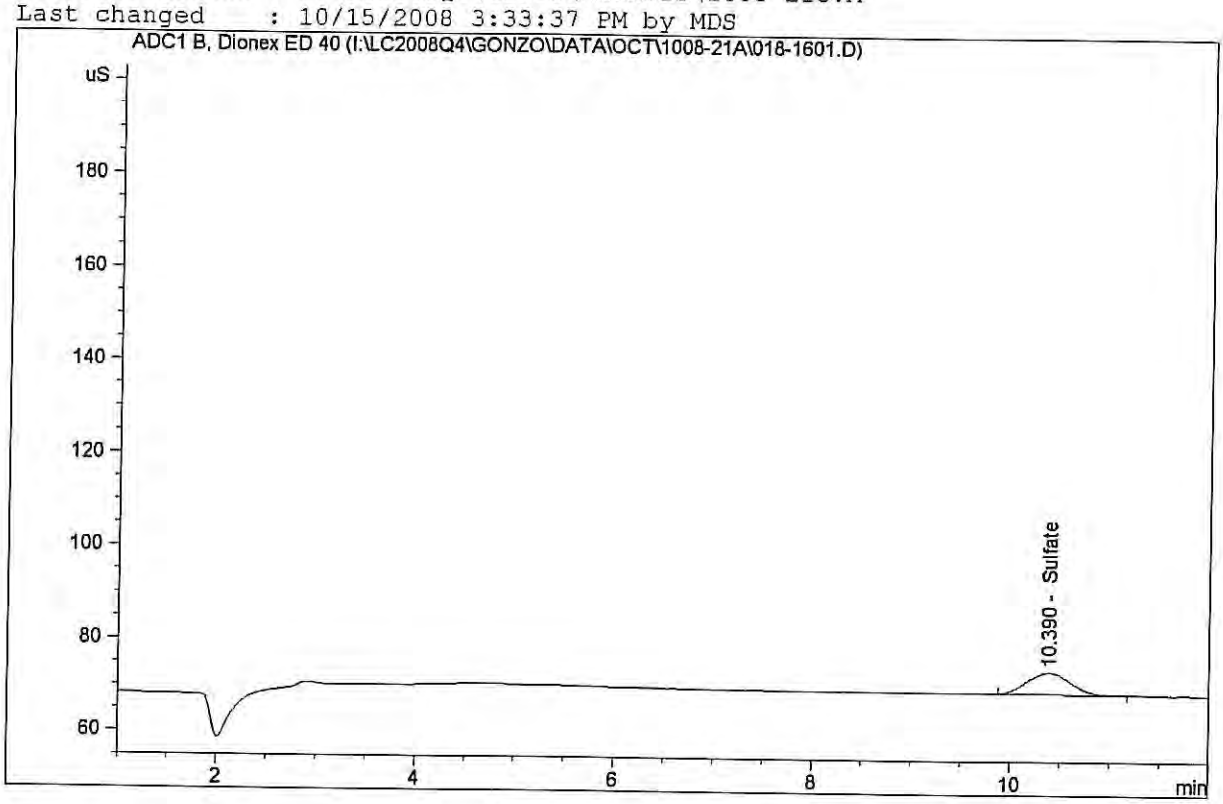
RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.369 BB      131.26828 1.69844e-2    2.22951     Sulfate

Totals :                                2.22951

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

1008-22

```
==========================================================================
Injection Date  : 10/13/2008 5:43:04 PM          Seq. Line :  16
Sample Name     : Stk R1 C2*10                    Location : Vial 18
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed    : 10/15/2008 3:33:37 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      10/15/2008 3:33:29 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.390 BB      144.89044 1.70347e-2    2.46816     Sulfate

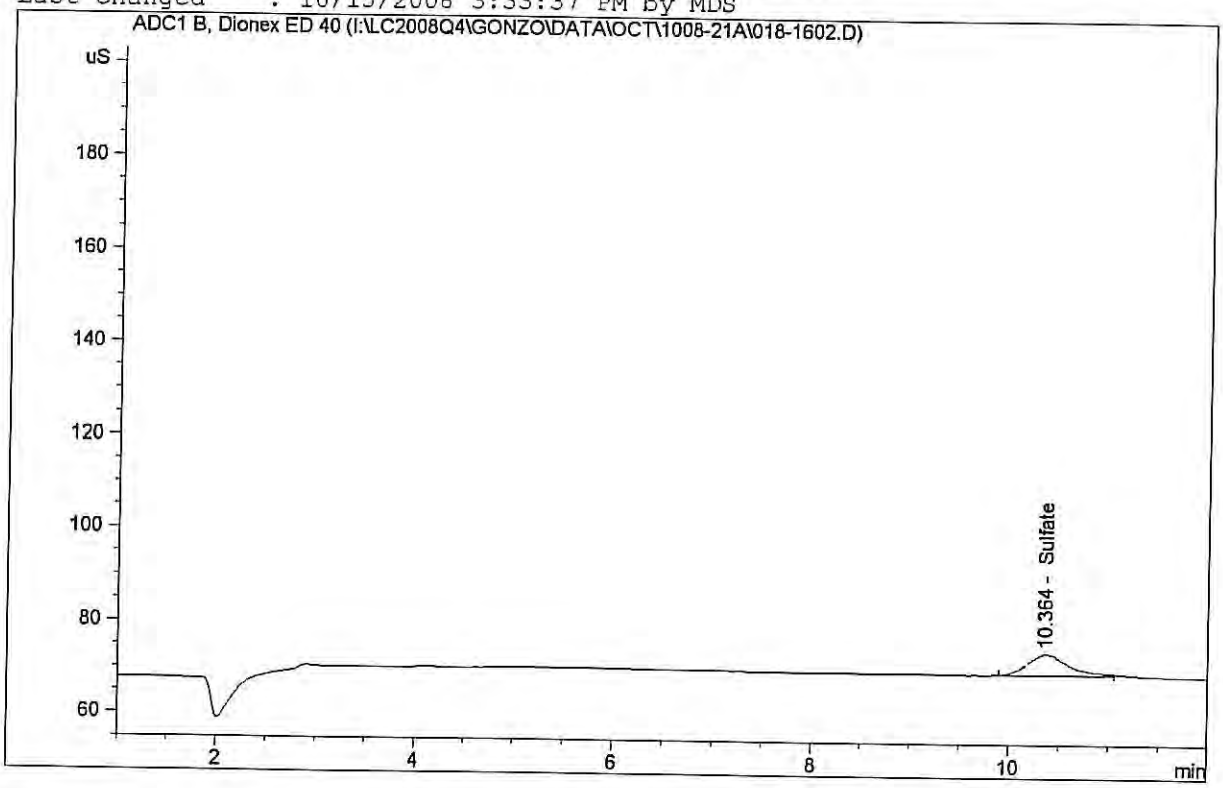
Totals :                                2.46816

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

1008-22

==========

Injection Date : 10/13/2008 5:57:02 PM Seq. Line : 16
Sample Name : Stk R1 C2*10 Location : Vial 18
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



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External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.364	BB	137.28368	1.70078e-2	2.33489		Sulfate

Totals : 2.33489

Results obtained with enhanced integrator!

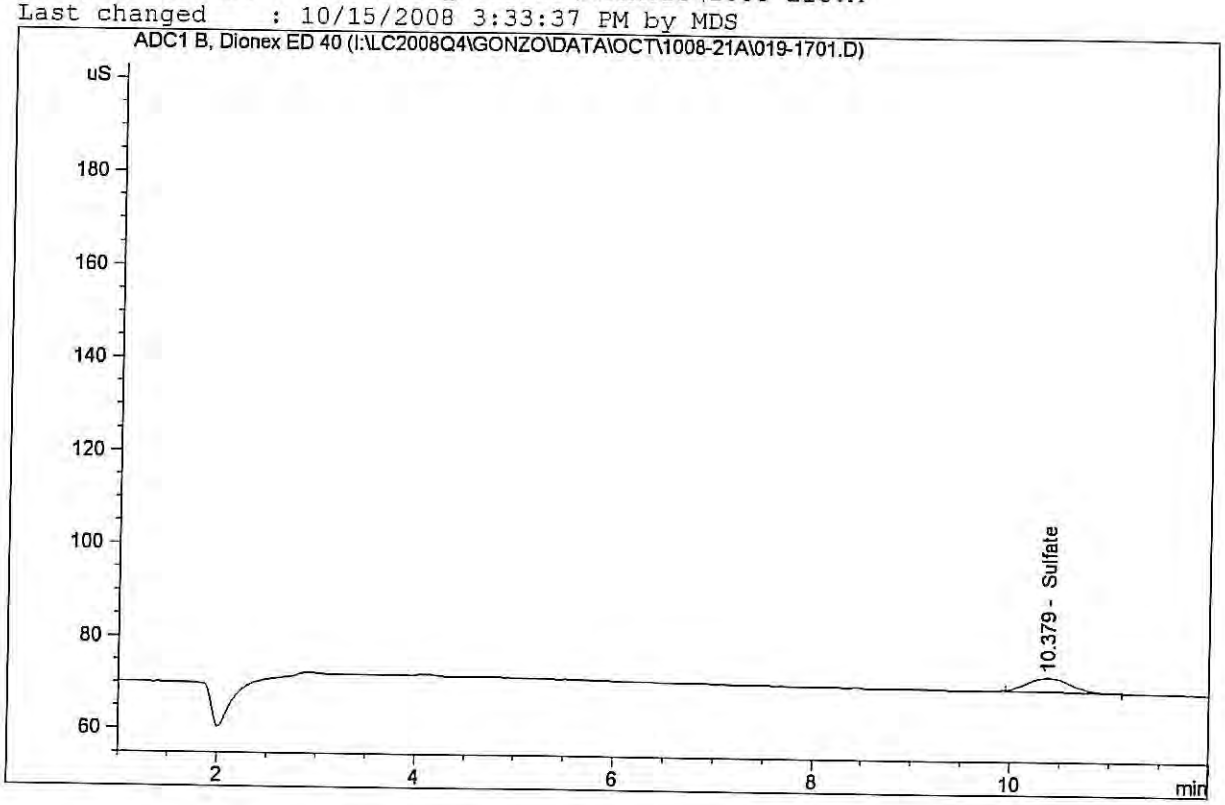
==========

*** End of Report ***

1008-22

==========

Injection Date : 10/13/2008 6:11:09 PM Seq. Line : 17
Sample Name : Stk R2 C2*10 Location : Vial 19
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.379	BB	94.44609	1.67757e-2	1.58440		Sulfate
Totals :				1.58440		

Results obtained with enhanced integrator!

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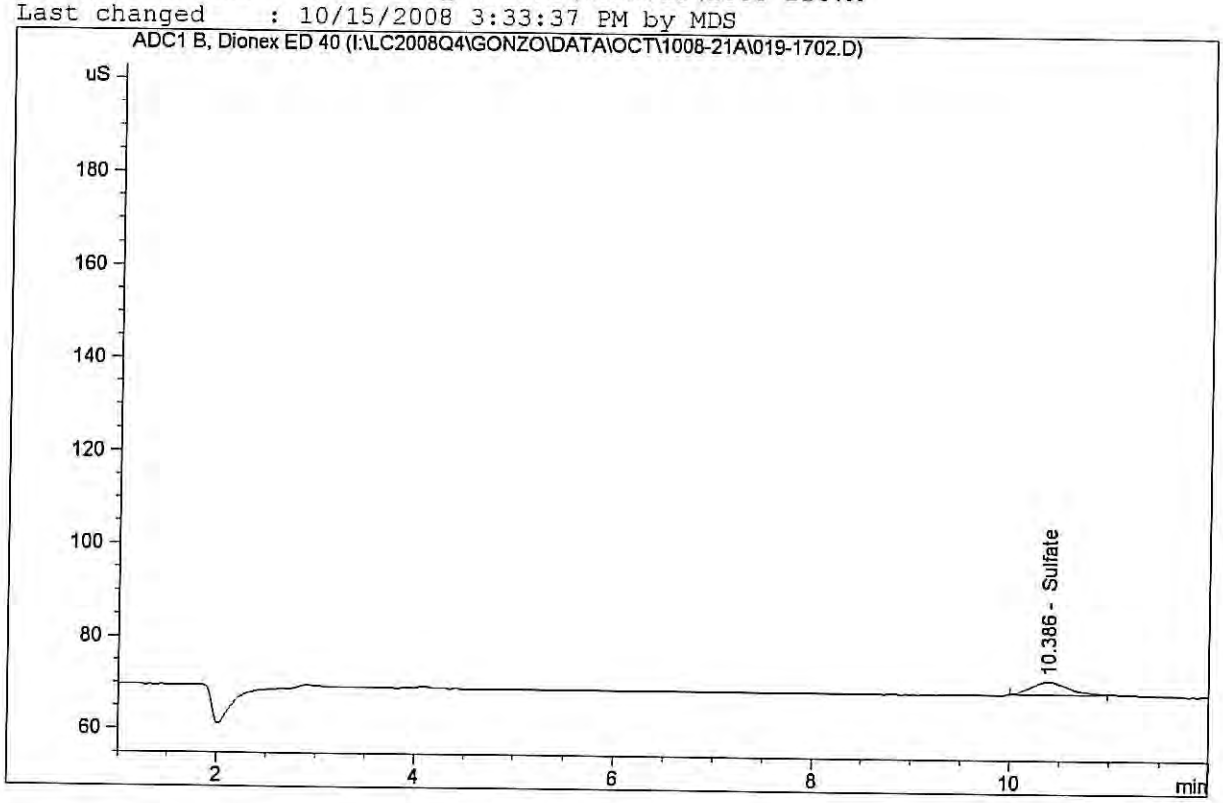
*** End of Report ***

1008-22

==========

Injection Date : 10/13/2008 6:42:12 PM Seq. Line : 17
Sample Name : Stk R2 C2*10 Location : Vial 19
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



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External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.386	BB	83.61464	1.66794e-2	1.39464		Sulfate
Totals :				1.39464		

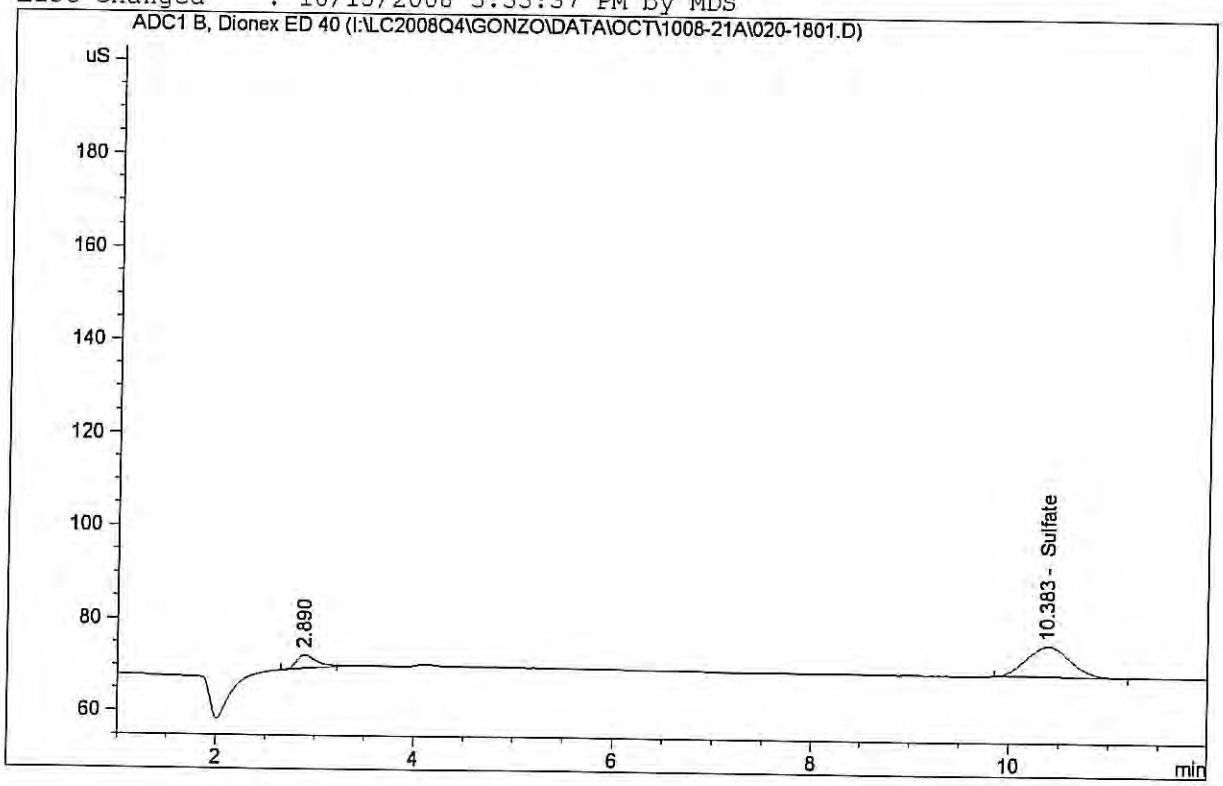
Results obtained with enhanced integrator!

==========

*** End of Report ***

1008-22

Injection Date	: 10/13/2008 6:56:09 PM	Seq. Line :	18
Sample Name	: Stk R3 C2*10	Location :	Vial 20
Acq. Operator	: MDS	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21C.M		
Last changed	: 10/15/2008 3:33:37 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	10/15/2008 3:33:29 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.383	BP	204.33684	1.71757e-2	3.50963		Sulfate
Totals :				3.50963		

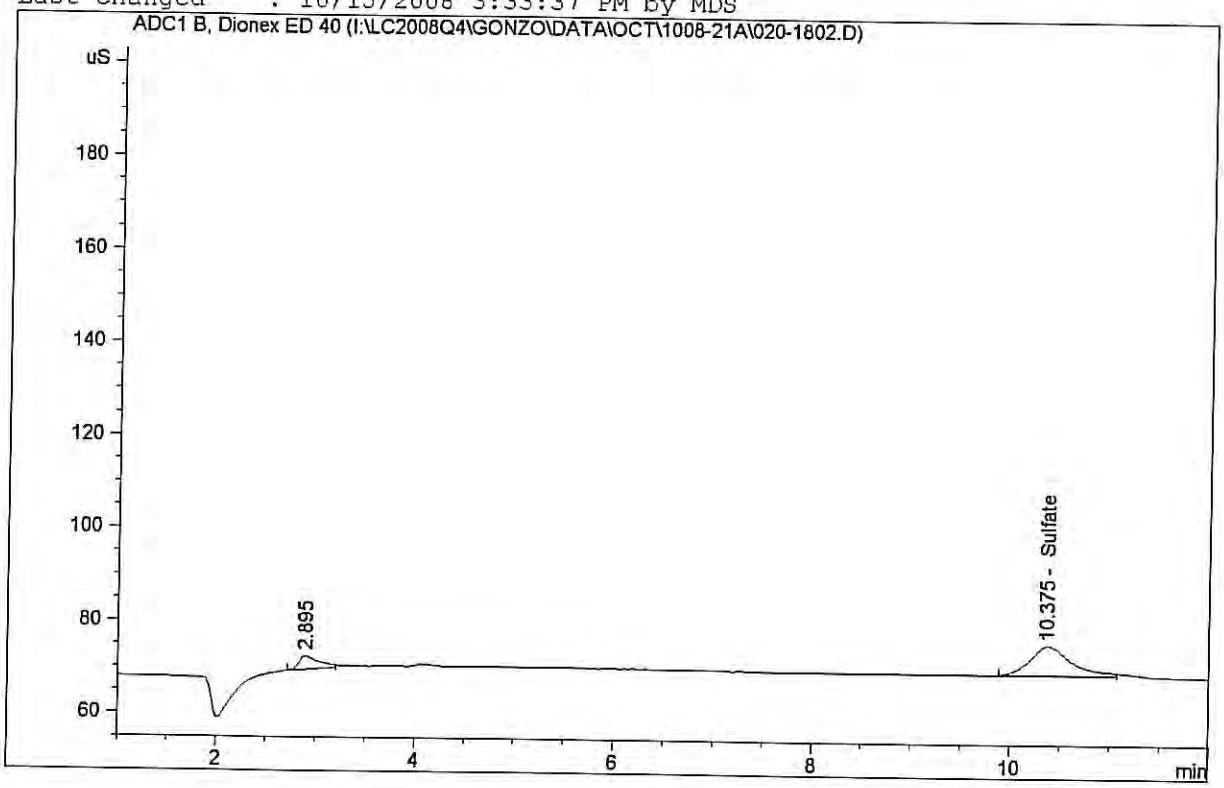
Results obtained with enhanced integrator!

*** End of Report ***

1008-22

==========

Injection Date : 10/13/2008 7:10:06 PM Seq. Line : 18
Sample Name : Stk R3 C2*10 Location : Vial 20
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



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External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.375	BB	188.36943	1.71466e-2	3.22989		Sulfate
Totals :				3.22989		

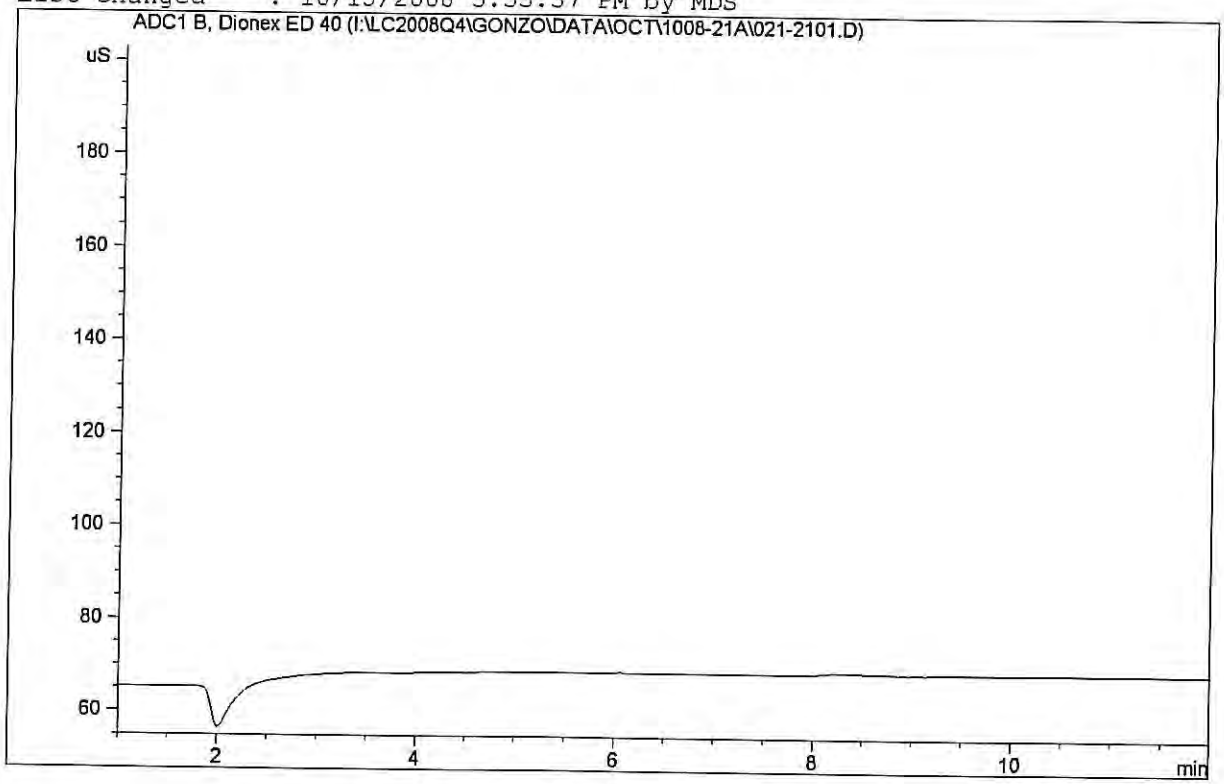
Results obtained with enhanced integrator!

==========

*** End of Report ***

1008-22 Sample Blank

```
==========================================================================
Injection Date  : 10/13/2008 8:19:35 PM          Seq. Line :  21
Sample Name     : In C4                           Location : Vial 21
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed    : 10/15/2008 3:33:37 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      10/15/2008 3:33:29 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.275            -          -          -          Sulfate

Totals :                                 0.00000

 Results obtained with enhanced integrator!
1 Warnings or Errors :

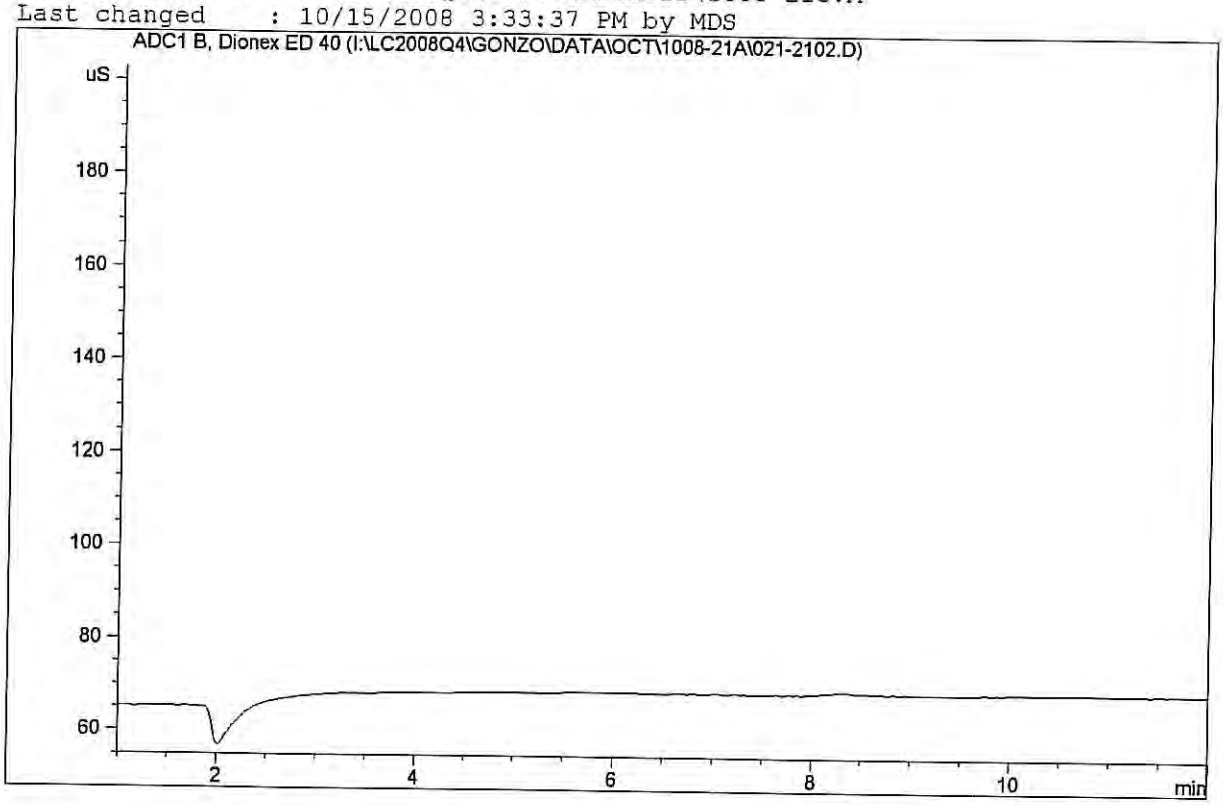
Warning : Calibrated compound(s) not found

==========================================================================
```

1008-22 Sample Blank

==========

Injection Date : 10/13/2008 8:33:28 PM Seq. Line : 21
Sample Name : In C4 Location : Vial 21
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.275		-	-	-		Sulfate

Totals : 0.00000

Results obtained with enhanced integrator!
1 Warnings or Errors :

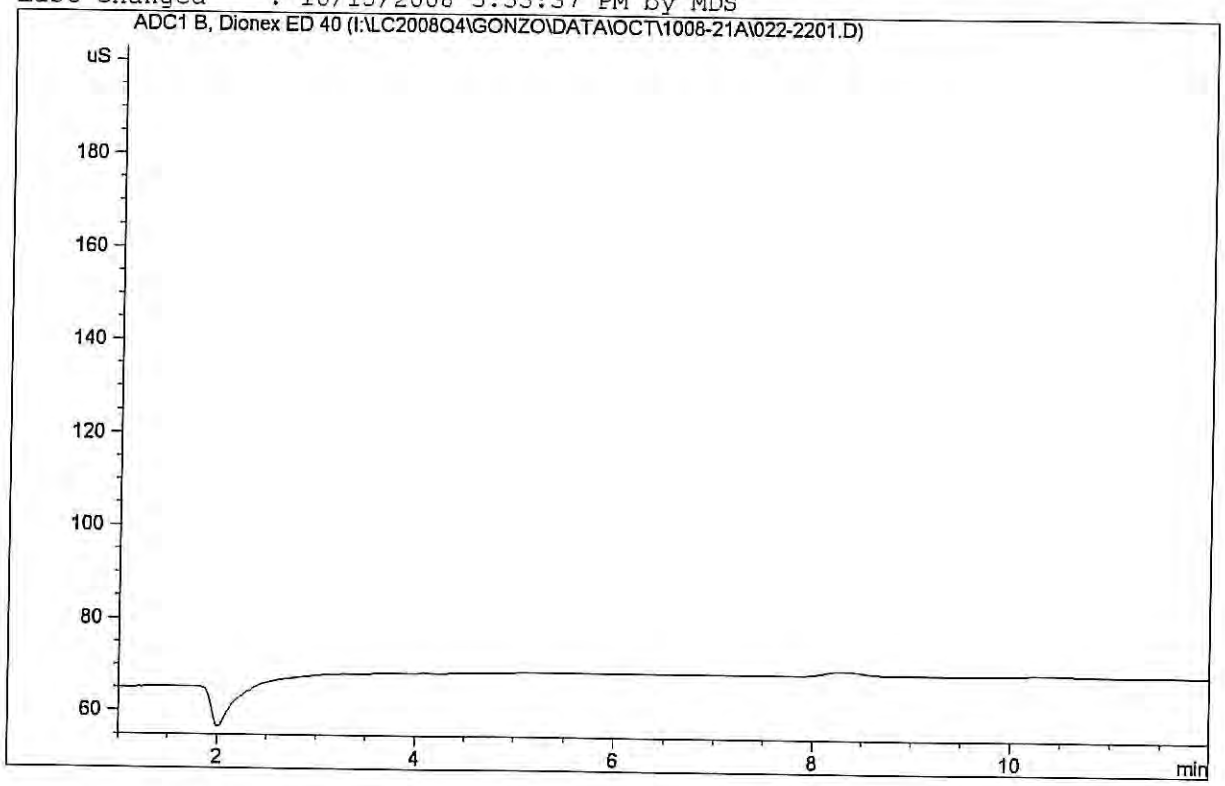
Warning : Calibrated compound(s) not found

==========

1008-22 Sample Blank

==========

Injection Date : 10/13/2008 8:47:07 PM Seq. Line : 22
Sample Name : Stk C4 Location : Vial 22
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.275		-	-	-		Sulfate

Totals : 0.00000

Results obtained with enhanced integrator!
1 Warnings or Errors :

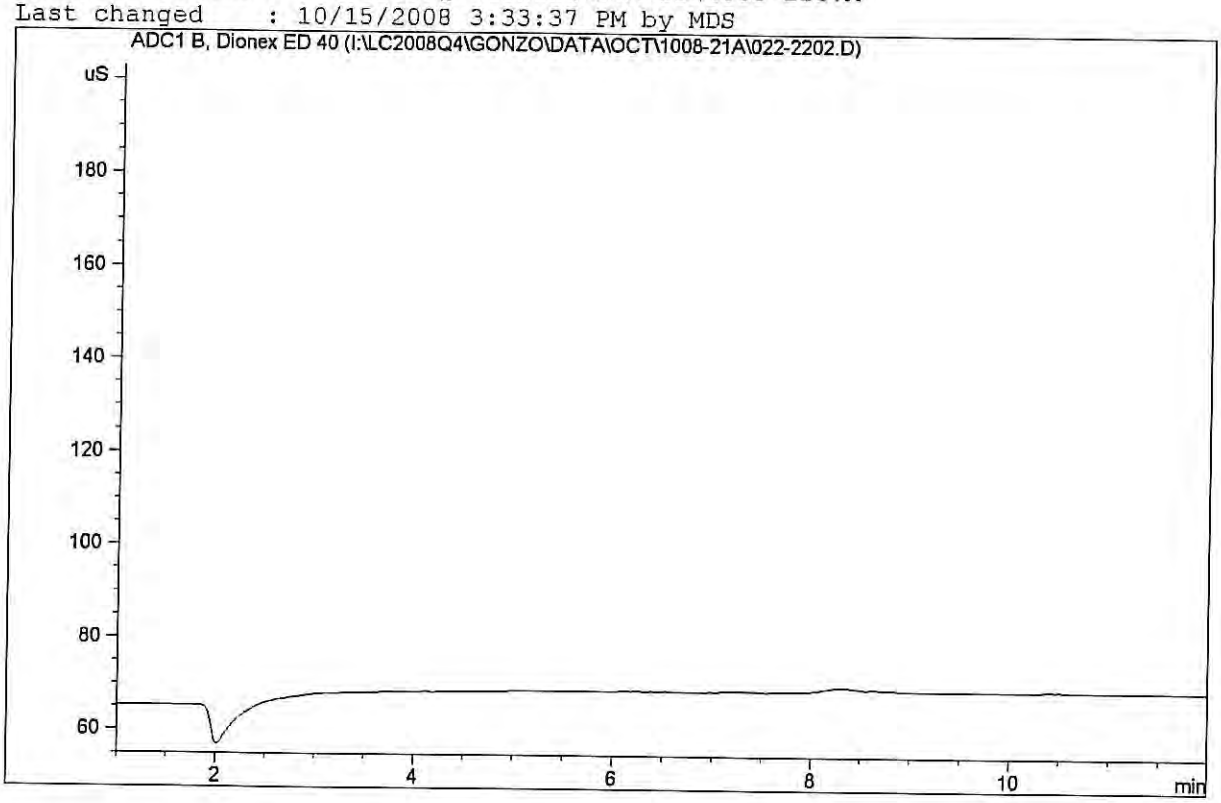
Warning : Calibrated compound(s) not found

==========

1008-22 Sample Blank

==========

Injection Date : 10/13/2008 9:01:08 PM Seq. Line : 22
Sample Name : Stk C4 Location : Vial 22
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.275		-	-	-		Sulfate

Totals : 0.00000

Results obtained with enhanced integrator!
1 Warnings or Errors :

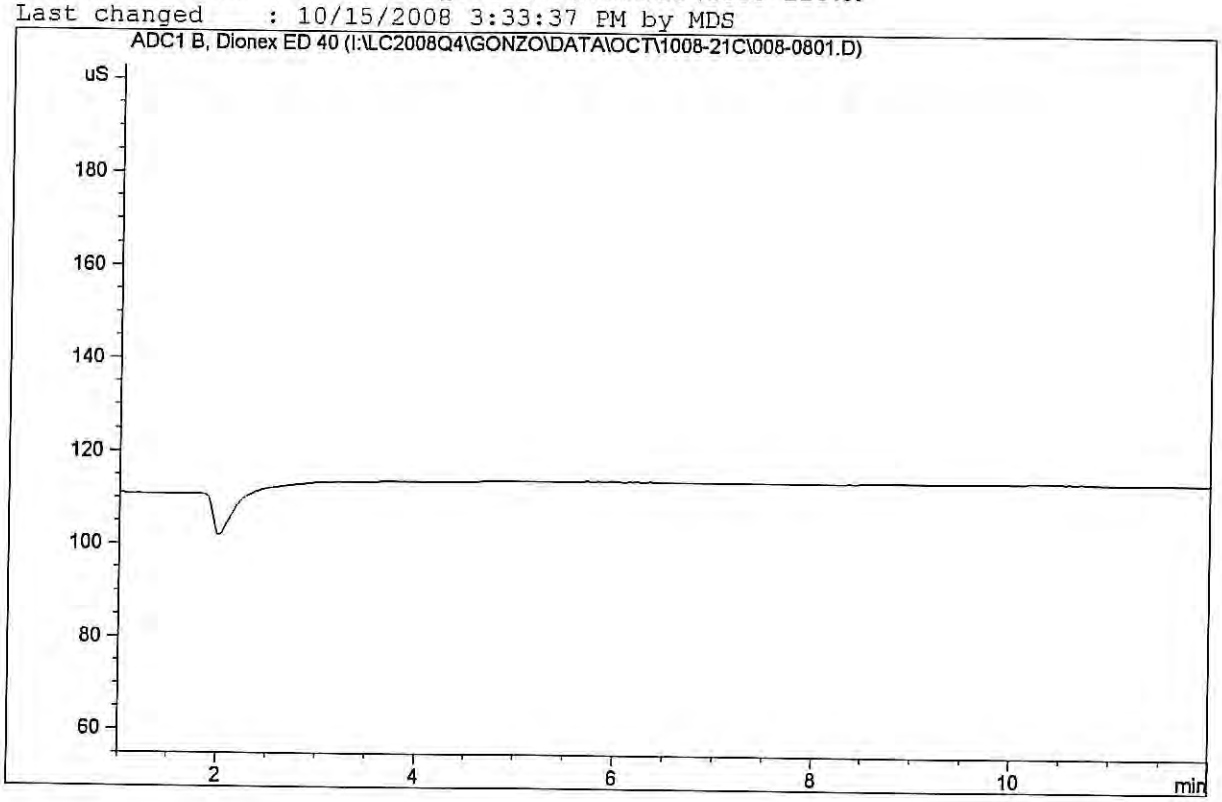
Warning : Calibrated compound(s) not found

==========

used to prepare standards and dilute samples

==========

Injection Date : 10/13/2008 12:27:26 PM Seq. Line : 8
Sample Name : DI H2O Lab Blank Location : Vial 8
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.275		-	-	-		Sulfate

Totals : 0.00000

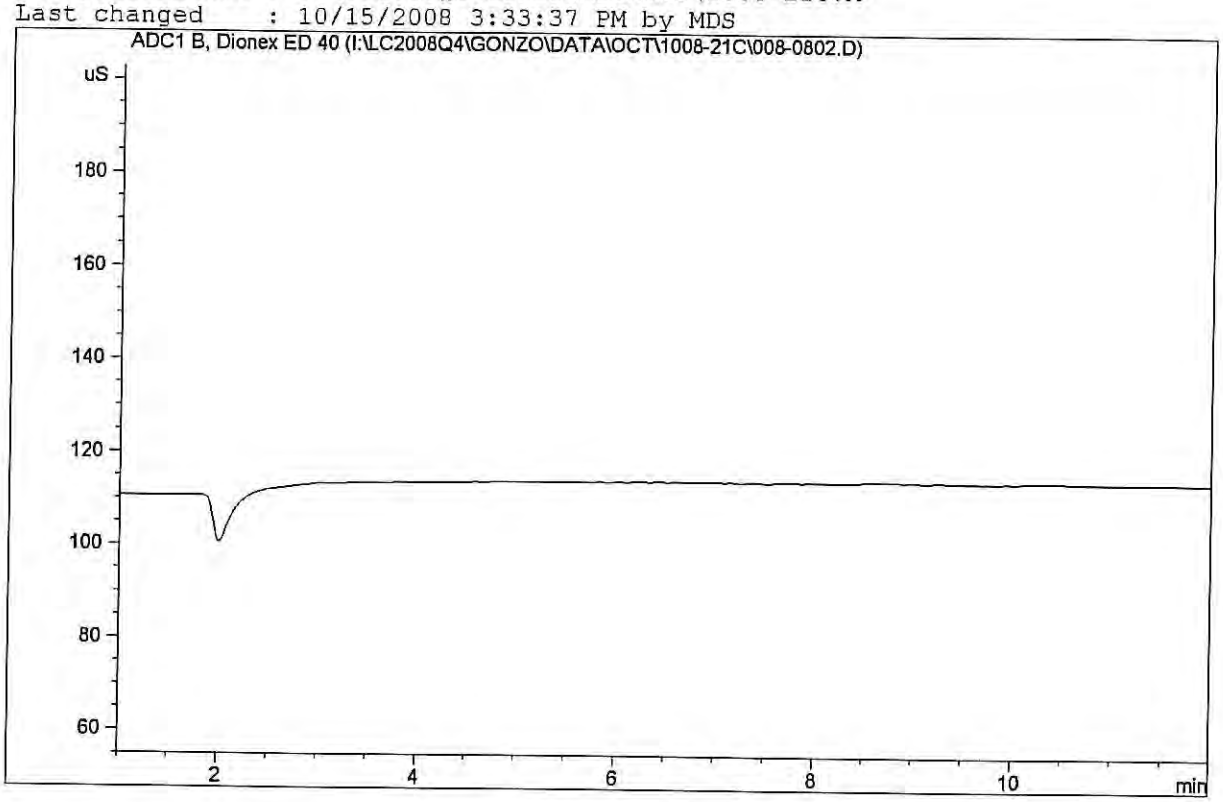
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

==========

used to prepare standards and dilute samples

```
==========================================================================
Injection Date  : 10/13/2008 12:41:24 PM          Seq. Line :   8
Sample Name     : DI H2O Lab Blank                 Location : Vial 8
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed    : 10/15/2008 3:33:37 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      10/15/2008 3:33:29 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
 10.275            -          -          -          Sulfate

Totals :                                 0.00000

 Results obtained with enhanced integrator!
1 Warnings or Errors :

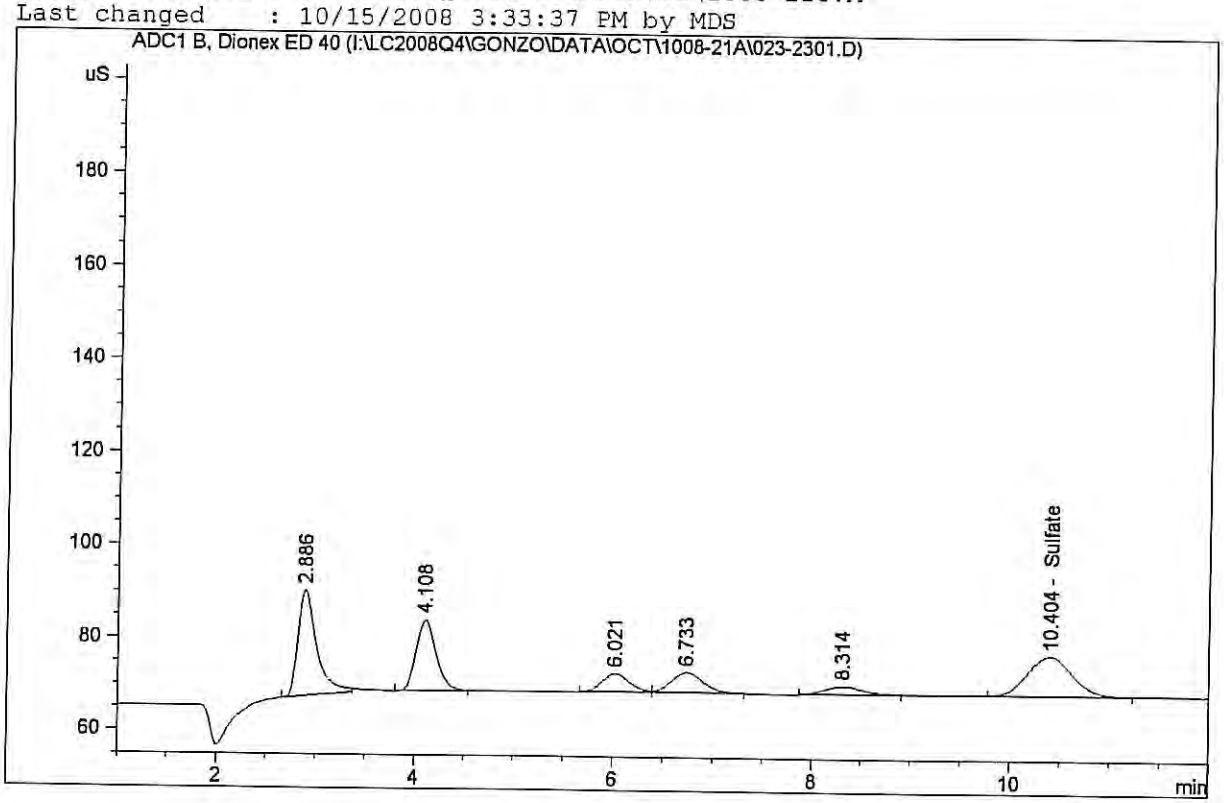
Warning : Calibrated compound(s) not found

==========================================================================
```

1008-22 Matrix Spike

==========

Injection Date : 10/13/2008 9:14:50 PM Seq. Line : 23
Sample Name : MS/In R3 C2 Location : Vial 23
Acq. Operator : MDS Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.404	PB	269.78842	1.72591e-2	4.65631		Sulfate
Totals :				4.65631		

Results obtained with enhanced integrator!

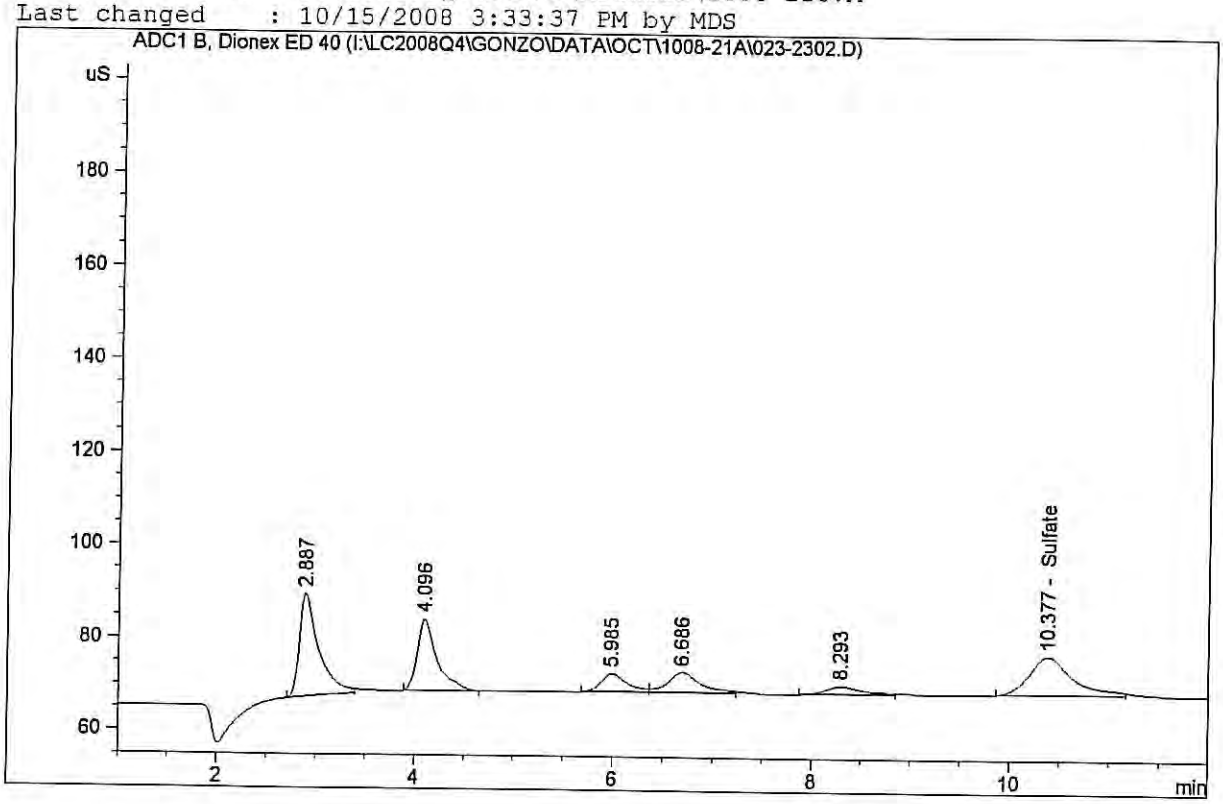
==========

*** End of Report ***

1008-22 Matrix Spike

==========

Injection Date : 10/13/2008 9:28:53 PM Seq. Line : 23
Sample Name : MS/In R3 C2 Location : Vial 23
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21C.M
Last changed : 10/15/2008 3:33:37 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : 10/15/2008 3:33:29 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
10.377	BB	259.81766	1.72491e-2	4.48163		Sulfate

Totals : 4.48163

Results obtained with enhanced integrator!

==========

*** End of Report ***

Curve(s)/QA Point(s) Chromatograms

Calibration Table

Calib. Data Modified : Wednesday, October 15, 2008 3:01:39 PM

Calculate : External Standard
Based on : Peak Area

Rel. Reference Window : 20.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 20.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : Yes, identified peaks are recalibrated
Correct All Ret. Times: No, only for identified peaks

Curve Type : Linear
Origin : Connected
Weight : Linear (Amnt)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

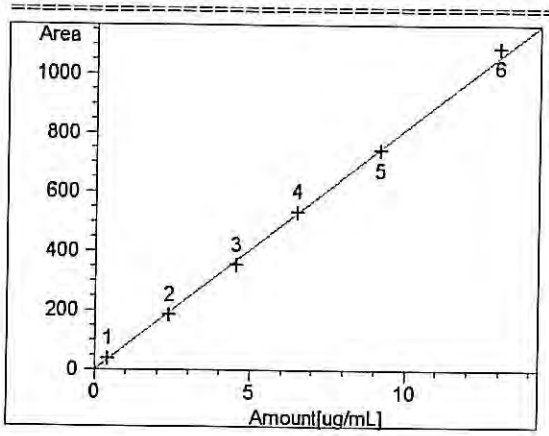
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Sig	Lvl	Amount [ug/mL]	Area	Amt/Area	Ref	Grp	Name
4.077	1	1	4.34000e-1	34.64068	1.25286e-2			Chloride
		2	2.38000	182.88964	1.30133e-2			
		3	4.55000	353.25279	1.28803e-2			
		4	6.52000	533.20381	1.22280e-2			
		5	9.18000	741.24788	1.23845e-2			
		6	13.00000	1087.45514	1.19545e-2			
10.275	1	1	4.34000e-1	29.70305	1.46113e-2			Sulfate
		2	2.38000	135.66957	1.75426e-2			
		3	4.55000	259.96547	1.75023e-2			
		4	6.52000	376.63283	1.73113e-2			
		5	9.18000	524.47047	1.75034e-2			
		6	13.00000	756.12341	1.71930e-2			

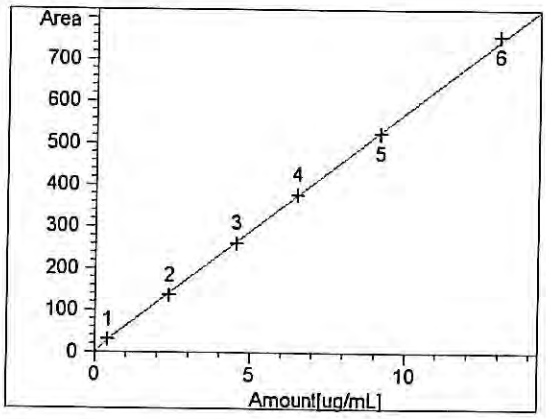
Peak Sum Table

No Entries in table

Calibration Curves

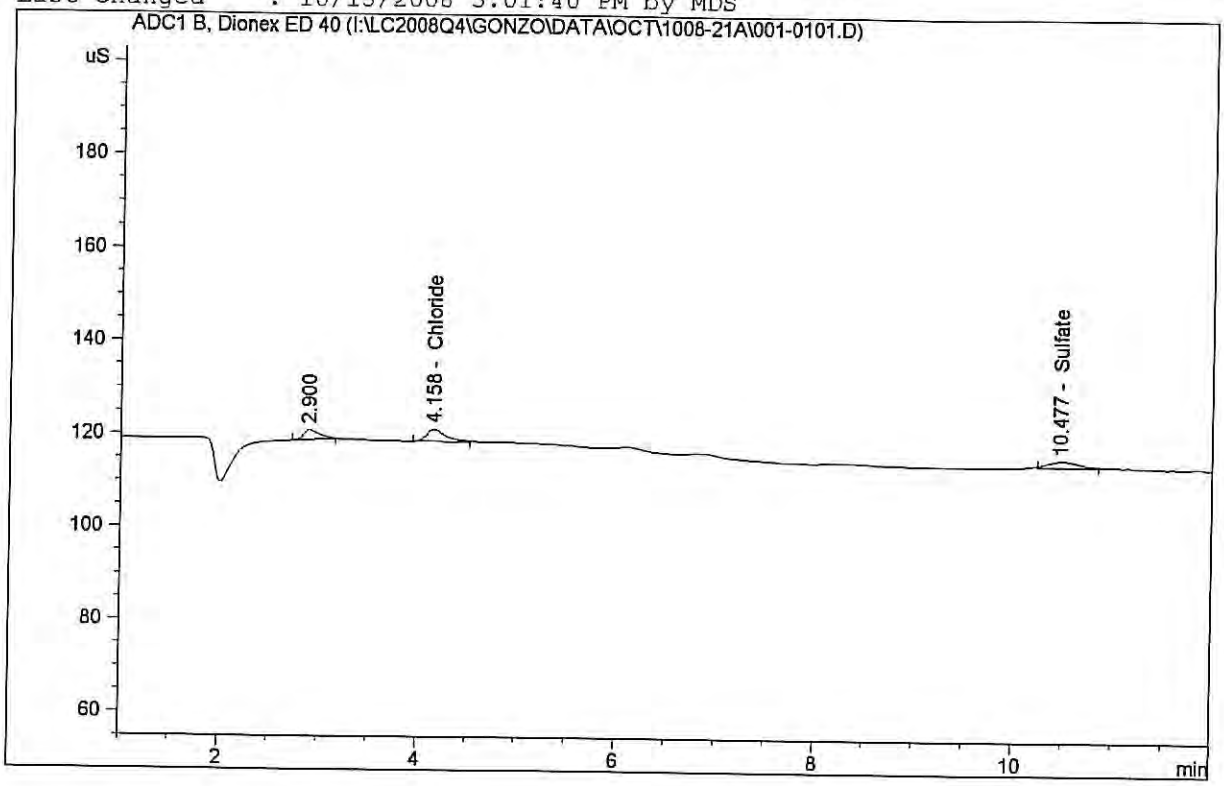


Chloride at exp. RT: 4.077
ADC1 B, Dionex ED 40
Correlation: 0.99952
Residual Std. Dev.: 16.54705
Formula: y = mx + b
m: 81.86062
b: -3.25525
x: Amount[ug/mL]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.182353
Level 3 : 0.095385
Level 4 : 0.066564
Level 5 : 0.047277
Level 6 : 0.033385



Sulfate at exp. RT: 10.275
ADC1 B, Dionex ED 40
Correlation: 0.99987
Residual Std. Dev.: 6.05844
Formula: y = mx + b
m: 57.07929
b: 4.00958
x: Amount[ug/mL]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.182353
Level 3 : 0.095385
Level 4 : 0.066564
Level 5 : 0.047277
Level 6 : 0.033385

```
==========================================================================
Injection Date  : 10/13/2008 9:12:38 AM          Seq. Line :   1
Sample Name     : Standard 1                      Location : Vial 1
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

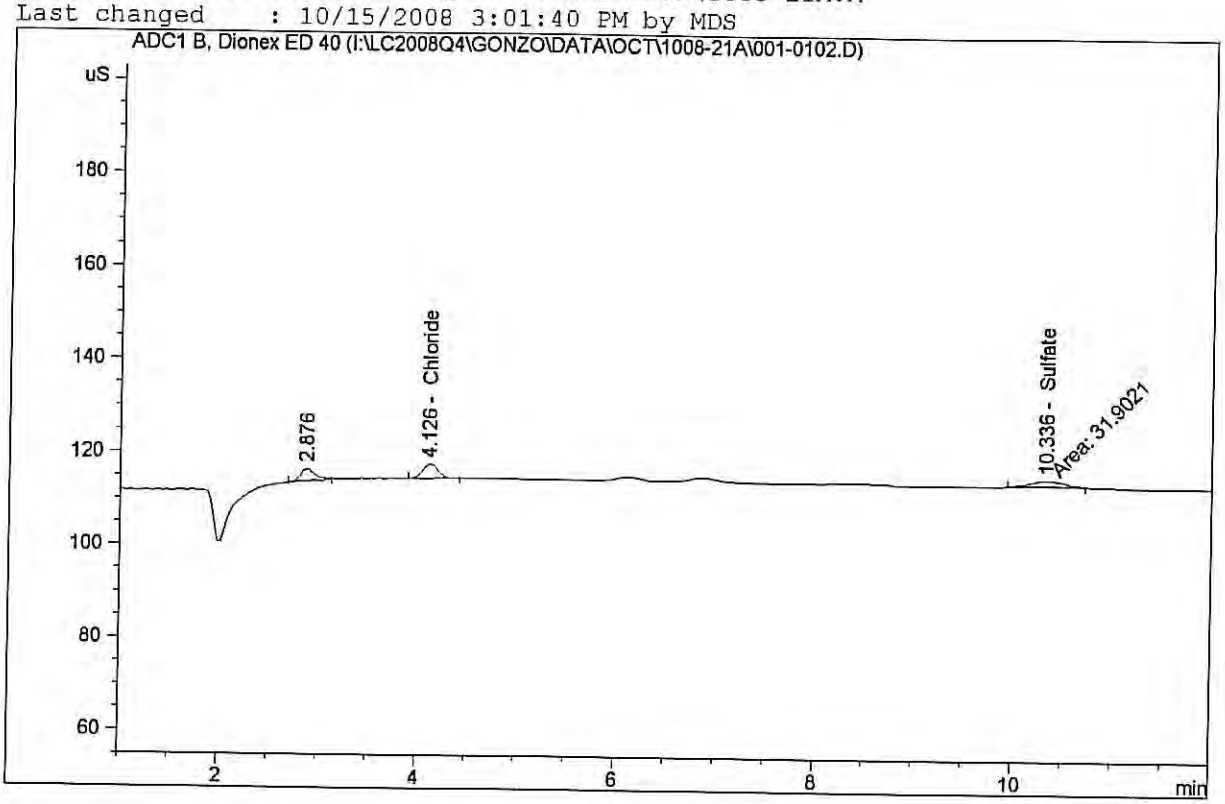
RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.158 PB       36.13769 1.33163e-2 4.81220e-1     Chloride
 10.477 BB       31.48125 1.52881e-2 4.81290e-1     Sulfate

Totals :                               9.62509e-1

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

==========

Injection Date : 10/13/2008 9:26:31 AM Seq. Line : 1
Sample Name : Standard 1 Location : Vial 1
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed : 10/15/2008 3:01:40 PM by MDS



==========

External Standard Report

==========

Sorted By : Signal
Calib. Data Modified : Wednesday, October 15, 2008 3:01:39 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.126	BB	34.55636	1.33666e-2	4.61902e-1		Chloride
10.336	MM	31.90210	1.53176e-2	4.88663e-1		Sulfate

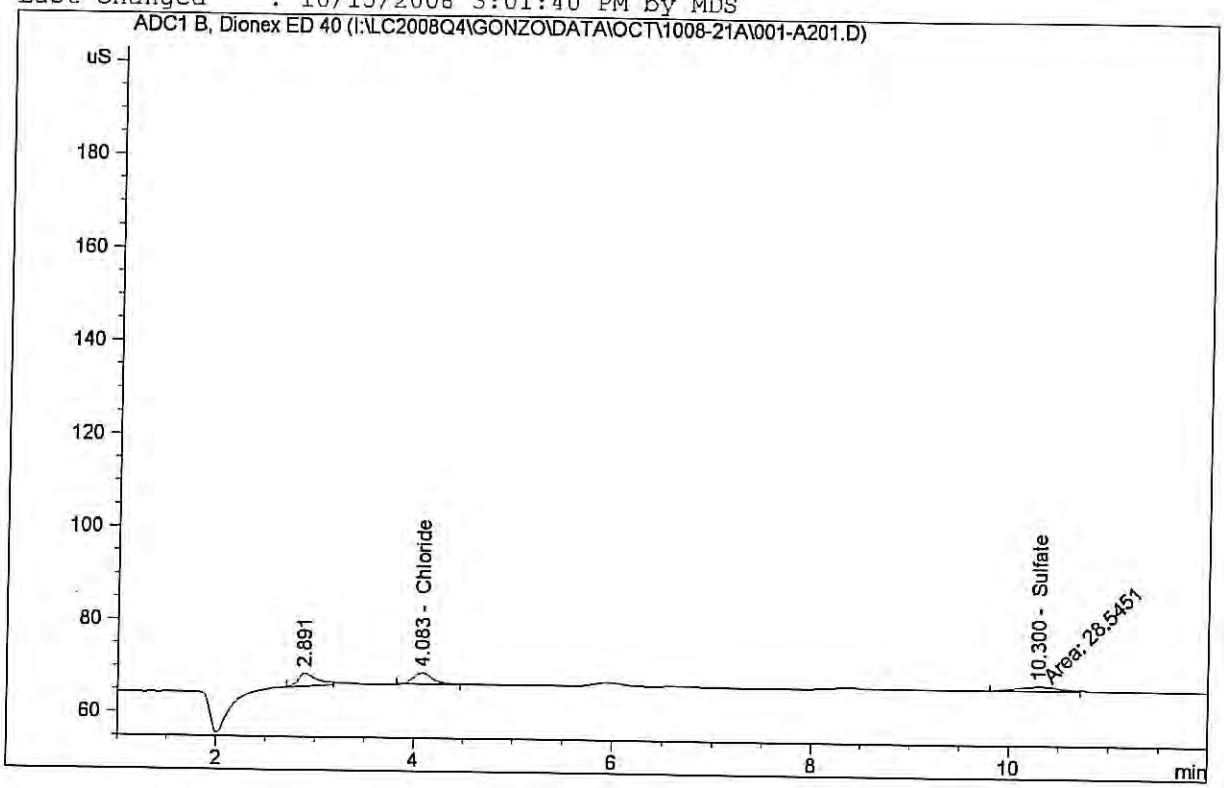
Totals : 9.50565e-1

Results obtained with enhanced integrator!

==========

*** End of Report ***

```
==========================================================================
Injection Date  : 10/15/2008 11:36:14 AM          Seq. Line : 102
Sample Name     : Standard 1                       Location : Vial 1
Acq. Operator   : MDS                                   Inj :   1
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

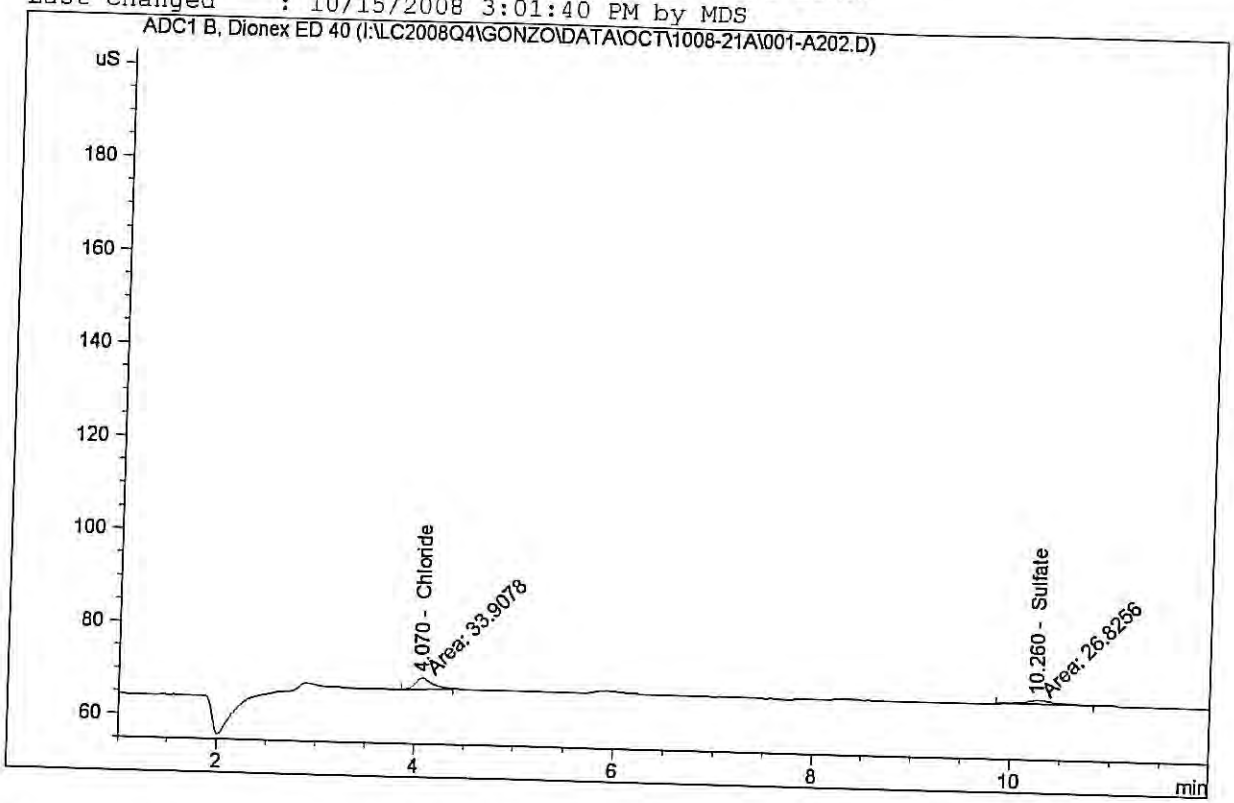
RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.083 BB       33.96087 1.33868e-2 4.54628e-1      Chloride
 10.300 MM       28.54506 1.50789e-2 4.30427e-1      Sulfate

Totals :                                8.85055e-1

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

Injection Date : 10/15/2008 11:50:13 AM
Sample Name : Standard 1
Acq. Operator : MDS
Acq. Instrument : Gonzo
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed : 10/15/2008 3:01:40 PM by MDS

Seq. Line : 102
Location : Vial 1
Inj : 2
Inj Volume : 25 µl



External Standard Report

Sorted By : Signal
Calib. Data Modified : Wednesday, October 15, 2008 3:01:39 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

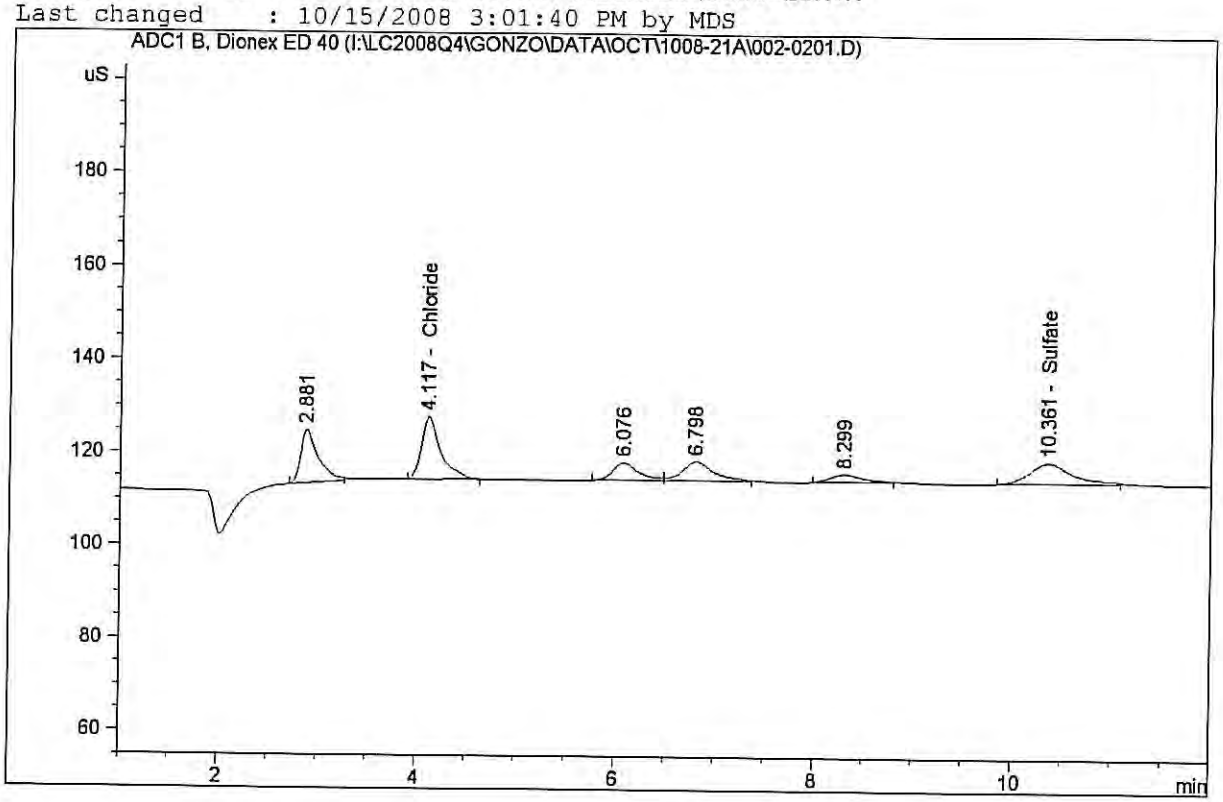
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.070	MM	33.90780	1.33886e-2	4.53980e-1		Chloride
10.260	MM	26.82557	1.50789e-2	4.04499e-1		Sulfate
Totals :				8.58479e-1		

Results obtained with enhanced integrator!

*** End of Report ***

```
==========================================================================
Injection Date  : 10/13/2008 9:40:26 AM          Seq. Line :   2
Sample Name     : Standard 2                      Location : Vial 2
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

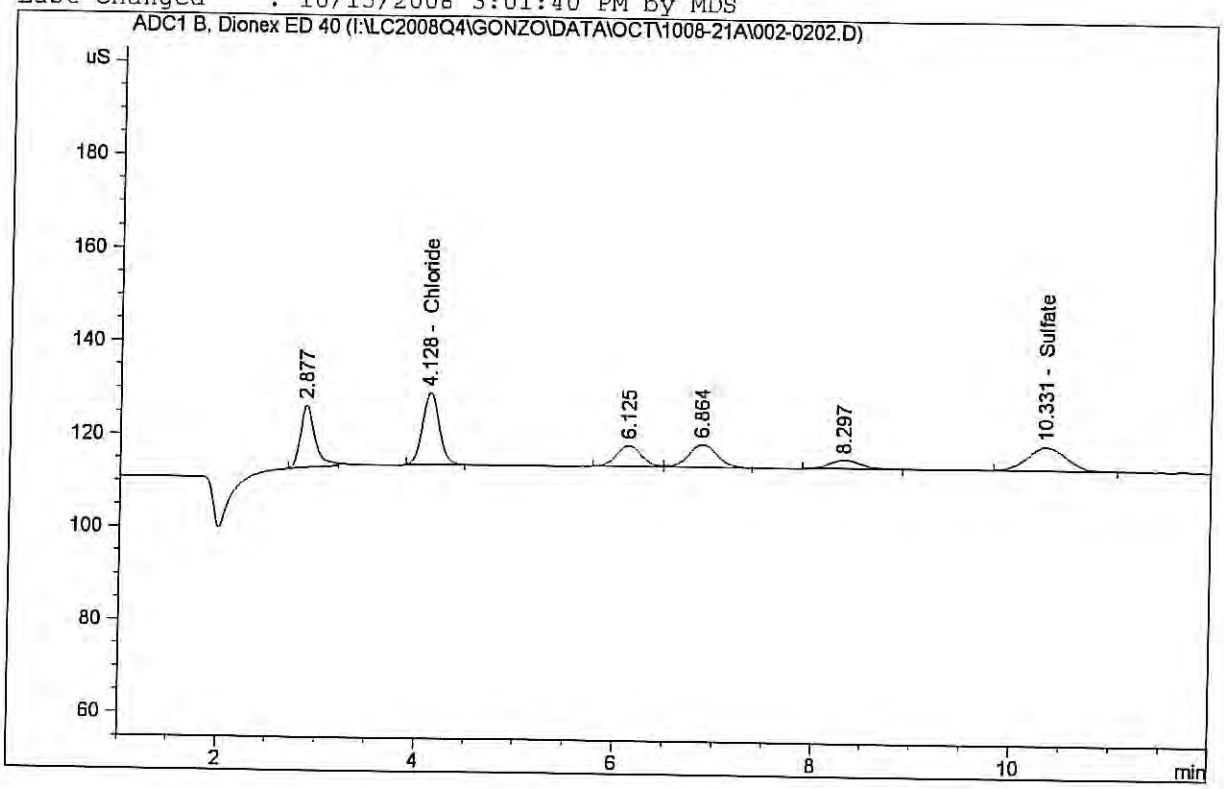
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  4.117 BB      185.04236 1.24308e-2    2.30022      Chloride
 10.361 BB      138.57367 1.70126e-2    2.35749      Sulfate

Totals :                                4.65772

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

Injection Date	: 10/13/2008 9:54:24 AM	Seq. Line :	2
Sample Name	: Standard 2	Location :	Vial 2
Acq. Operator	: MDS	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21A.M		
Last changed	: 10/15/2008 3:01:40 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Wednesday, October 15, 2008 3:01:39 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

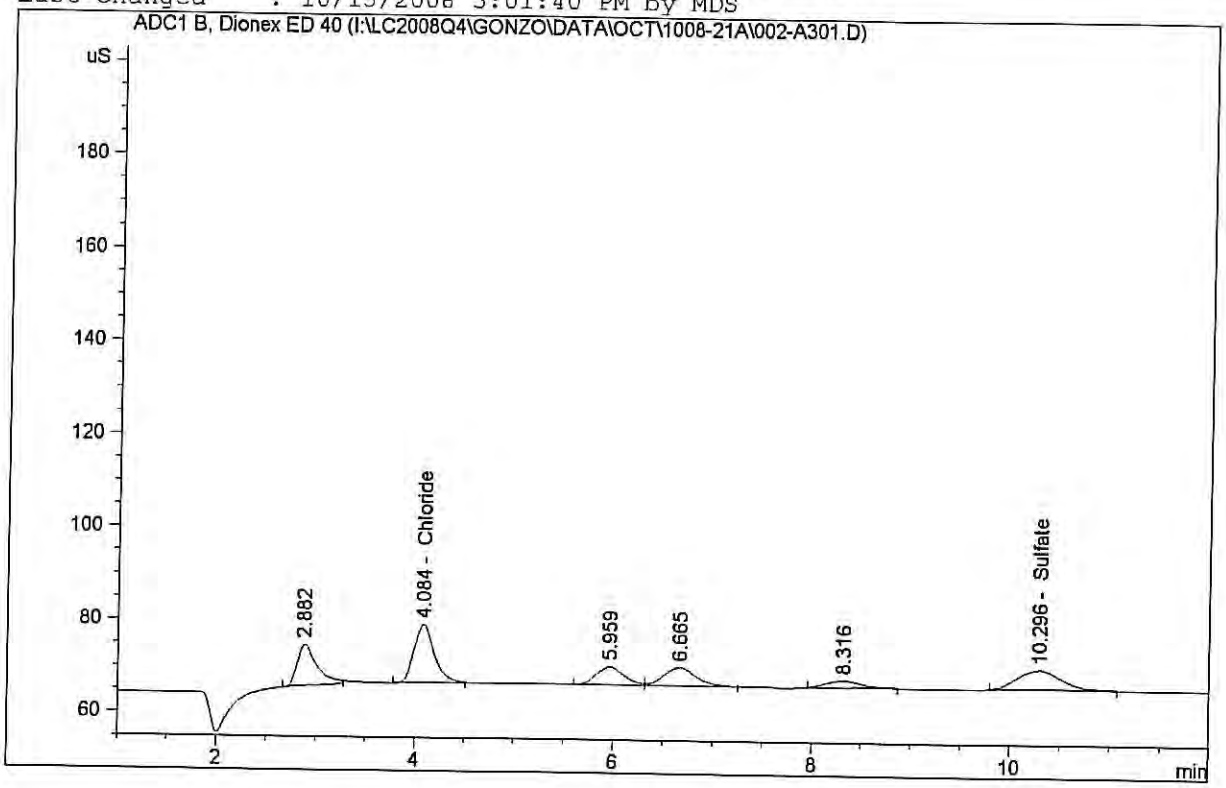
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.128	BB	184.75447	1.24311e-2	2.29671		Chloride
10.331	BB	142.20760	1.70255e-2	2.42116		Sulfate
Totals :				4.71786		

Results obtained with enhanced integrator!

*** End of Report ***

```
==========================================================================
Injection Date  : 10/15/2008 12:04:08 PM          Seq. Line : 103
Sample Name     : Standard 2                       Location : Vial 2
Acq. Operator   : MDS                                   Inj :   1
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

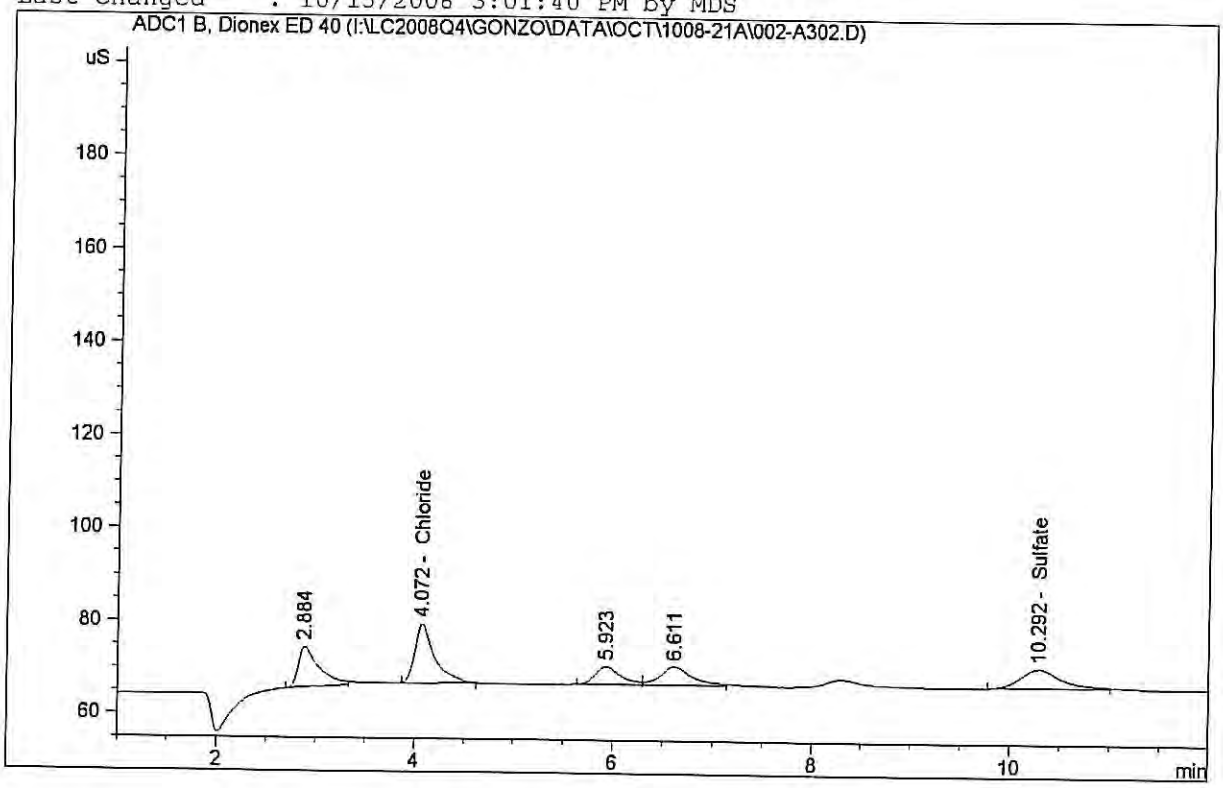
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.084 PB      181.06718 1.24355e-2    2.25166     Chloride
 10.296 BB      133.96823 1.69951e-2    2.27681     Sulfate

Totals :                                4.52847

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/15/2008 12:18:04 PM          Seq. Line : 103
Sample Name     : Standard 2                       Location : Vial 2
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

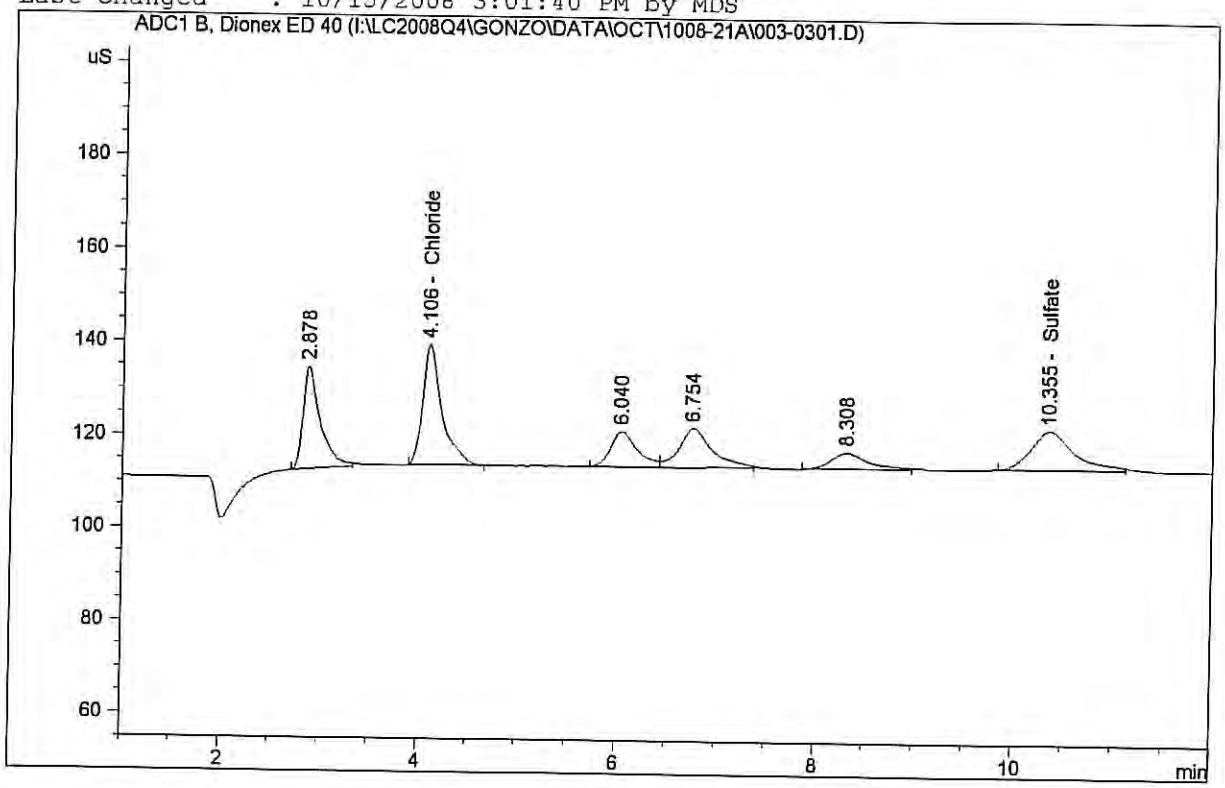
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.072 BB      180.69456 1.24360e-2    2.24711     Chloride
 10.292 BB      127.92879 1.69704e-2    2.17100     Sulfate

Totals :                                4.41811

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/13/2008 10:08:17 AM          Seq. Line :   3
Sample Name     : Standard 3                       Location : Vial 3
Acq. Operator   : MDS                                   Inj :   1
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

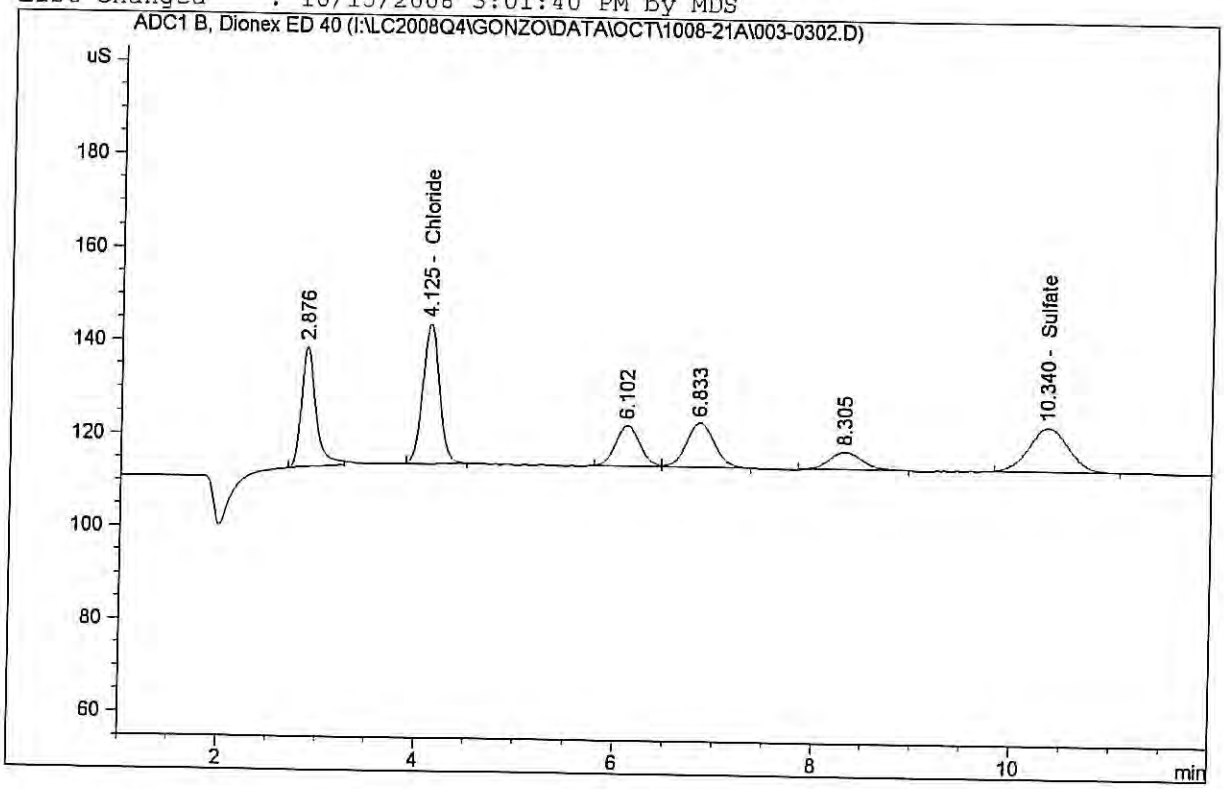
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.106 BB      354.07928 1.23282e-2    4.36516     Chloride
 10.355 BB      261.02515 1.72504e-2    4.50278     Sulfate

Totals :                                8.86794

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

Injection Date	: 10/13/2008 10:22:16 AM	Seq. Line :	3
Sample Name	: Standard 3	Location :	Vial 3
Acq. Operator	: MDS	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21A.M		
Last changed	: 10/15/2008 3:01:40 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Wednesday, October 15, 2008 3:01:39 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

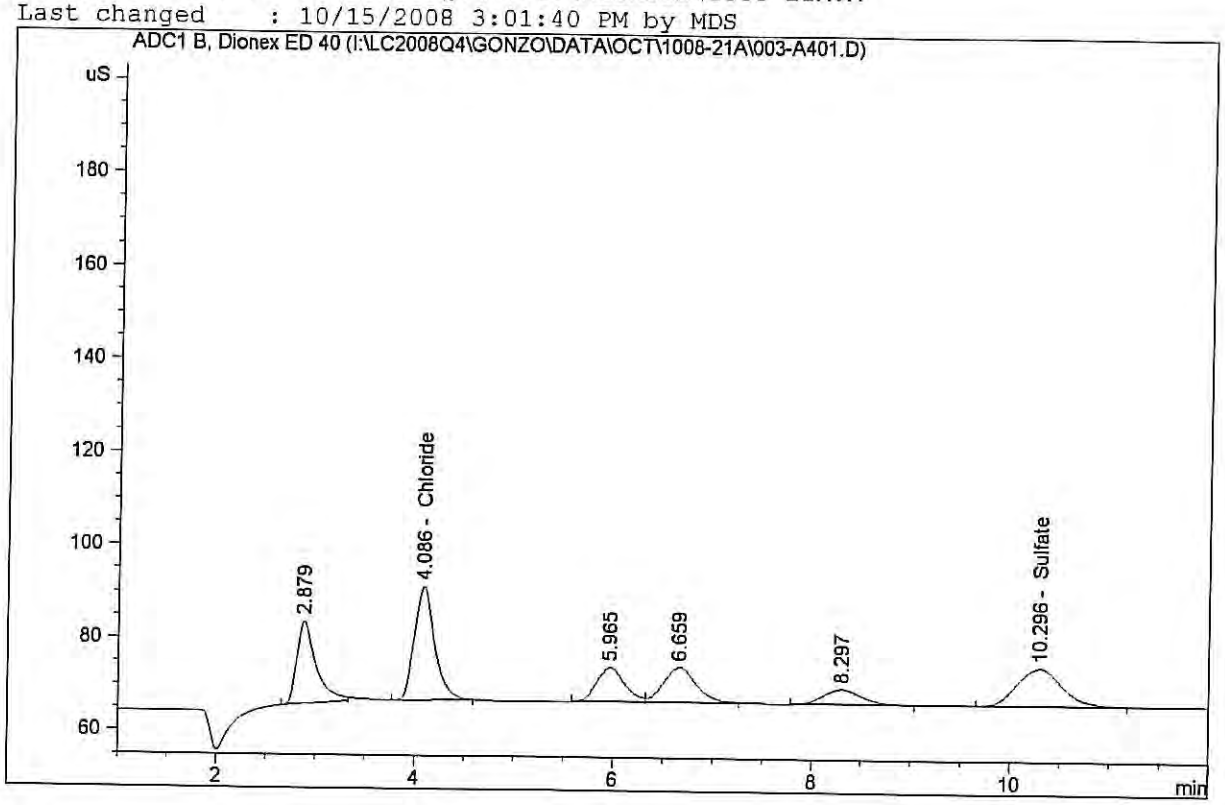
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.125	BB	354.95956	1.23279e-2	4.37591		Chloride
10.340	BB	268.09445	1.72575e-2	4.62663		Sulfate
Totals :				9.00254		

Results obtained with enhanced integrator!

*** End of Report ***

Injection Date	: 10/15/2008 12:31:58 PM	Seq. Line	: 104
Sample Name	: Standard 3	Location	: Vial 3
Acq. Operator	: MDS	Inj	: 1
Acq. Instrument	: Gonzo	Inj Volume	: 25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21A.M		
Last changed	: 10/15/2008 3:01:40 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Wednesday, October 15, 2008 3:01:39 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

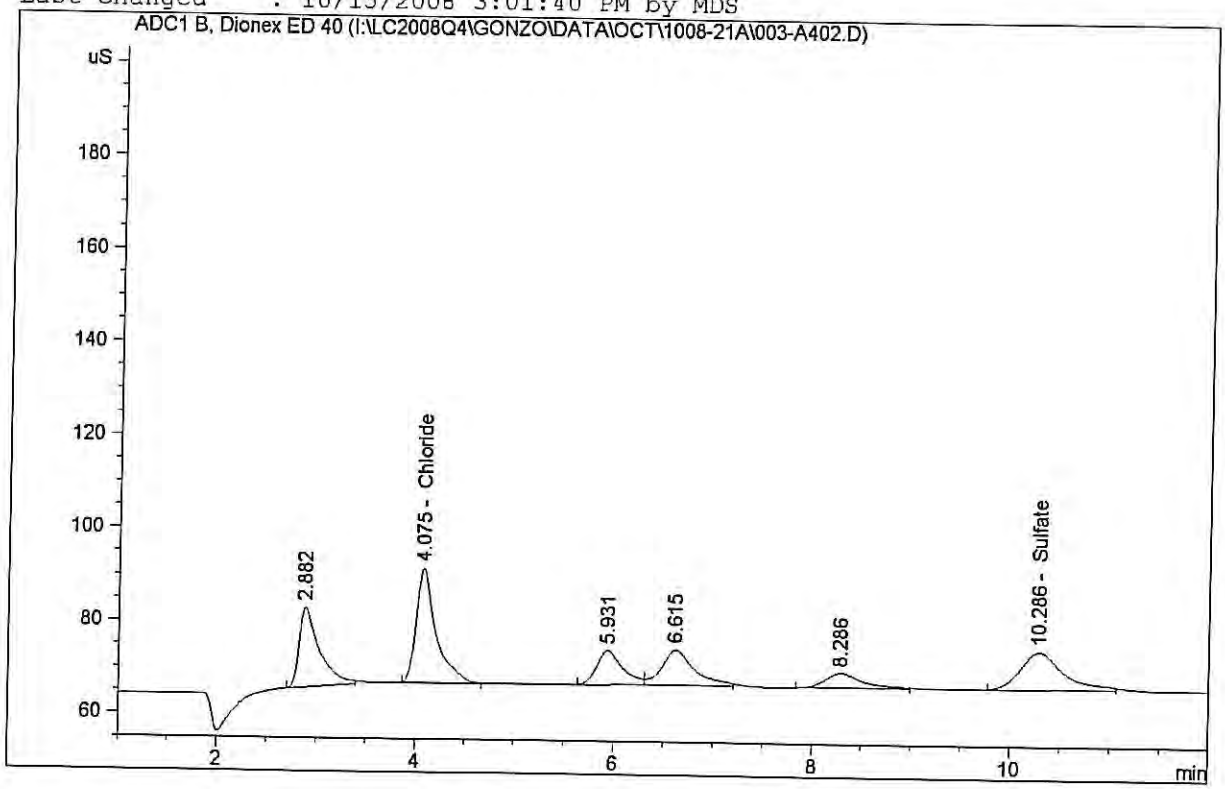
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.086	PB	353.73996	1.23283e-2	4.36101		Chloride
10.296	BB	261.02466	1.72504e-2	4.50277		Sulfate
Totals :				8.86379		

Results obtained with enhanced integrator!

*** End of Report ***

Injection Date	: 10/15/2008 12:45:54 PM	Seq. Line	: 104
Sample Name	: Standard 3	Location	: Vial 3
Acq. Operator	: MDS	Inj	: 2
Acq. Instrument	: Gonzo	Inj Volume	: 25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21A.M		
Last changed	: 10/15/2008 3:01:40 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Wednesday, October 15, 2008 3:01:39 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

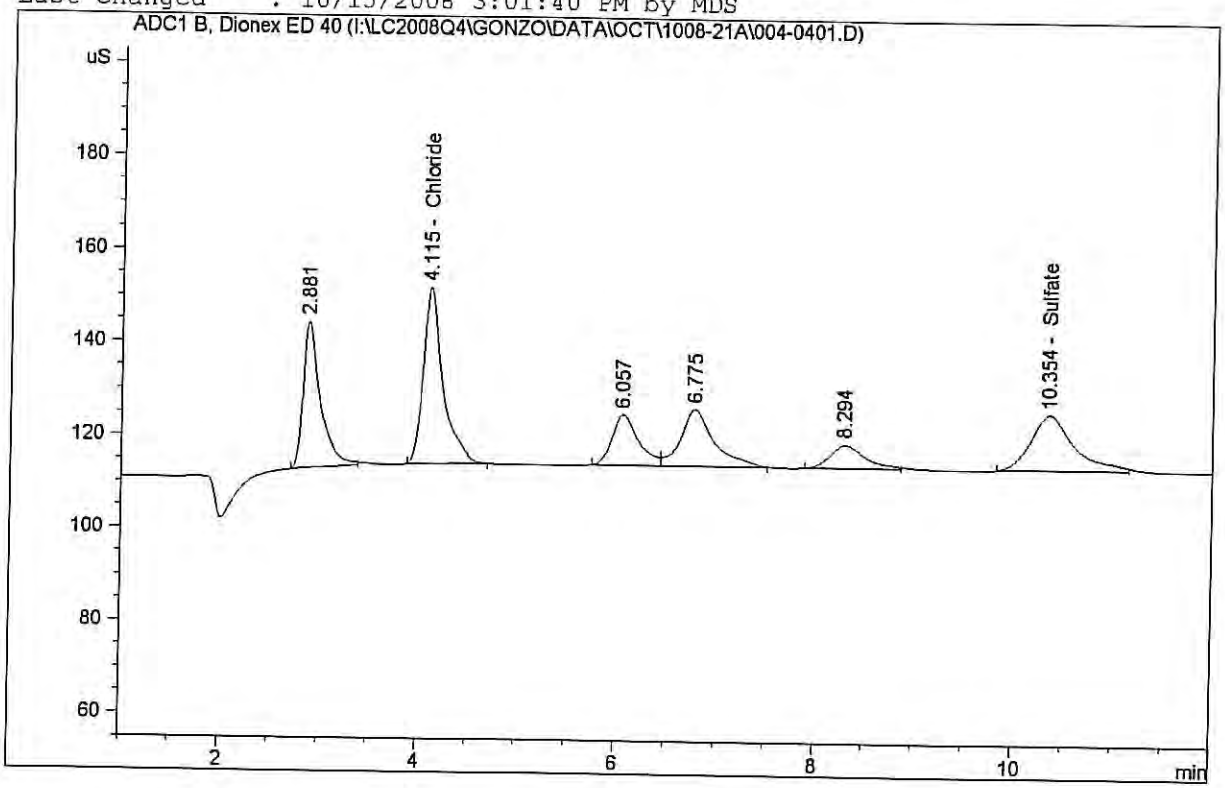
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.075	BB	350.23236	1.23294e-2	4.31816		Chloride
10.286	BB	249.71764	1.72382e-2	4.30468		Sulfate
Totals :				8.62284		

Results obtained with enhanced integrator!

*** End of Report ***

Injection Date	: 10/13/2008 10:36:13 AM	Seq. Line :	4
Sample Name	: Standard 4	Location :	Vial 4
Acq. Operator	: MDS	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21A.M		
Last changed	: 10/15/2008 3:01:40 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Wednesday, October 15, 2008 3:01:39 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

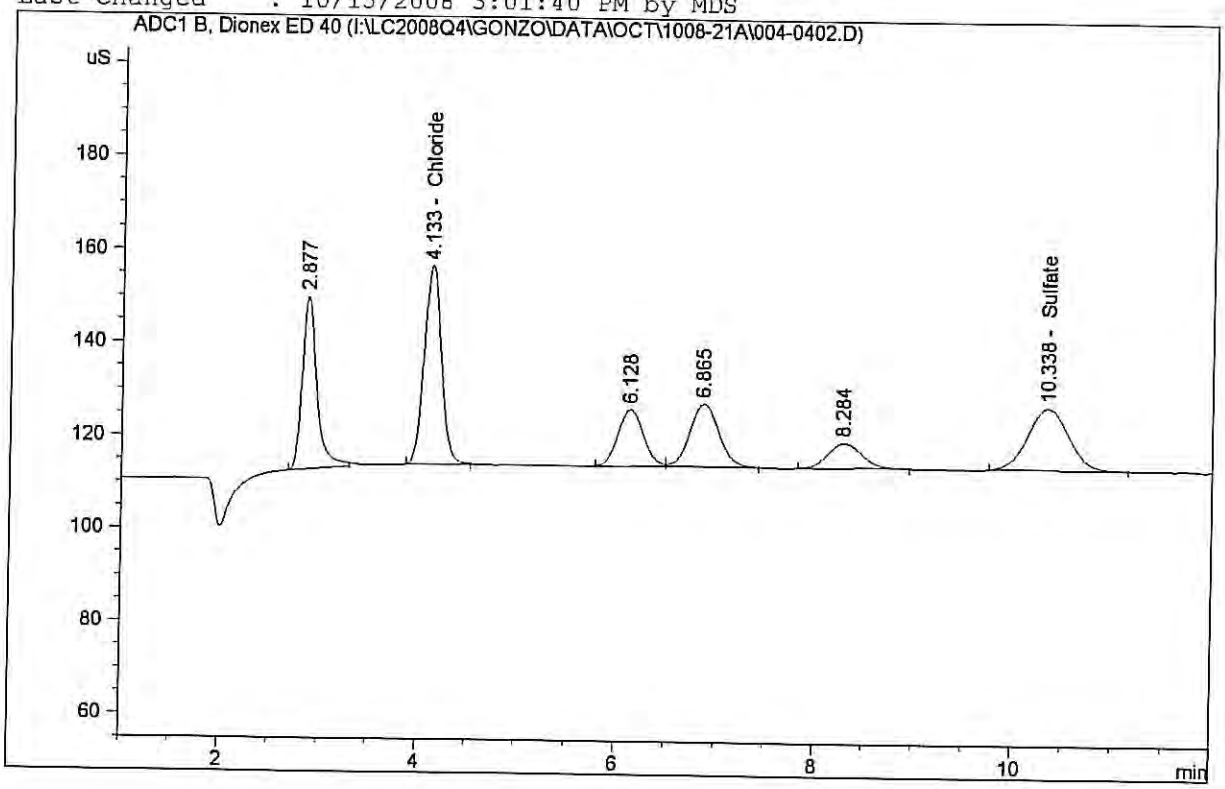
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.115	BB	529.56366	1.22910e-2	6.50885		Chloride
10.354	BB	373.05093	1.73312e-2	6.46542		Sulfate
Totals :				12.97427		

Results obtained with enhanced integrator!

*** End of Report ***

```
==========================================================================
Injection Date  : 10/13/2008 10:50:07 AM          Seq. Line :   4
Sample Name     : Standard 4                       Location : Vial 4
Acq. Operator   : MDS                                   Inj :   2
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

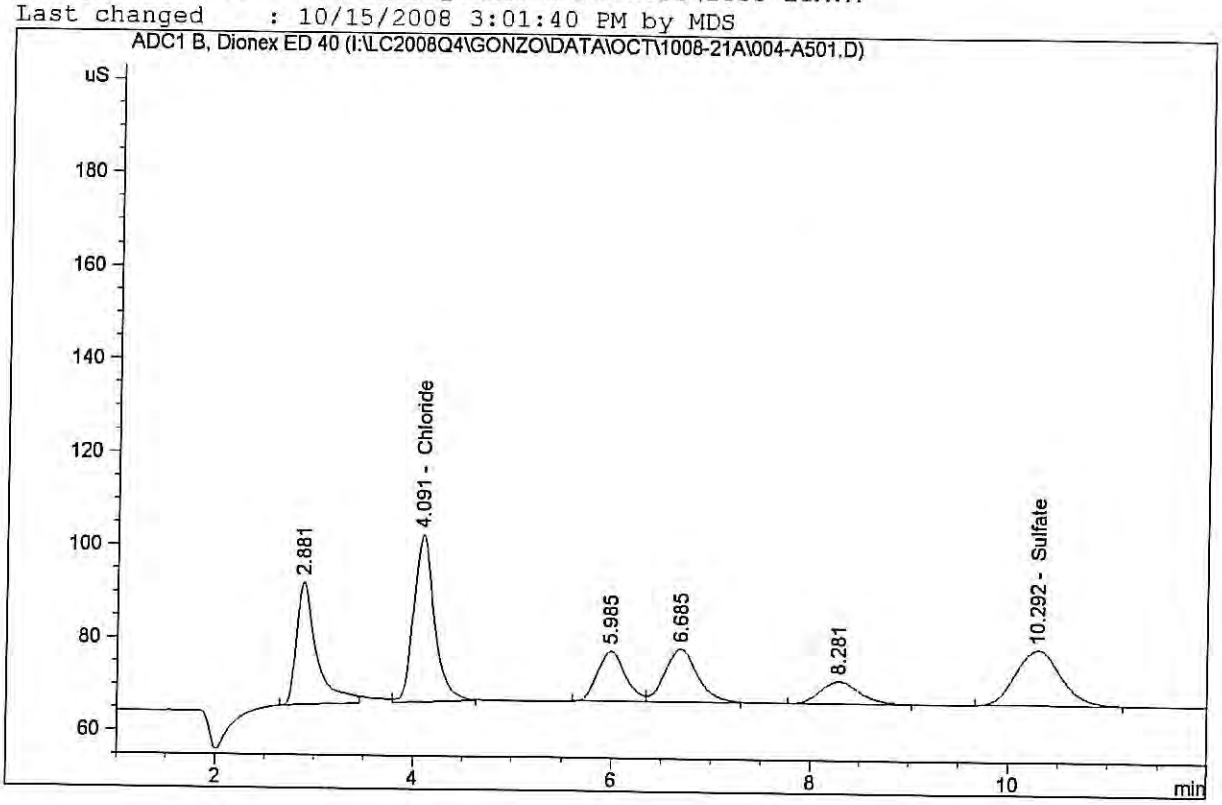
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  4.133 BB      519.89447 1.22924e-2    6.39074     Chloride
 10.338 BB      388.51440 1.73387e-2    6.73633     Sulfate

Totals :                                13.12707

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/15/2008 12:59:48 PM          Seq. Line : 105
Sample Name     : Standard 4                       Location : Vial 4
Acq. Operator   : MDS                                   Inj :   1
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

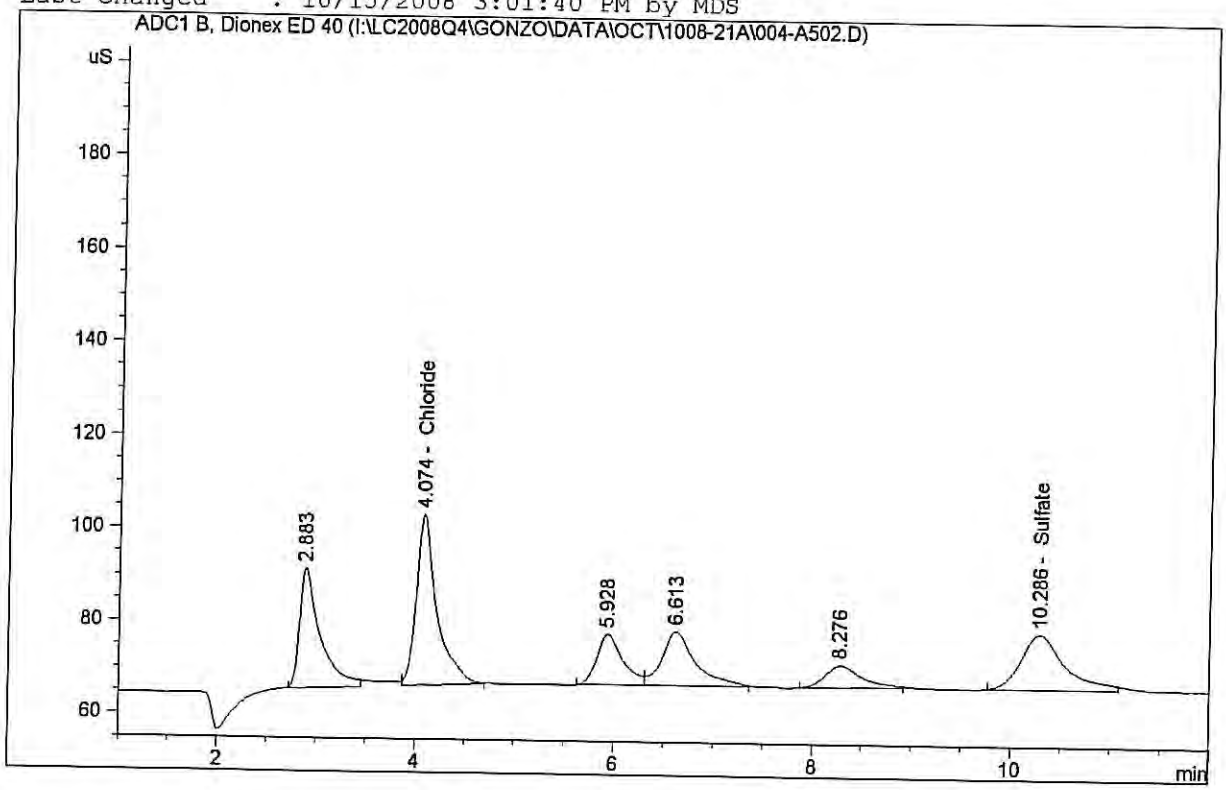
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.091 BB      541.74921 1.22893e-2    6.65771     Chloride
 10.292 BB      379.67389 1.73345e-2    6.58145     Sulfate

Totals :                                13.23916

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

Injection Date : 10/15/2008 1:13:42 PM Seq. Line : 105
Sample Name : Standard 4 Location : Vial 4
Acq. Operator : MDS Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed : 10/15/2008 3:01:40 PM by MDS



External Standard Report

Sorted By : Signal
Calib. Data Modified : Wednesday, October 15, 2008 3:01:39 PM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

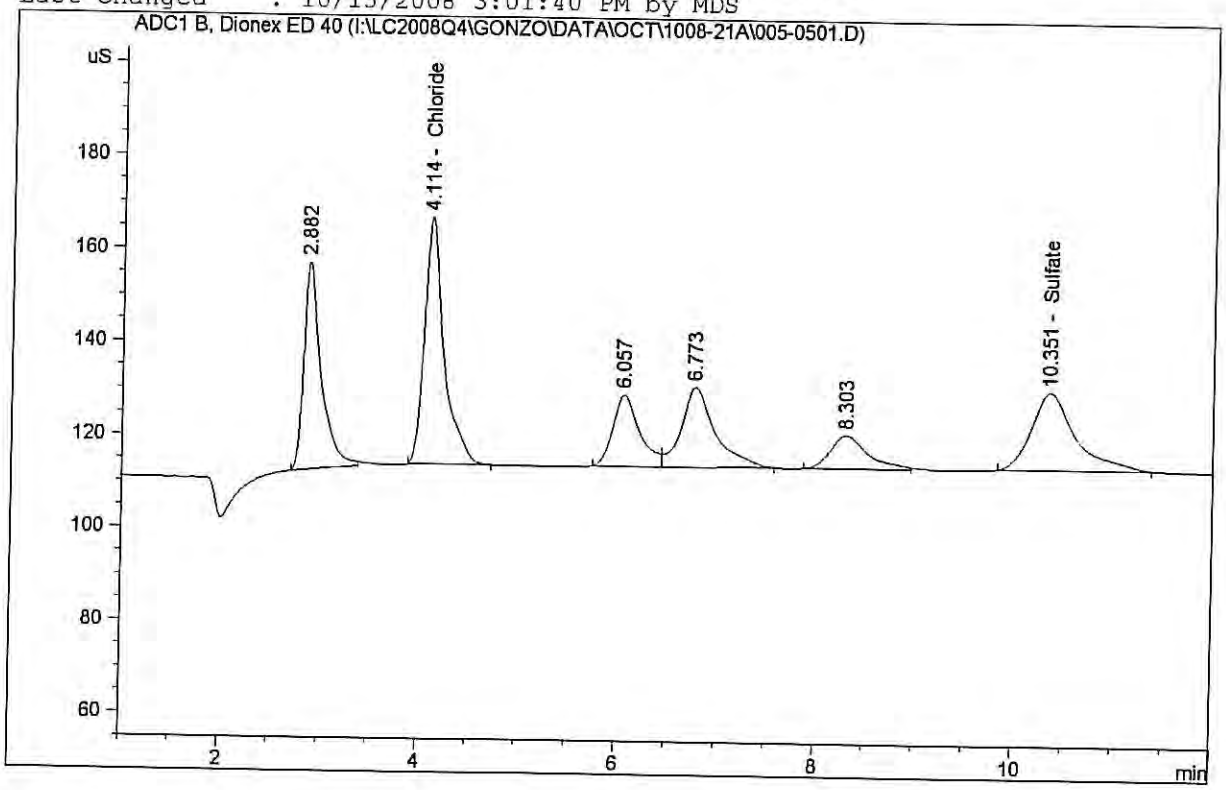
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.074	BB	541.60791	1.22893e-2	6.65599		Chloride
10.286	BB	365.29208	1.73272e-2	6.32949		Sulfate
Totals :				12.98547		

Results obtained with enhanced integrator!

*** End of Report ***

Injection Date	: 10/13/2008 11:04:01 AM	Seq. Line :	5
Sample Name	: Standard 5	Location :	Vial 5
Acq. Operator	: MDS	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21A.M		
Last changed	: 10/15/2008 3:01:40 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Wednesday, October 15, 2008 3:01:39 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

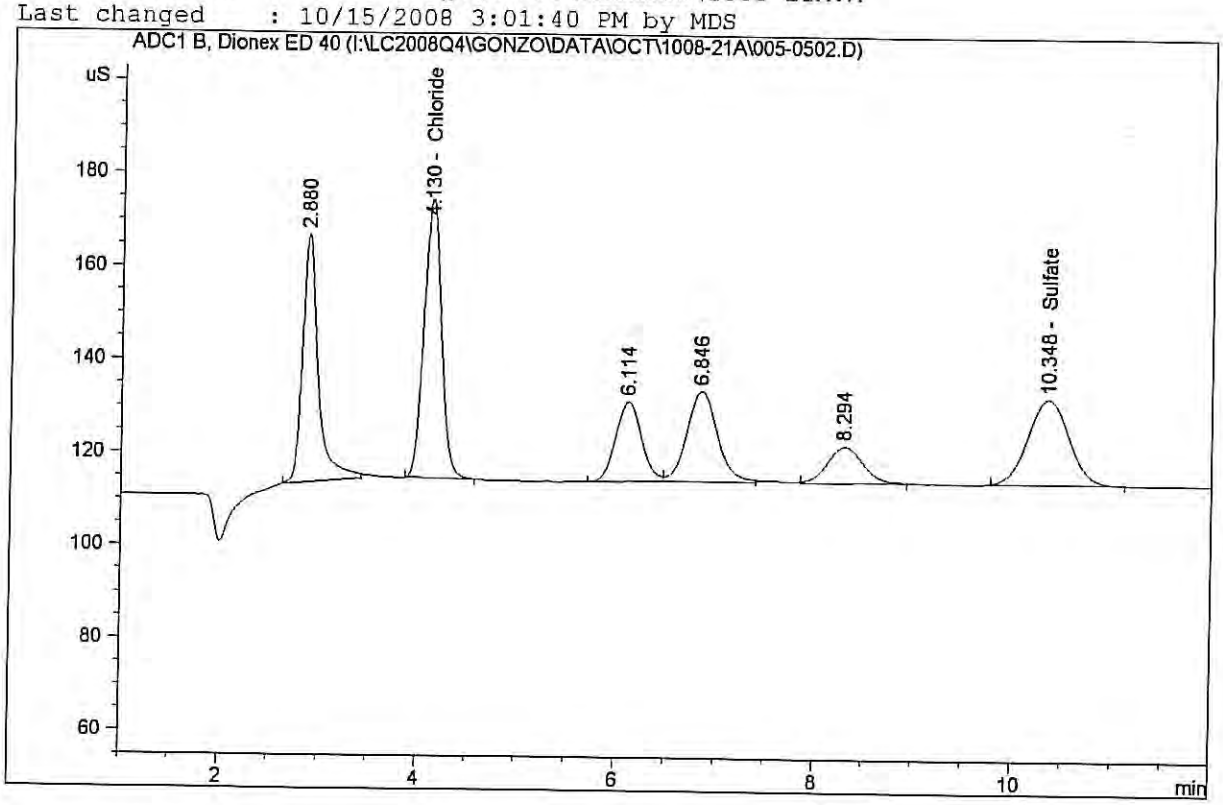
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.114	BB	732.73822	1.22702e-2	8.99081		Chloride
10.351	BB	531.22424	1.73873e-2	9.23653		Sulfate
Totals :				18.22734		

Results obtained with enhanced integrator!

*** End of Report ***

Injection Date	: 10/13/2008 11:17:54 AM	Seq. Line :	5
Sample Name	: Standard 5	Location :	Vial 5
Acq. Operator	: MDS	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21A.M		
Last changed	: 10/15/2008 3:01:40 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Wednesday, October 15, 2008 3:01:39 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

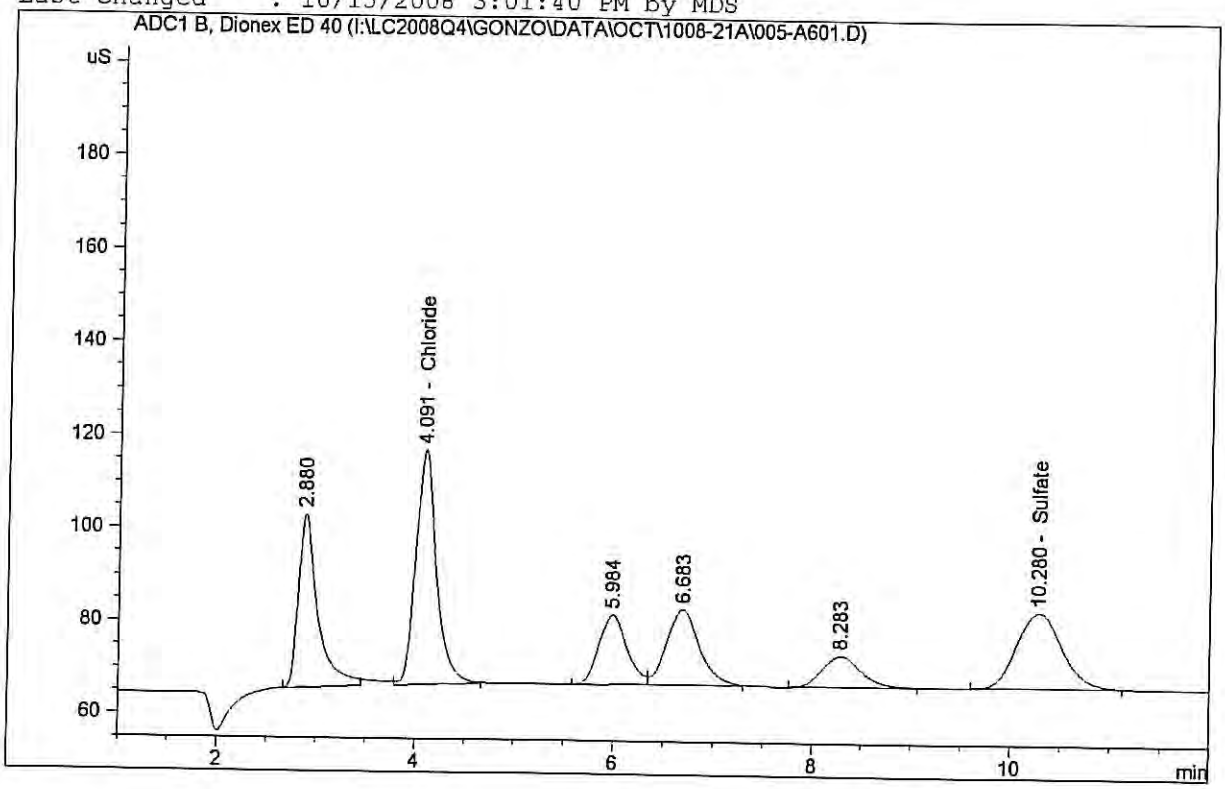
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.130	PB	734.13550	1.22701e-2	9.00788		Chloride
10.348	BB	533.77448	1.73879e-2	9.28121		Sulfate
Totals :				18.28909		

Results obtained with enhanced integrator!

*** End of Report ***

```
==========================================================================
Injection Date  : 10/15/2008 1:27:36 PM          Seq. Line : 106
Sample Name     : Standard 5                      Location : Vial 5
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```

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==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

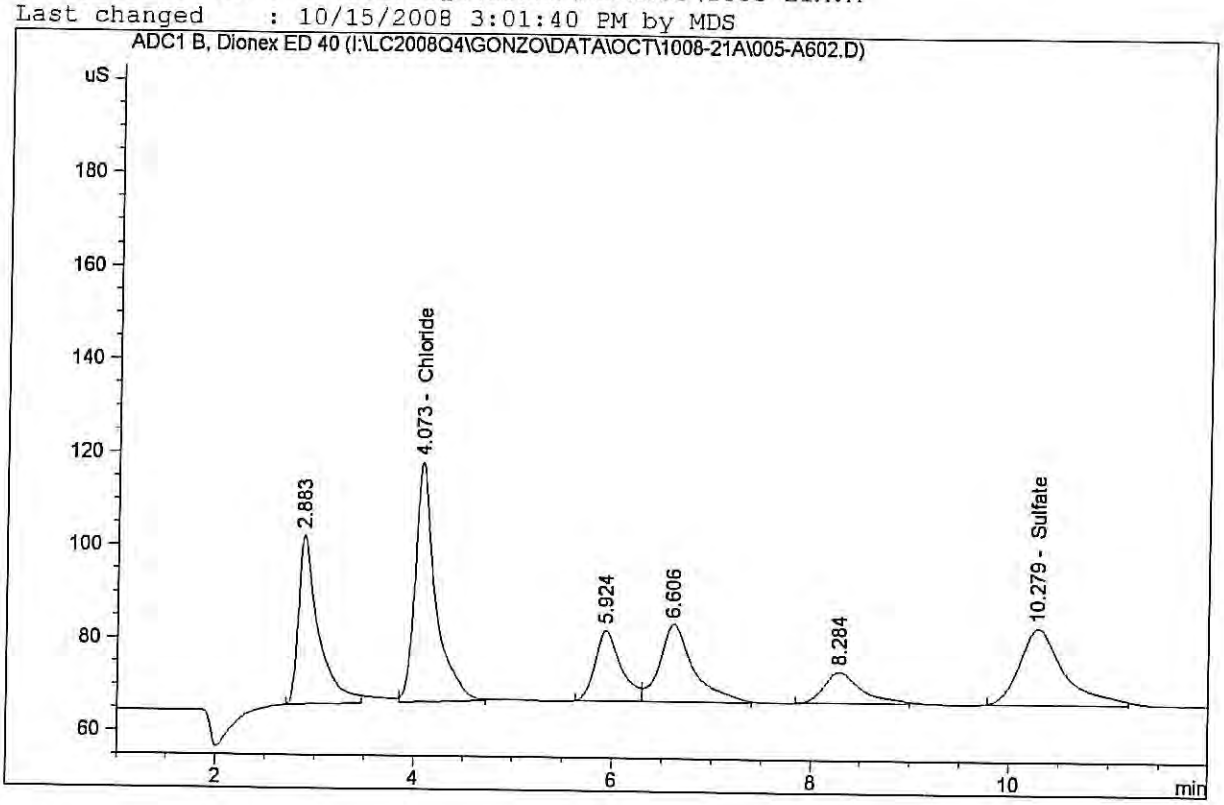
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.091 BB      749.82336 1.22689e-2    9.19952      Chloride
 10.280 PB      521.70685 1.73848e-2    9.06979      Sulfate

Totals :                                18.26931

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/15/2008 1:41:31 PM          Seq. Line : 106
Sample Name     : Standard 5                      Location : Vial 5
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

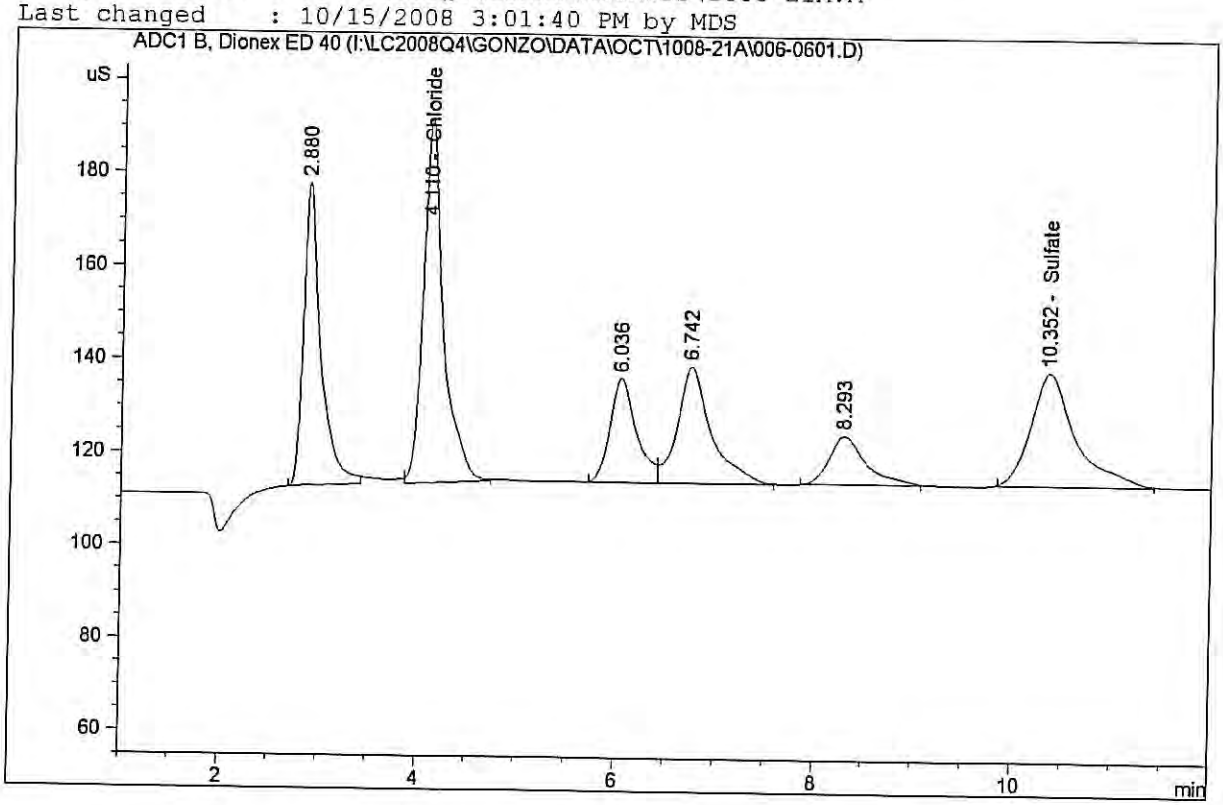
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  4.073 BB      748.29443 1.22690e-2    9.18085     Chloride
 10.279 BB      511.17633 1.73821e-2    8.88530     Sulfate

Totals :                                18.06615

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/13/2008 11:31:52 AM          Seq. Line :   6
Sample Name     : Standard 6                       Location : Vial 6
Acq. Operator   : MDS                                   Inj :   1
Acq. Instrument : Gonzo                           Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

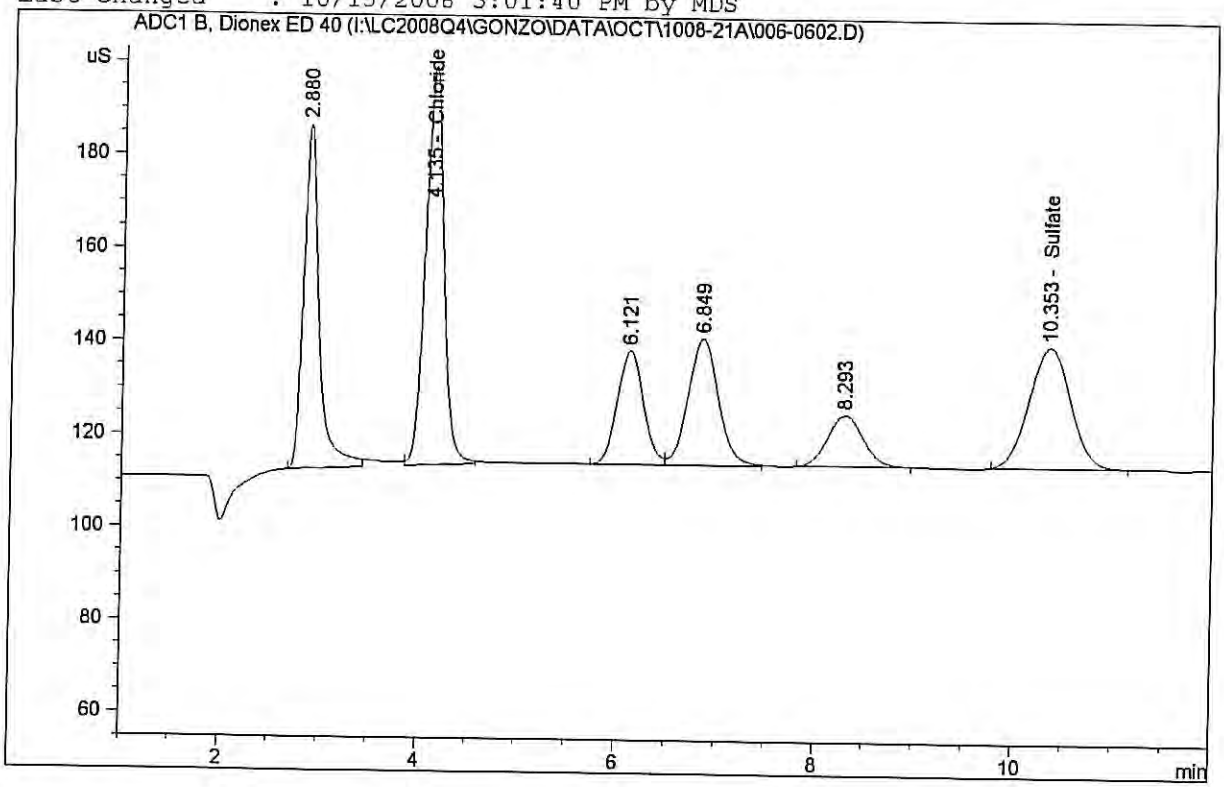
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  4.110 BB     1099.55225 1.22521e-2   13.47177      Chloride
 10.352 BB      771.15979 1.74284e-2   13.44008      Sulfate

Totals :                               26.91185

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

Injection Date	: 10/13/2008 11:45:41 AM	Seq. Line :	6
Sample Name	: Standard 6	Location :	Vial 6
Acq. Operator	: MDS	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21A.M		
Last changed	: 10/15/2008 3:01:40 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Wednesday, October 15, 2008 3:01:39 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

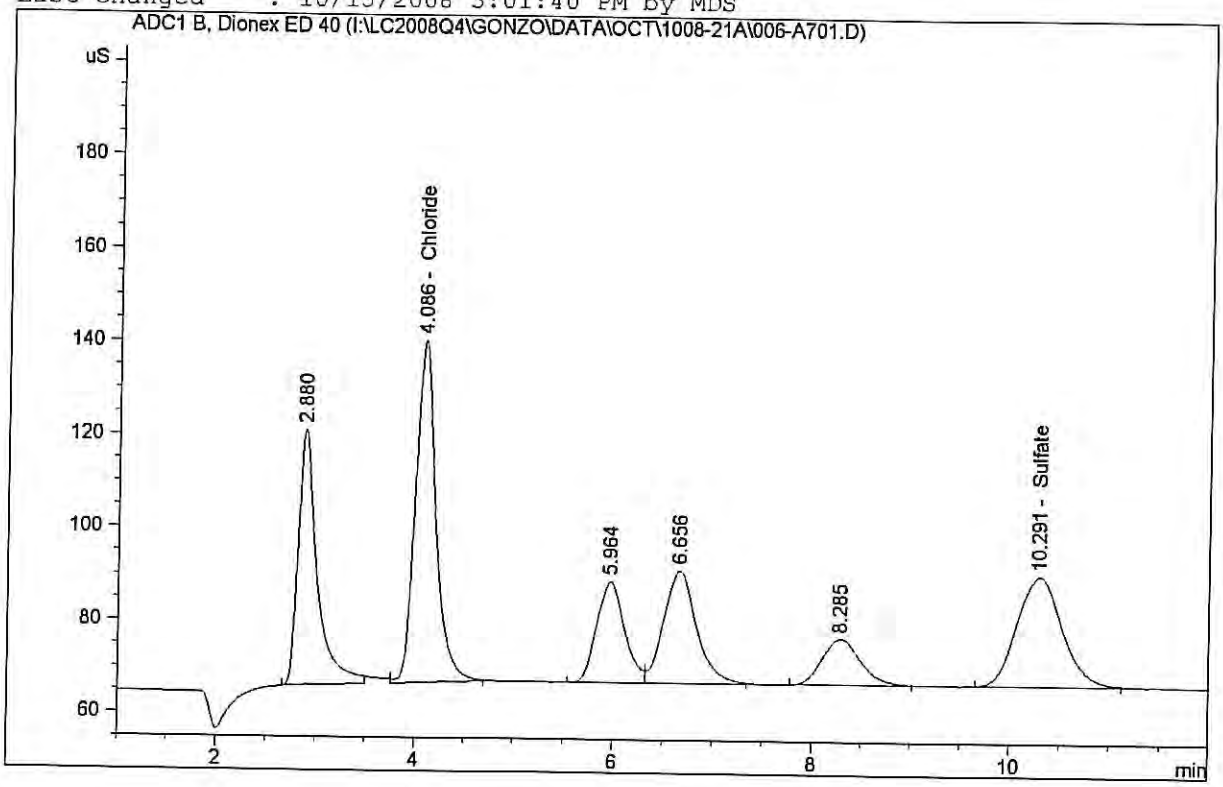
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.135	BB	1095.18262	1.22522e-2	13.41839		Chloride
10.353	BB	769.98358	1.74283e-2	13.41947		Sulfate
Totals :				26.83787		

Results obtained with enhanced integrator!

*** End of Report ***

Injection Date	: 10/15/2008 1:55:27 PM	Seq. Line	: 107
Sample Name	: Standard 6	Location	: Vial 6
Acq. Operator	: MDS	Inj	: 1
Acq. Instrument	: Gonzo	Inj Volume	: 25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21A.M		
Last changed	: 10/15/2008 3:01:40 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Wednesday, October 15, 2008 3:01:39 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

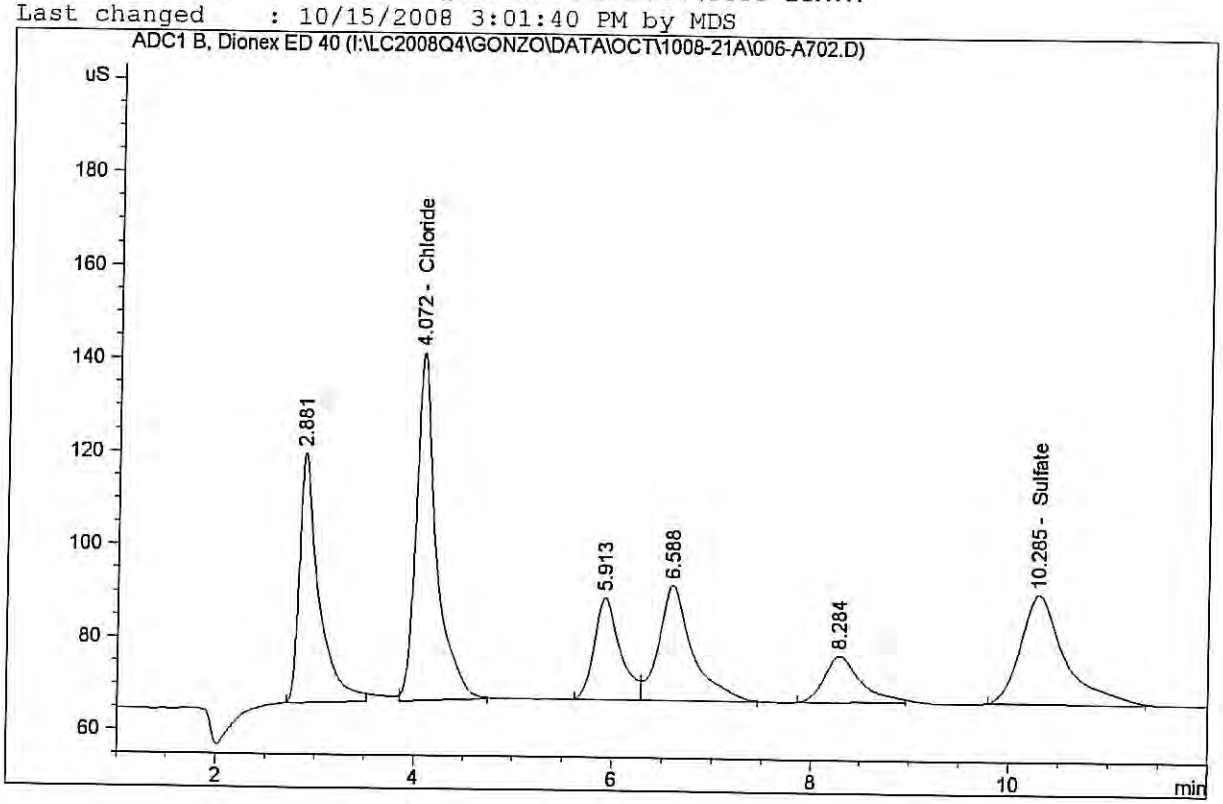
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.086	BB	1081.24670	1.22527e-2	13.24815		Chloride
10.291	BB	747.60205	1.74255e-2	13.02736		Sulfate
Totals :				26.27551		

Results obtained with enhanced integrator!

*** End of Report ***

```
==========================================================================
Injection Date  : 10/15/2008 2:09:23 PM          Seq. Line : 107
Sample Name     : Standard 6                      Location : Vial 6
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

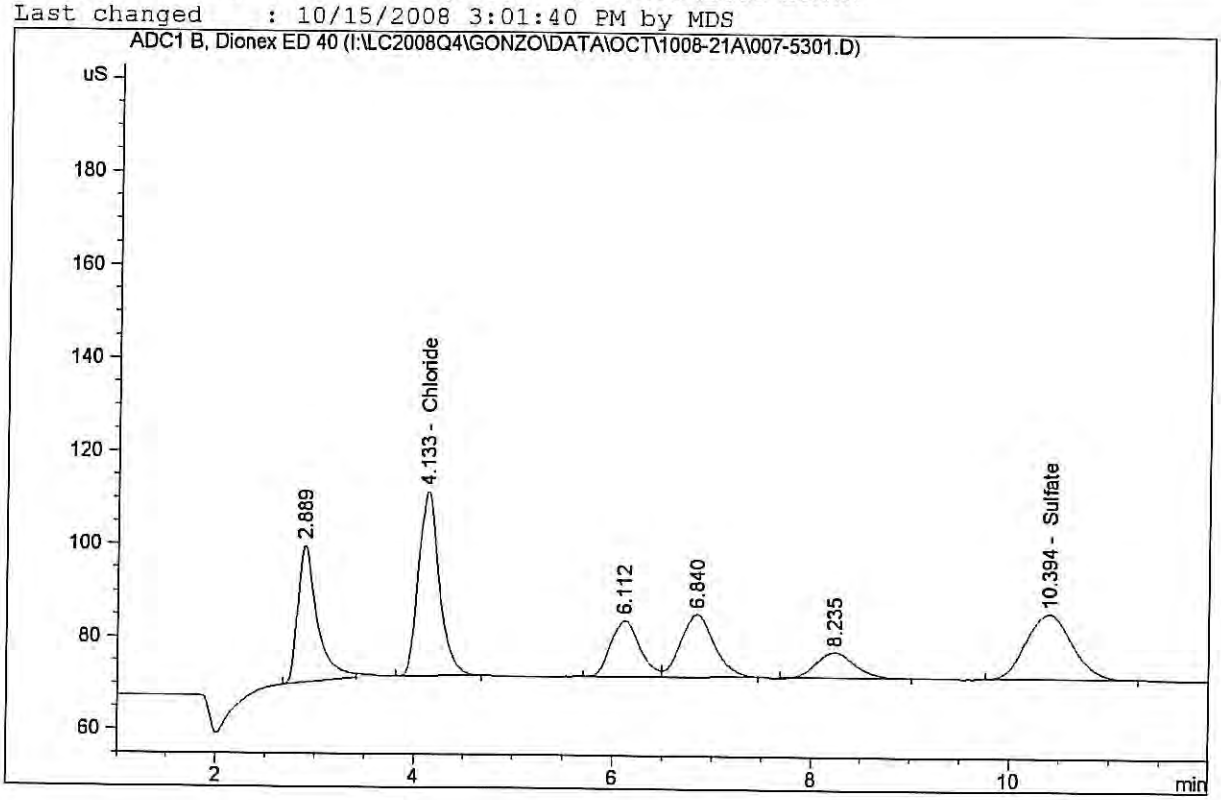
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.072 BB     1073.83899 1.22529e-2   13.15766     Chloride
 10.285 BB      735.74823 1.74240e-2   12.81969     Sulfate

Totals :                               25.97735

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==================================================================
Injection Date  : 10/14/2008 12:27:42 PM        Seq. Line :  53
Sample Name     : Second Source                  Location : Vial 7
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==================================================================
                    External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

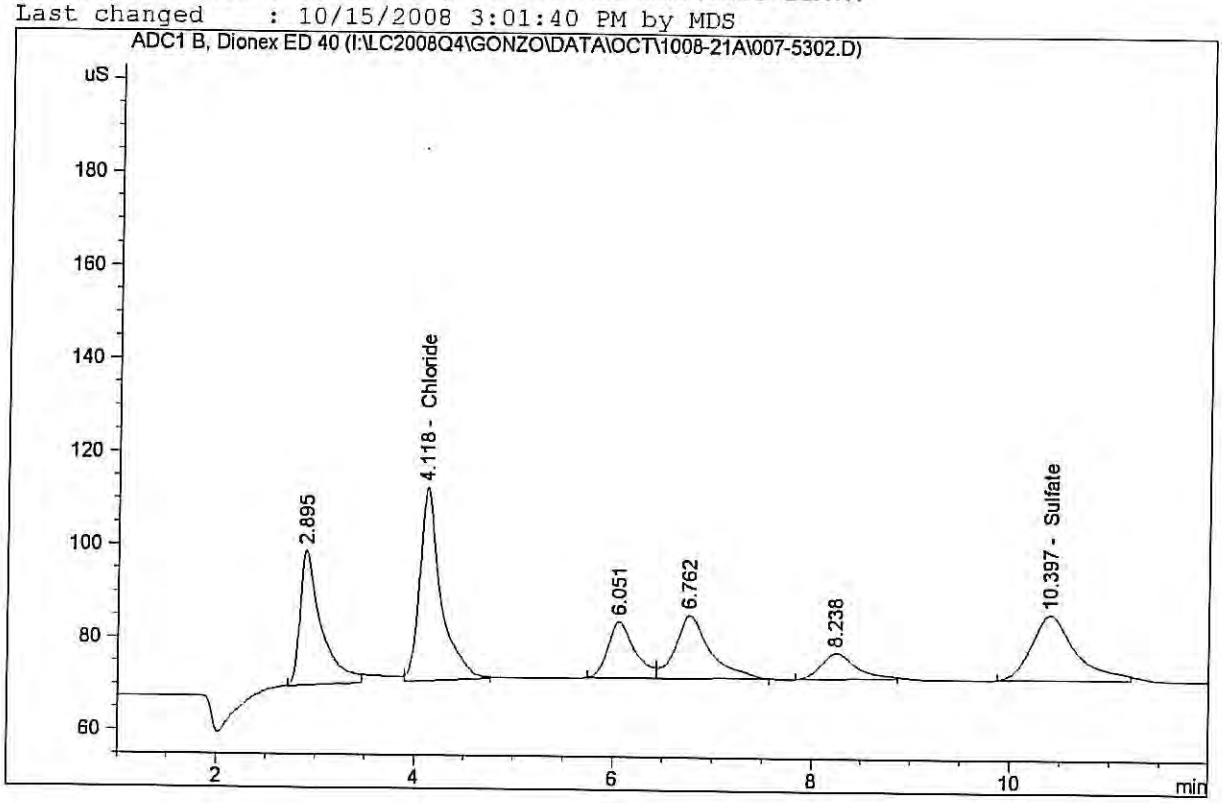
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.133 PB      590.74872 1.22832e-2    7.25628     Chloride
 10.394 BB      457.74164 1.73660e-2    7.94915     Sulfate

Totals :                                15.20544

 Results obtained with enhanced integrator!
==================================================================
                    *** End of Report ***
```

```
==================================================================
Injection Date  : 10/14/2008 12:41:35 PM        Seq. Line :  53
Sample Name     : Second Source                  Location : Vial 7
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==================================================================
                    External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

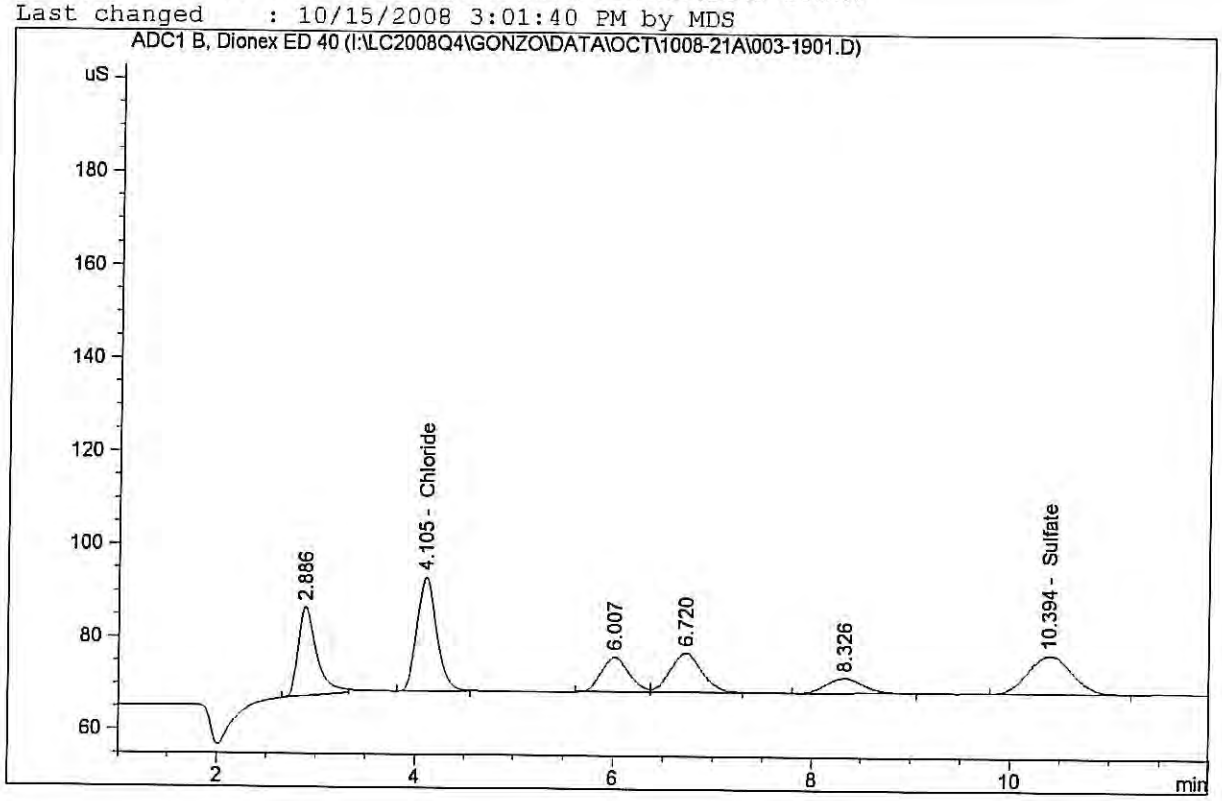
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.118 BB      624.59644 1.22796e-2    7.66976     Chloride
 10.397 BB      439.53201 1.73597e-2    7.63013     Sulfate

Totals :                                15.29990

 Results obtained with enhanced integrator!
==================================================================
                    *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/13/2008 7:24:00 PM          Seq. Line :  19
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

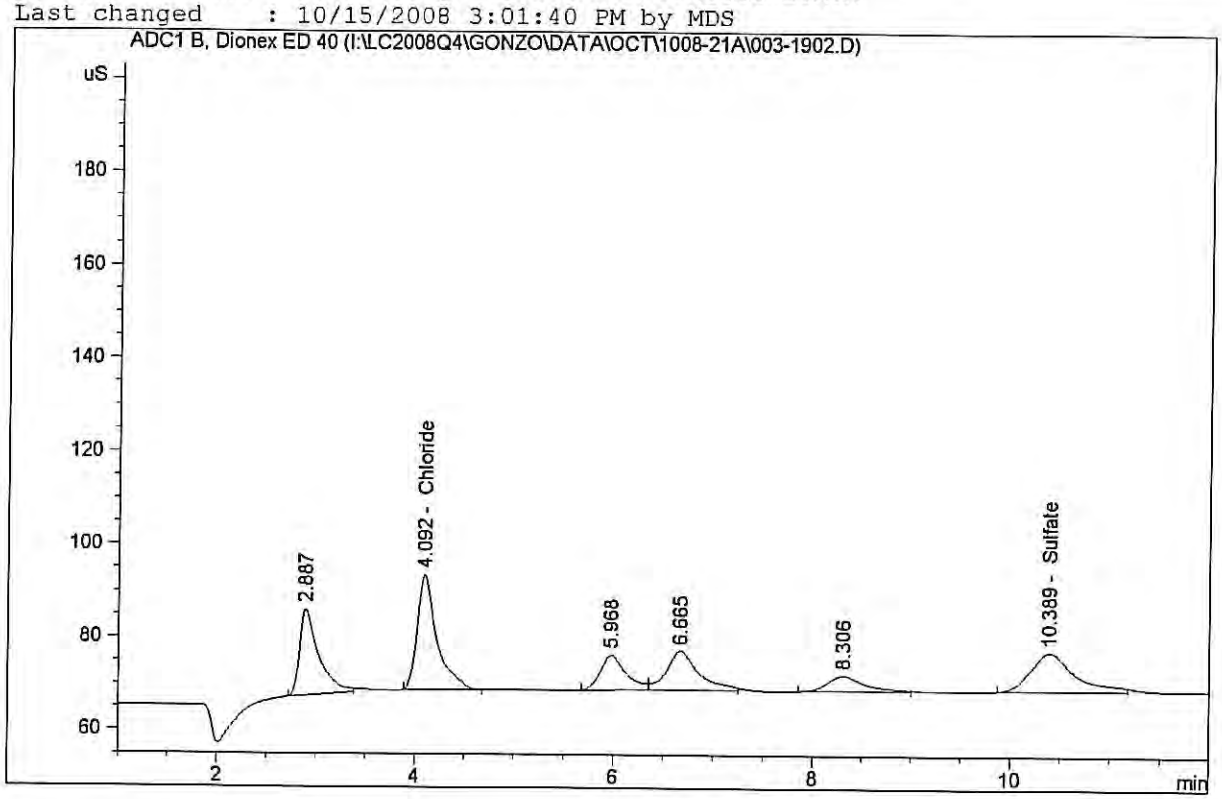
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.105 PB      348.52594 1.23300e-2    4.29732     Chloride
 10.394 BP      258.26523 1.72475e-2    4.45443     Sulfate

Totals :                                8.75175

 Results obtained with enhanced integrator!
==========================================================================
                          *** End of Report ***
```

```
==================================================================
Injection Date  : 10/13/2008 7:37:56 PM          Seq. Line :  19
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==================================================================
                    External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

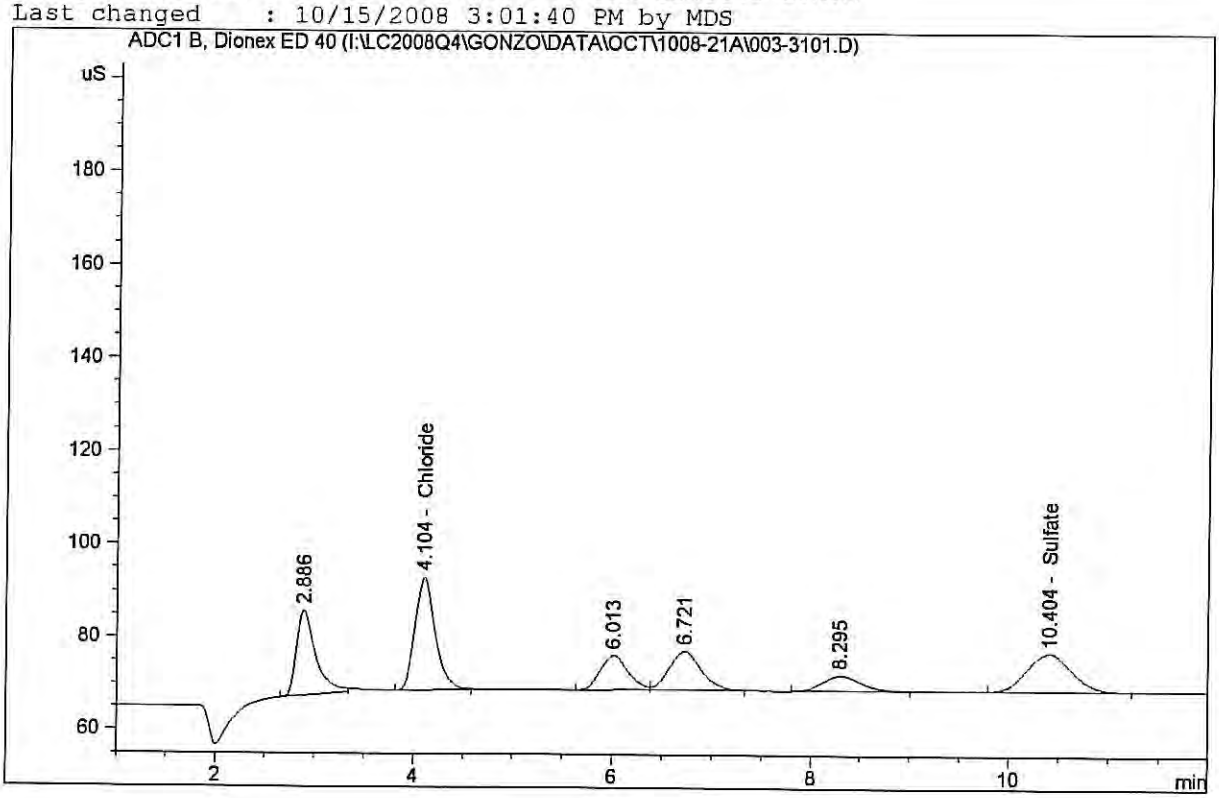
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.092 BB      346.03046 1.23308e-2    4.26683     Chloride
 10.389 BB      259.69534 1.72490e-2    4.47948     Sulfate

Totals :                                8.74632

 Results obtained with enhanced integrator!
==================================================================
                      *** End of Report ***
```

```
==================================================================
Injection Date  : 10/14/2008 12:57:15 AM        Seq. Line :  31
Sample Name     : Standard 3                     Location : Vial 3
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==================================================================
                    External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

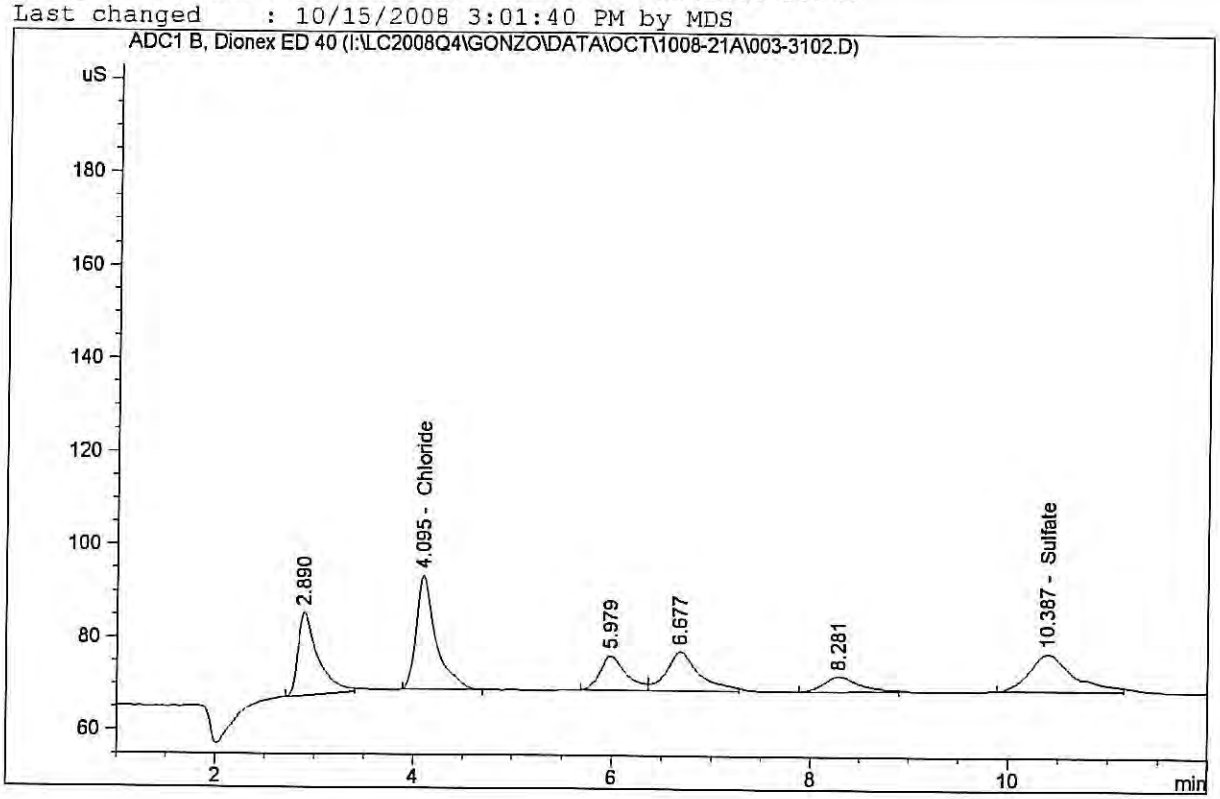
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.104 PB      349.81778 1.23296e-2    4.31310     Chloride
 10.404 BB      259.94681 1.72493e-2    4.48389     Sulfate

Totals :                                8.79699

 Results obtained with enhanced integrator!
==================================================================
                      *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/14/2008 1:11:12 AM          Seq. Line :  31
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

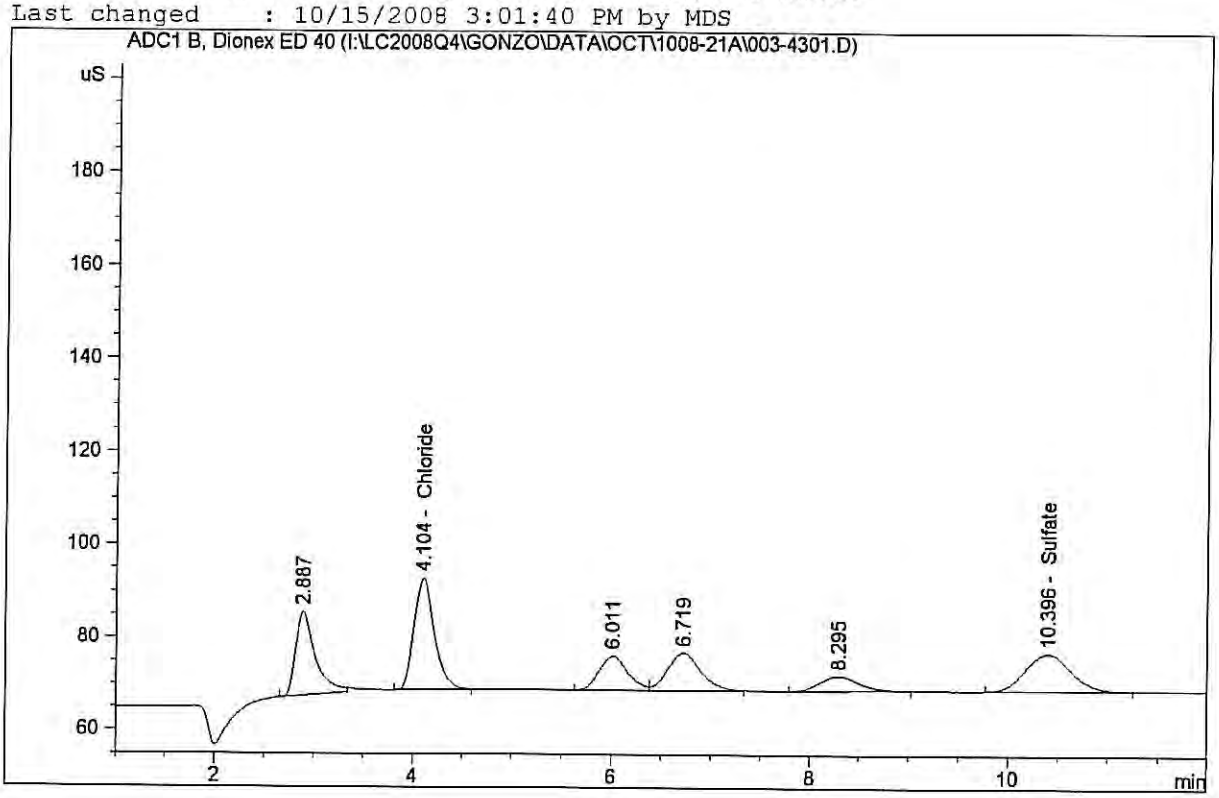
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.095 BB      346.47870 1.23307e-2    4.27231     Chloride
 10.387 BB      257.92206 1.72471e-2    4.44842     Sulfate

Totals :                                8.72073

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/14/2008 6:30:40 AM          Seq. Line :  43
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

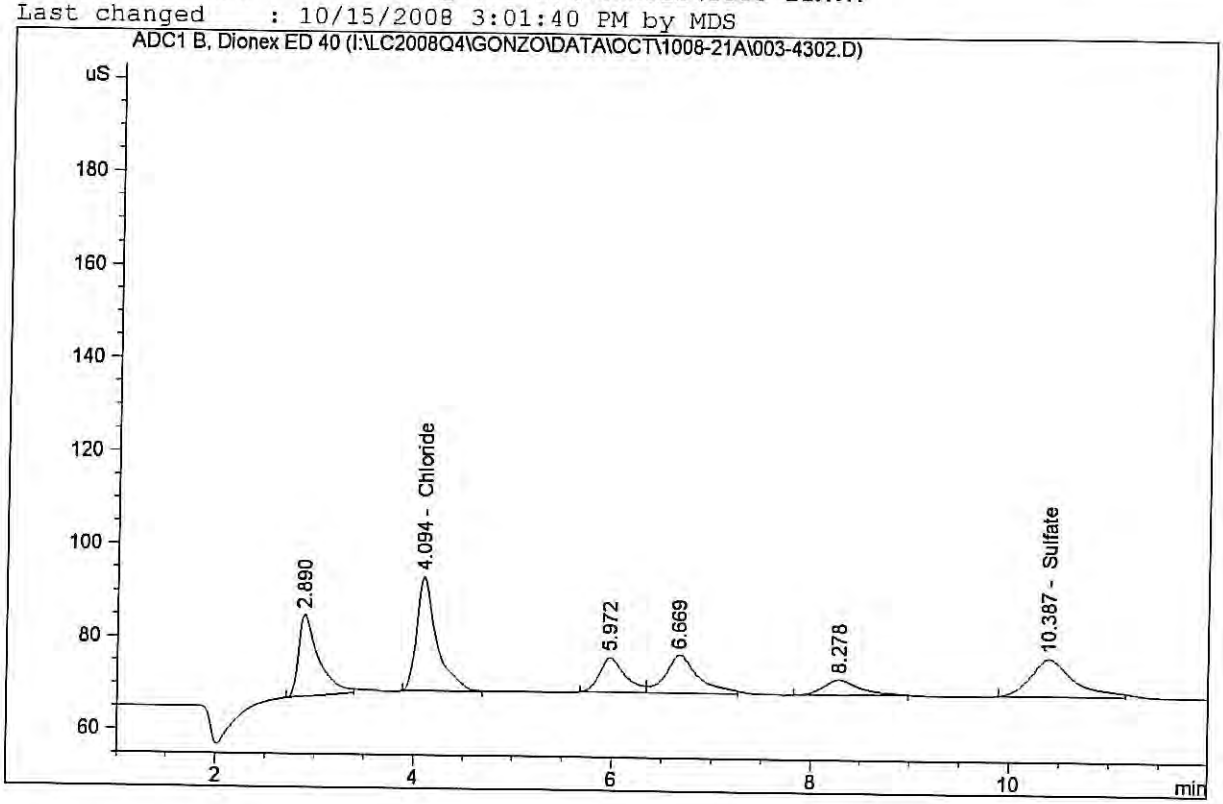
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.104 PB      348.65137 1.23299e-2    4.29885     Chloride
 10.396 BB      259.67630 1.72490e-2    4.47915     Sulfate

Totals :                                8.77800

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/14/2008 6:44:31 AM          Seq. Line :  43
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

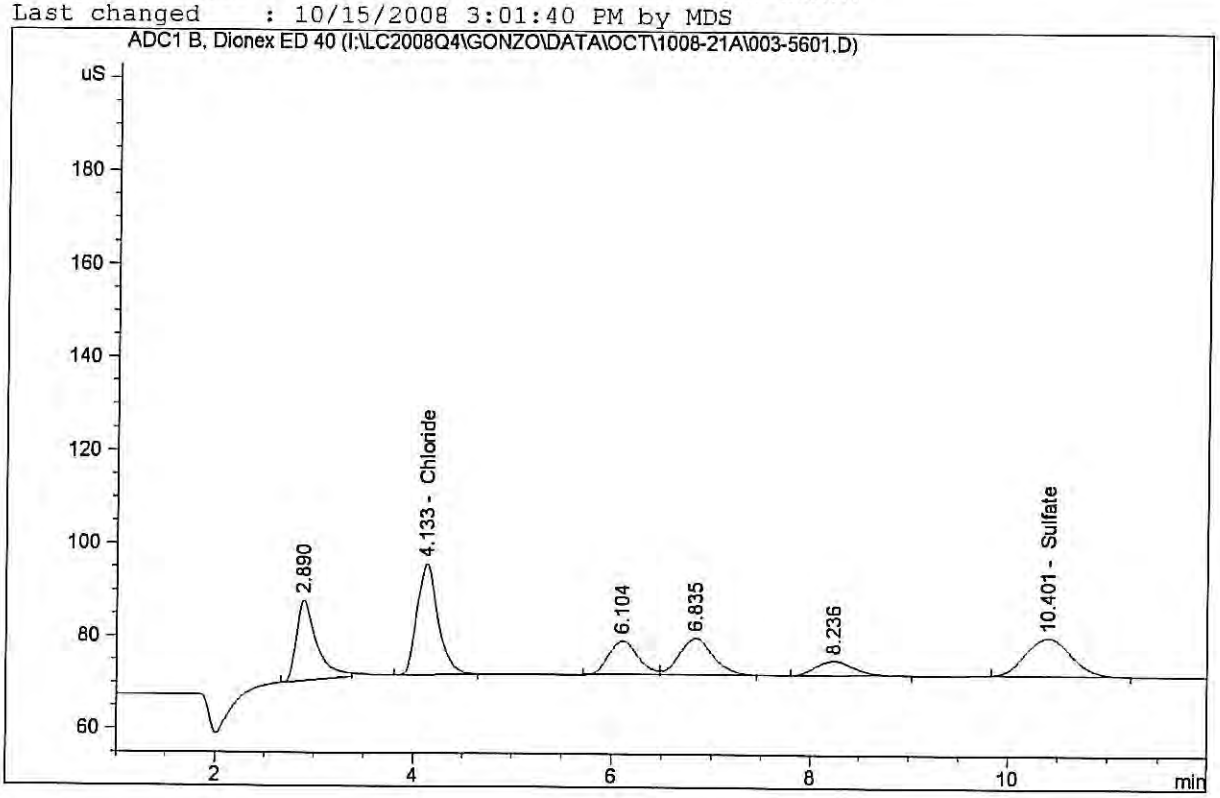
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.094 BB      346.92133 1.23305e-2    4.27772     Chloride
 10.387 BB      252.15431 1.72409e-2    4.34737     Sulfate

Totals :                                8.62509

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==================================================================
Injection Date  : 10/14/2008 1:51:18 PM          Seq. Line :  56
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==================================================================
                      External Standard Report
==================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

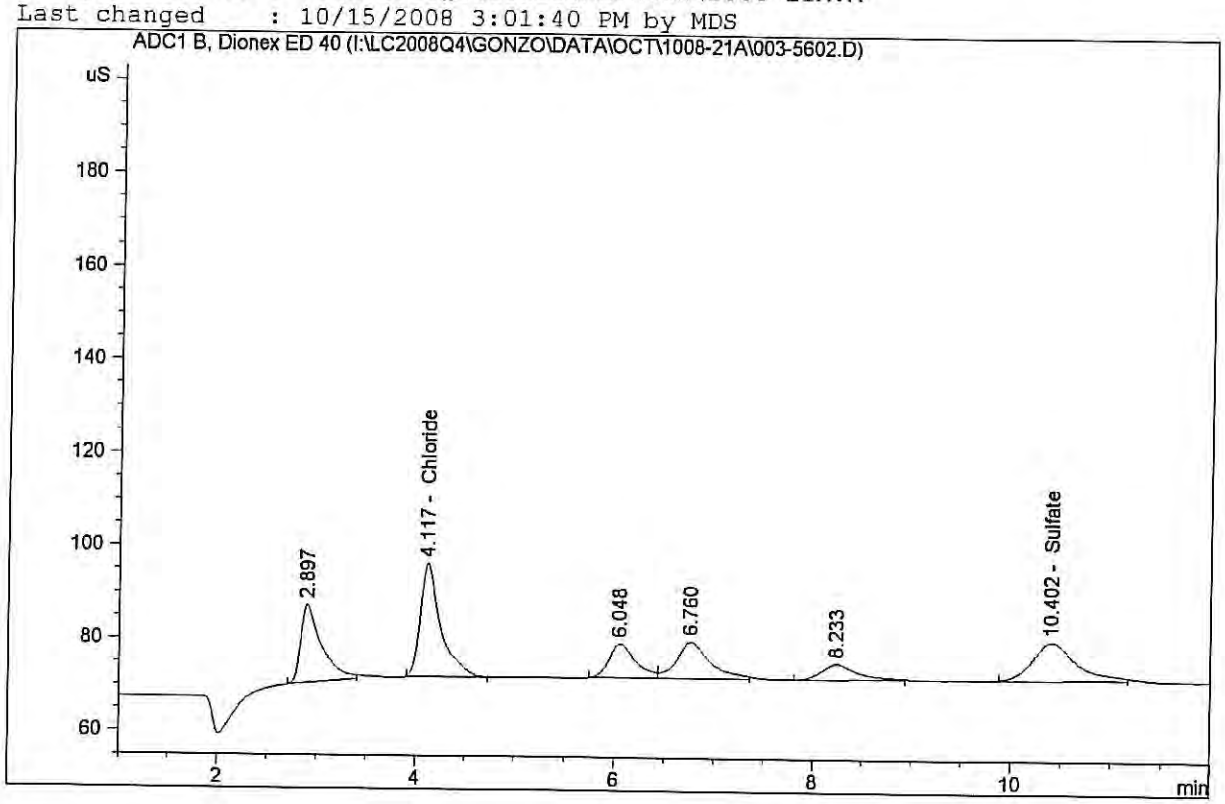
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.133 PB      356.16373 1.23275e-2    4.39062    Chloride
 10.401 BB      262.50089 1.72519e-2    4.52864    Sulfate

Totals :                                8.91926

 Results obtained with enhanced integrator!
==================================================================
                     *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/14/2008 2:05:15 PM          Seq. Line :  56
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

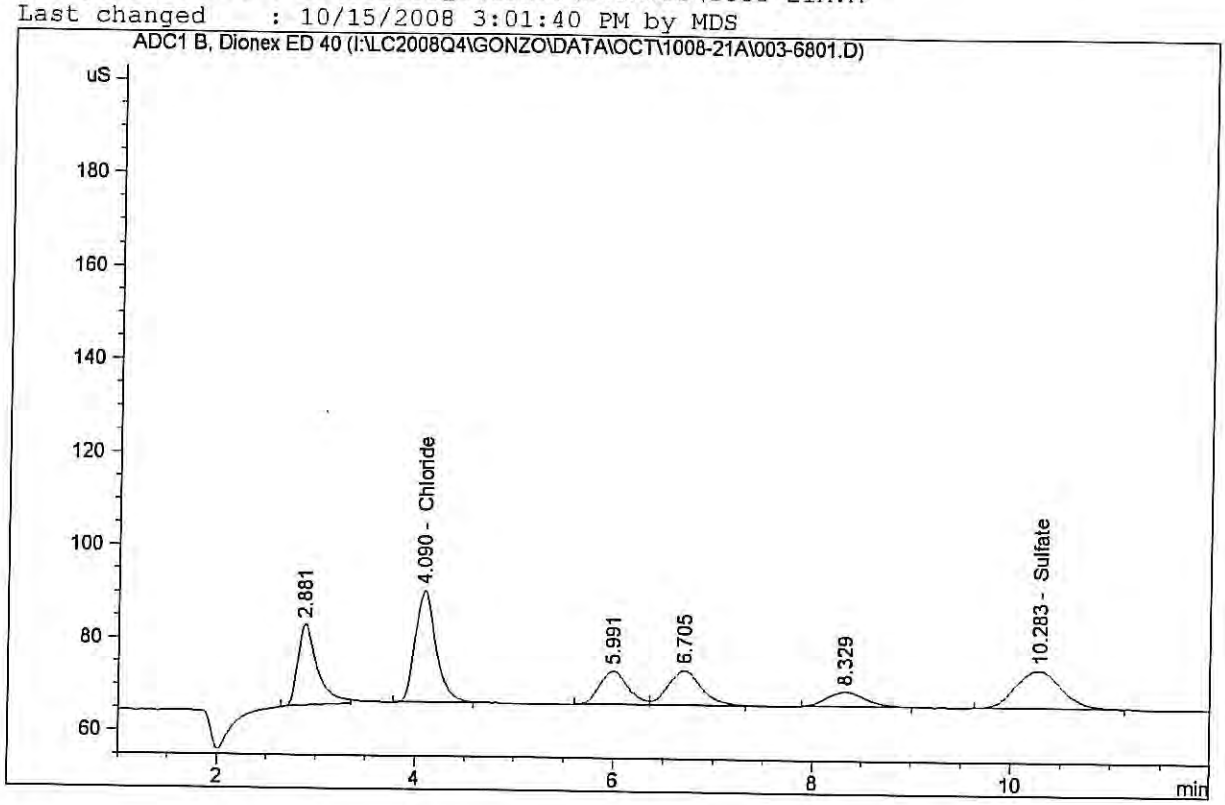
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.117 BB      354.29929 1.23281e-2    4.36785     Chloride
 10.402 BB      258.08279 1.72473e-2    4.45123     Sulfate

Totals :                                8.81908

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/14/2008 7:49:44 PM          Seq. Line :  68
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :  1
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

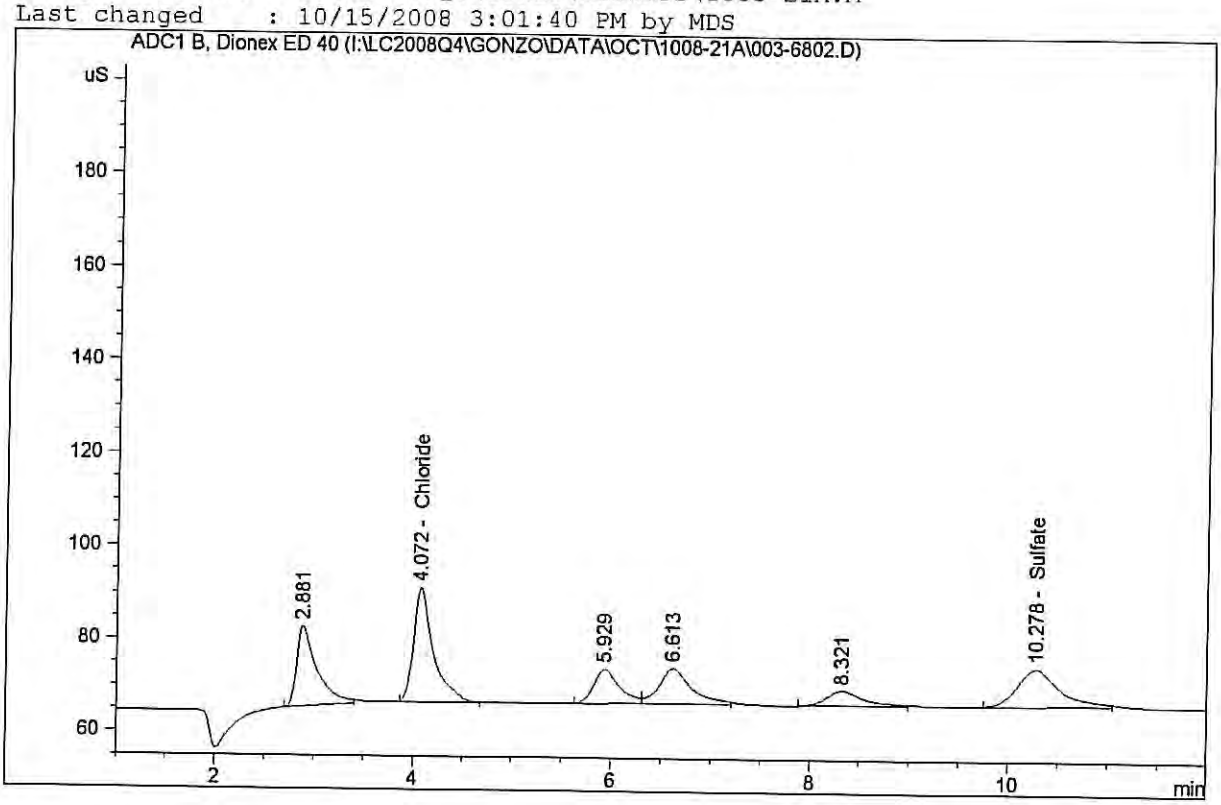
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.090 PB      353.14325 1.23285e-2    4.35372     Chloride
 10.283 PB      264.67578 1.72541e-2    4.56674     Sulfate

Totals :                                8.92046

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/14/2008 8:03:37 PM          Seq. Line :  68
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

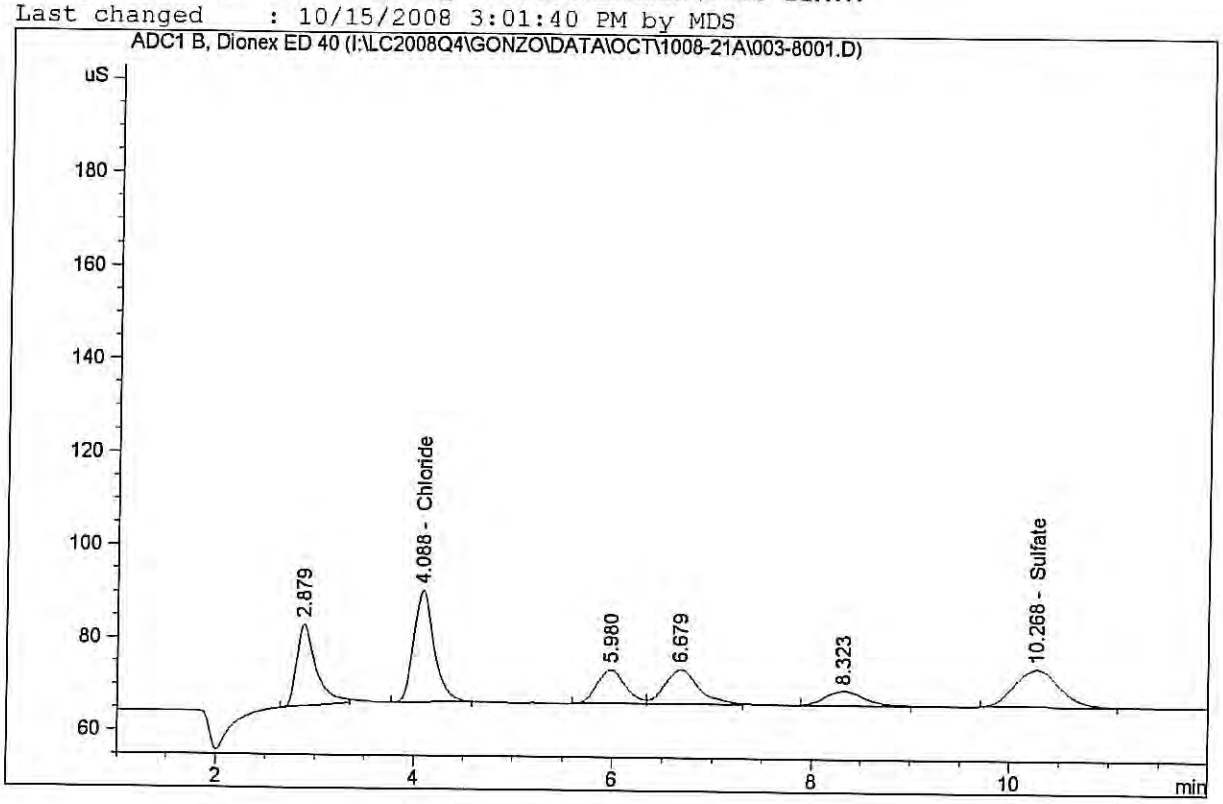
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|-----------------
  4.072 BB      346.42477 1.23307e-2    4.27165     Chloride
 10.278 BB      249.91989 1.72384e-2    4.30822     Sulfate

Totals :                                8.57987

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/15/2008 1:23:28 AM          Seq. Line :  80
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   1
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

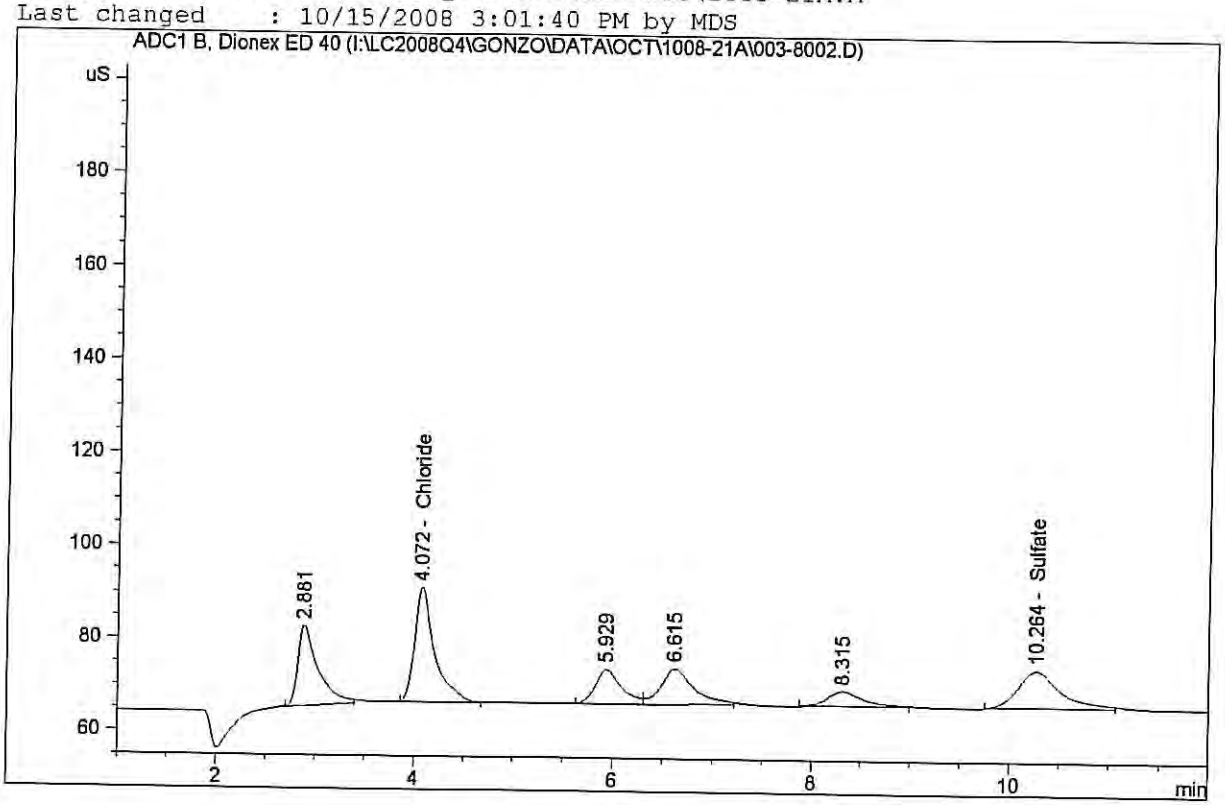
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.088 PB      350.91962 1.23292e-2    4.32656     Chloride
 10.268 BB      259.51077 1.72488e-2    4.47625     Sulfate

Totals :                                8.80281

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

```
==========================================================================
Injection Date  : 10/15/2008 1:37:28 AM          Seq. Line :  80
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

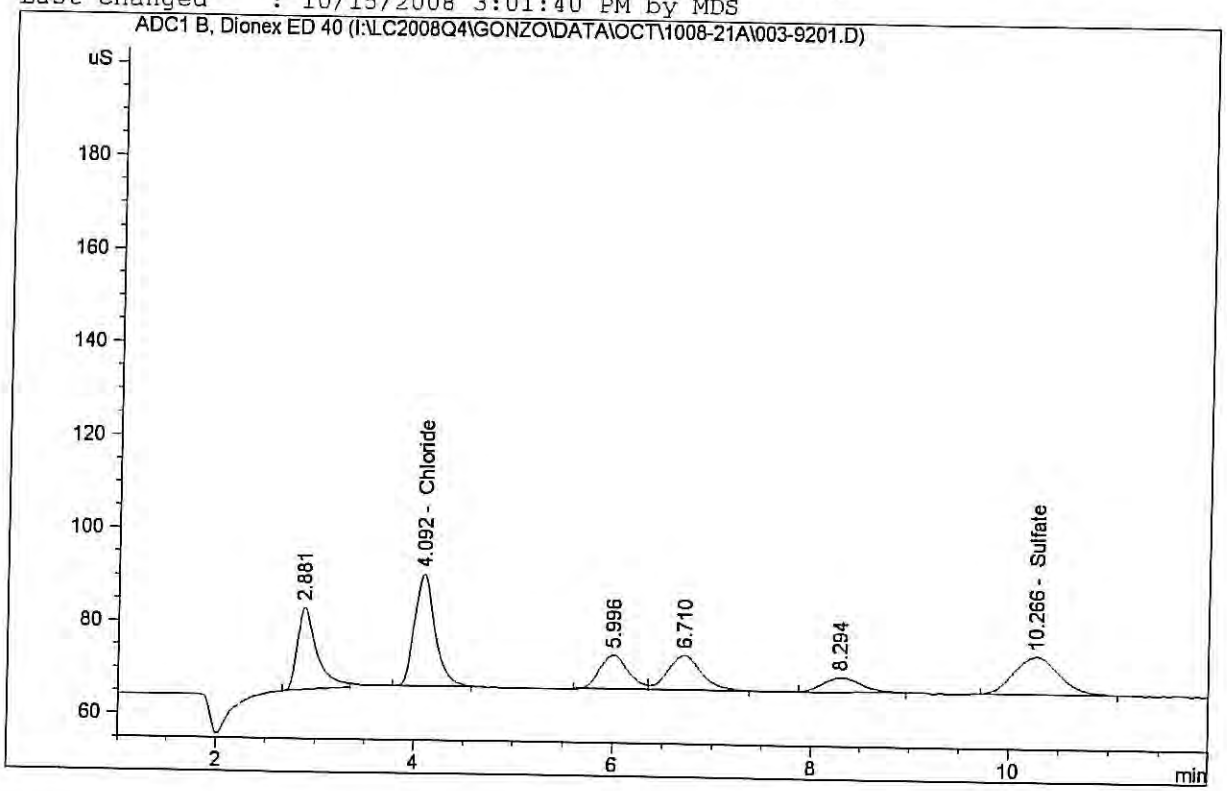
Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.072 BB      348.34787 1.23300e-2    4.29514      Chloride
 10.264 BB      246.09537 1.72340e-2    4.24122      Sulfate

Totals :                                8.53636

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

Injection Date	: 10/15/2008 6:57:57 AM	Seq. Line :	92
Sample Name	: Standard 3	Location :	Vial 3
Acq. Operator	: MDS	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2008Q4\GONZO\METHODS\COLSULF.M		
Last changed	: 10/9/2008 1:53:53 PM by MDS		
Analysis Method	: I:\LC2008Q4\GONZO\METHODS\1008-21A.M		
Last changed	: 10/15/2008 3:01:40 PM by MDS		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Wednesday, October 15, 2008 3:01:39 PM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

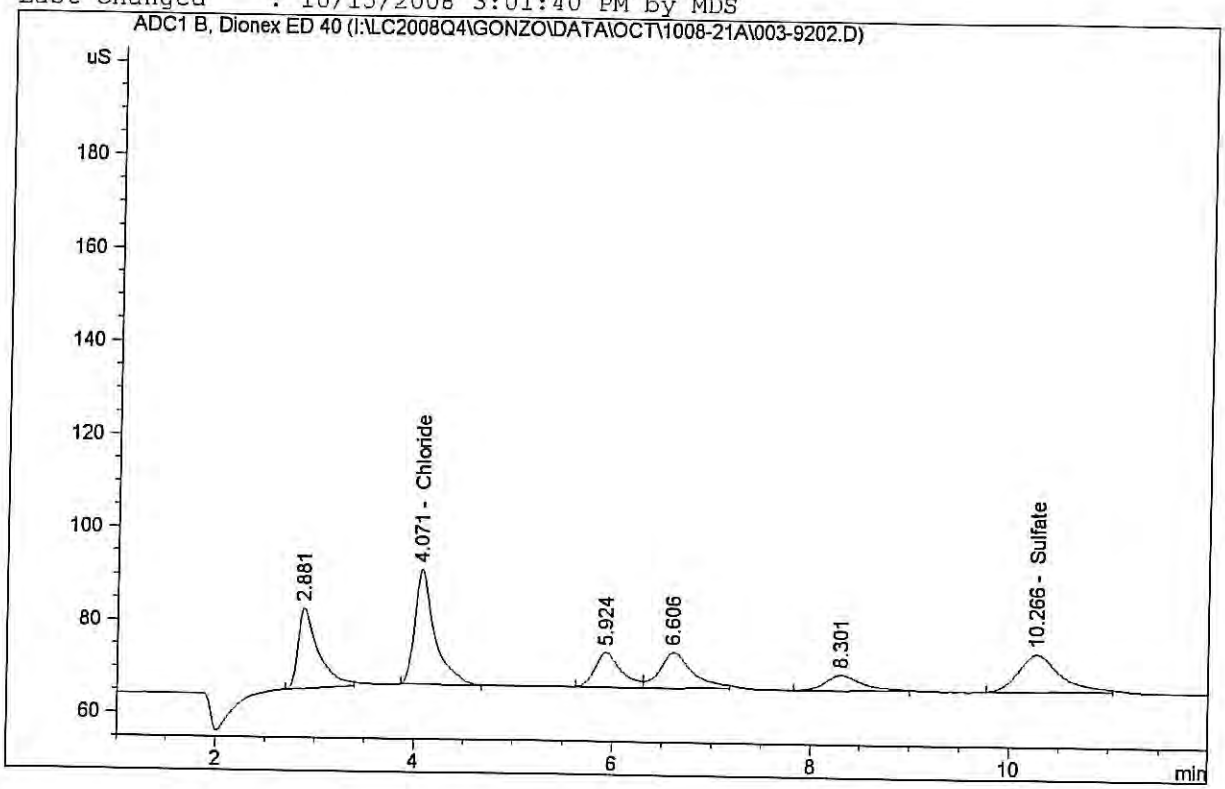
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
4.092	PB	352.17197	1.23288e-2	4.34186		Chloride
10.266	BB	261.23624	1.72506e-2	4.50648		Sulfate
Totals :				8.84834		

Results obtained with enhanced integrator!

*** End of Report ***

```
==========================================================================
Injection Date  : 10/15/2008 7:11:52 AM          Seq. Line :  92
Sample Name     : Standard 3                      Location : Vial 3
Acq. Operator   : MDS                                 Inj :   2
Acq. Instrument : Gonzo                          Inj Volume : 25 µl
Acq. Method     : H:\LC2008Q4\GONZO\METHODS\COLSULF.M
Last changed    : 10/9/2008 1:53:53 PM by MDS
Analysis Method : I:\LC2008Q4\GONZO\METHODS\1008-21A.M
Last changed    : 10/15/2008 3:01:40 PM by MDS
```




```
==========================================================================
                        External Standard Report
==========================================================================

Sorted By              :      Signal
Calib. Data Modified   :      Wednesday, October 15, 2008 3:01:39 PM
Multiplier             :      1.0000
Dilution               :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]           [uS*s]                [ug/mL]
-------|------|----------|----------|----------|--|------------------
  4.071 BB      351.14844 1.23291e-2    4.32935     Chloride
 10.266 BB      247.36397 1.72355e-2    4.26344     Sulfate

Totals :                                8.59280

 Results obtained with enhanced integrator!
==========================================================================
                        *** End of Report ***
```

Method Information

Dionex IonPac AS-14A 4-mm analytical (4x250mm) column.
Flow rate 1.2 mL/min
8mM Na2CO3/1mM NaHCO3 mobile phase
Suppressed anion conductivity detection

==========

ANALOG DIGITAL CONVERTER

==========

	Signal 1
Description:	Dionex ED 40
Source:	Signal
Unit:	uS
Units/Volt:	1000.000
Peakwidth (Data Rate):	0.027 Min (10.00 Hz)
Stop Time:	No Limit
Data Storage:	All

Start Signal Source: External Device Will Start 35900

Timed Event Table:
<no events>

1100 Quaternary Pump 1

Control

Column Flow	:	1.200 ml/min
Stoptime	:	12.00 min
Posttime	:	Off

Solvents

Solvent A	:	100.0 % (8.0mM Na2CO3/1.0mM NaHCO3)
Solvent B	:	Off
Solvent C	:	0.0 % (8.0mM Na2CO3/1.0mM NaHCO3)
Solvent D	:	Off

PressureLimits

Minimum Pressure	:	0 bar
Maximum Pressure	:	400 bar

Auxiliary

Maximal Flow Ramp	:	100.00 ml/min^2
Primary Channel	:	Auto
Compressibility	:	83*10^-6/bar
Minimal Stroke	:	Auto

Store Parameters

Store Ratio A	:	Yes
Store Ratio B	:	Yes
Store Ratio C	:	Yes
Store Ratio D	:	Yes
Store Flow	:	Yes
Store Pressure	:	Yes

Agilent 1100 Contacts Option

Contact 1	:	Open
Contact 2	:	Open
Contact 3	:	Open
Contact 4	:	Open

1100 Quaternary Pump 2

Control

Column Flow	:	1.200 ml/min
Stoptime	:	12.00 min
Posttime	:	Off

Solvents

Solvent A	:	0.0 % ( )
Solvent B	:	Off
Solvent C	:	Off
Solvent D	:	100.0 % (8mMNa2CO3\1mMNaHCO3)

PressureLimits

Minimum Pressure	:	0 bar
Maximum Pressure	:	400 bar

Auxiliary

Maximal Flow Ramp	:	100.00 ml/min^2
Primary Channel	:	Auto

Compressibility	:	100*10^-6/bar
Minimal Stroke	:	Auto

Store Parameters

Store Ratio A	:	Yes
Store Ratio B	:	Yes
Store Ratio C	:	Yes
Store Ratio D	:	Yes
Store Flow	:	Yes
Store Pressure	:	Yes

Agilent 1100 Contacts Option
==========

Contact 1	:	Open
Contact 2	:	Open
Contact 3	:	Open
Contact 4	:	Open

==========

Agilent 1100 Autosampler 1

==========

Injection

Injection Mode	:	Needle Wash
Injector volume	:	25.00 µl
Wash Vial	:	100
Optimization	:	none

Auxiliary

Drawspeed	:	100 µl/min
Ejectspeed	:	1000 µl/min
Draw position	:	2.0 mm

Time

Stoptime	:	As Pump
Posttime	:	Off

==========

Agilent 1100 Column Thermostat 1

==========

Temperature settings

Left temperature	:	30.0°C
Right temperature	:	Same as left
Enable analysis	:	When Temp. is within setpoint +/- 0.8°C
Store left temperature	:	No
Store right temperature	:	No

Time

Stoptime	:	As pump
Posttime	:	Off

Column Switching Valve	:	Use current

Sequence Table:

Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 1	Standard 1	COLSULF	2	Sample		
2	Vial 2	Standard 2	COLSULF	2	Sample		
3	Vial 3	Standard 3	COLSULF	2	Sample		
4	Vial 4	Standard 4	COLSULF	2	Sample		
5	Vial 5	Standard 5	COLSULF	2	Sample		
6	Vial 6	Standard 6	COLSULF	2	Sample		
7	Vial 7	Second Source	COLSULF	2	Sample		
8	Vial 8	DI H2O Lab Blank	COLSULF	2	Sample		
9	Vial 11	KR6521-1	CHLSWTCH	2	Sample		
10	Vial 12	KR6521-2	CHLSWTCH	2	Sample		
11	Vial 13	KR6521-3	CHLSWTCH	2	Sample		
12	Vial 14	MS/KR6521-1	CHLSWTCH	2	Sample		
13	Vial 15	In R1 C2*20	COLSULF	2	Sample		
14	Vial 16	In R2 C2*100	COLSULF	2	Sample		
15	Vial 17	In R3 C2*10	COLSULF	2	Sample		
16	Vial 18	Stk R1 C2*10	COLSULF	2	Sample		
17	Vial 19	Stk R2 C2*10	COLSULF	2	Sample		
18	Vial 20	Stk R3 C2*10	COLSULF	2	Sample		
19	Vial 3	Standard 3	COLSULF	2	Sample		
20	Vial 4	Standard 4	COLSULF	2	Sample		
21	Vial 21	In C4	COLSULF	2	Sample		
22	Vial 22	Stk C4	COLSULF	2	Sample		
23	Vial 23	MS/In R3 C2	COLSULF	2	Sample		
24	Vial 24	U4-E1-1*10	COLSULF	2	Sample		
25	Vial 25	U4-E1-1*10	COLSULF	2	Sample		
26	Vial 26	U4-E1-2*100	COLSULF	2	Sample		
27	Vial 27	U4-E1-2*100	COLSULF	2	Sample		
28	Vial 28	U4-E1-3*100	COLSULF	2	Sample		
29	Vial 29	U4-E1-4*100	COLSULF	2	Sample		
30	Vial 30	U4-E1-8*100	COLSULF	2	Sample		
31	Vial 3	Standard 3	COLSULF	2	Sample		
32	Vial 4	Standard 4	COLSULF	2	Sample		
33	Vial 31	U4-E1-16*100	COLSULF	2	Sample		
34	Vial 32	U4-E2-2*100	COLSULF	2	Sample		
35	Vial 33	U4-E2-3*20	COLSULF	2	Sample		
36	Vial 34	U4-E2-4*100	COLSULF	2	Sample		
37	Vial 35	U4-E2-4*100	COLSULF	2	Sample		
38	Vial 36	U4-E2-8*20	COLSULF	2	Sample		
39	Vial 37	U4-E2-15*100	COLSULF	2	Sample		
40	Vial 38	U4-E3-2*10	COLSULF	2	Sample		
41	Vial 39	U4-E3-3*10	COLSULF	2	Sample		
42	Vial 40	U4-E4-1*10	COLSULF	2	Sample		
43	Vial 3	Standard 3	COLSULF	2	Sample		
44	Vial 4	Standard 4	COLSULF	2	Sample		
45	Vial 41	U4-W3-3*100	COLSULF	2	Sample		
46	Vial 42	U4-W4-1100	COLSULF	2	Sample		
47	Vial 43	U4-W4-2*100	COLSULF	2	Sample		
48	Vial 44	MS1/U4-E1-3	COLSULF	2	Sample		
49	Vial 45	U4-E1-1-4*100	COLSULF	2	Sample		
50	Vial 46	U4-E1-1-4*100	COLSULF	2	Sample		
51	Vial 47	U4-E1-1-4*100	COLSULF	2	Sample		
52	Vial 48	U4-E1-1-4*100	COLSULF	2	Sample		
53	Vial 7	Second Source	COLSULF	2	Sample		
54	Vial 49	U4-E1-1-6*100	COLSULF	2	Sample		
55	Vial 50	U4-E1-5-6*100	COLSULF	2	Sample		
56	Vial 3	Standard 3	COLSULF	2	Sample		
57	Vial 4	Standard 4	COLSULF	2	Sample		
58	Vial 51	U4-E1-7-9*100	COLSULF	2	Sample		
59	Vial 52	U4-E1-7-12*100	COLSULF	2	Sample		
60	Vial 53	U4-E1-13-15*100	COLSULF	2	Sample		

Sequence: H:\LC2008Q4\GONZO\SEQUENCE\1008-21A.S

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
61	Vial 54	U4-E1-16-18*100	COLSULF	2	Sample		
62	Vial 55	U4-E2-1-4*100	COLSULF	2	Sample		
63	Vial 56	U4-E2-1-4*100	COLSULF	2	Sample		
64	Vial 57	U4-E2-1-4*100	COLSULF	2	Sample		
65	Vial 58	U4-E2-1-6*100	COLSULF	2	Sample		
66	Vial 59	U4-E2-5-6*100	COLSULF	2	Sample		
67	Vial 60	U4-E2-5-8*100	COLSULF	2	Sample		
68	Vial 3	Standard 3	COLSULF	2	Sample		
69	Vial 4	Standard 4	COLSULF	2	Sample		
70	Vial 61	U4-E2-7-9*100	COLSULF	2	Sample		
71	Vial 62	U4-E2-7-12*100	COLSULF	2	Sample		
72	Vial 63	U4-E2-13-14*100	COLSULF	2	Sample		
73	Vial 64	U4-E2-13-15*100	COLSULF	2	Sample		
74	Vial 65	U4-E2-16-18*100	COLSULF	2	Sample		
75	Vial 66	MS2/U4-E1-1-6	COLSULF	2	Sample		
76	Vial 67	U4-E1-1-4*2000	COLSULF	2	Sample		
77	Vial 68	U4-E1-1-4*2000	COLSULF	2	Sample		
78	Vial 69	U4-E1-1-4*2000	COLSULF	2	Sample		
79	Vial 70	U4-E1-1-4*2000	COLSULF	2	Sample		
80	Vial 3	Standard 3	COLSULF	2	Sample		
81	Vial 4	Standard 4	COLSULF	2	Sample		
82	Vial 71	U4-E1-1-6*2000	COLSULF	2	Sample		
83	Vial 72	U4-E1-5-6*2000	COLSULF	2	Sample		
84	Vial 73	U4-E1-7-9*2000	COLSULF	2	Sample		
85	Vial 74	U4-E1-7-12*2000	COLSULF	2	Sample		
86	Vial 75	U4-E1-13-15*2000	COLSULF	2	Sample		
87	Vial 76	U4-E1-16-18*2000	COLSULF	2	Sample		
88	Vial 77	U4-E2-1-4*2000	COLSULF	2	Sample		
89	Vial 78	U4-E2-1-4*2000	COLSULF	2	Sample		
90	Vial 79	U4-E2-1-4*2000	COLSULF	2	Sample		
91	Vial 80	U4-E2-1-6*2000	COLSULF	2	Sample		
92	Vial 3	Standard 3	COLSULF	2	Sample		
93	Vial 4	Standard 4	COLSULF	2	Sample		
94	Vial 81	U4-E2-5-6*2000	COLSULF	2	Sample		
95	Vial 82	U4-E2-5-8*2000	COLSULF	2	Sample		
96	Vial 83	U4-E2-7-9*2000	COLSULF	2	Sample		
97	Vial 84	U4-E2-7-12*2000	COLSULF	2	Sample		
98	Vial 85	U4-E2-13-14*2000	COLSULF	2	Sample		
99	Vial 86	U4-E2-13-15*2000	COLSULF	2	Sample		
100	Vial 87	U4-E2-16-18*2000	COLSULF	2	Sample		
101	Vial 88	MS3/U4-E1-1-6	COLSULF	2	Sample		
102	Vial 1	Standard 1	COLSULF	2	Sample		
103	Vial 2	Standard 2	COLSULF	2	Sample		
104	Vial 3	Standard 3	COLSULF	2	Sample		
105	Vial 4	Standard 4	COLSULF	2	Sample		
106	Vial 5	Standard 5	COLSULF	2	Sample		
107	Vial 6	Standard 6	COLSULF	2	Sample		
108	Vial 8	DI H2O Lab Blank	PUMPX2	2	Sample		

This Is The Last Page Of This Report.

Appendix G:

EPA Test Method 17 (Particulate Matter) Analytical Data – SDA Inlet Duct

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

EPA Method 17

Project Number: 08-026

Date Analysis Completed: 10/14/08

Project Name: ADA-ES

Unit Tested: SDA Inlet Duct

Project Location: Hardin, MT

Run Number:	1	2	3
Particulate Matter on Filter (mg):	4,829.4	7,037.6	7,515.2
Particulate Matter in Front Wash (mg):	1,984.7	672.5	1,217.2
Total Particulate Matter in "Front-Half" – MF (mg):	6,814.1	7,710.1	8,732.4
Particulate Matter in "Back-Half" (mg):	—	—	—
Total Particulate Matter in Sample – MT (mg):	—	—	—

Joel C Hanley
Analyst

Billy J. Mullins Jr. **Date:** 11/9/08
Data Checked By

Version No. 1 5/30/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 17

Stack Filters

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested SDA Inlet Duct

Desiccator Time In	10-1-08 0900	10-3-08 0911	10-6-08 0930	10-10-08 1020	
Desiccator Time Out	10-3-08 0907	10-6-08 0900	10-10-08 0900	10-13-08 1350	

Run No. 1		Filter No. Thimble 58		Sample I.D.	
Filter & Particulate (g)	8.2994	8.2955	8.2950 ✓		

Filter & Particulate Average (g) 8.2950 ✓
Initial Filter Weight (g) 3.4656 ✓
Total Particulate (mg) 4,829.4 ✓

Run No. 2		Filter No. Thimble 65		Sample I.D.	
Filter & Particulate (g)	9.6750	9.6759	9.6757 ✓		

Filter & Particulate Average (g) 9.6757 ✓
Initial Filter Weight (g) 2.6381 ✓
Total Particulate (mg) 7,037.6 ✓

Run No. 3		Filter No. Thimble 96		Sample I.D.	
Filter & Particulate (g)	9.9758	9.9693	9.9666	9.9670 ✓	

Filter & Particulate Average (g) 9.9670 ✓
Initial Filter Weight (g) 2.4518 ✓
Total Particulate (mg) 7,515.2 ✓

Jol C Stanley 10/13/08
Analyst

AIR SAMPLING ASSOCIATES, INC.

Thimble Tare Weight Log
EPA Method 17

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
45	9/29/06 1200	2.7941 10/2/06 1635	2.7944 10/3/06 1100				2.7944
46		2.7987 10/2/06 1636	2.7990 10/3/06 1101				2.7990
47		2.5514 10/2/06 1637	2.5514 10/3/06 1102				2.5514
48		2.7781 10/2/06 1638	2.7785 10/3/06 1103				2.7785
49		2.7795 10/2/06 1639	2.7799 10/3/06 1104				2.7799
50		2.6485 10/2/06 1640	2.6487 10/3/06 1105				2.6487
51		2.8600 10/2/06 1641	2.8605 10/3/06 1106				2.8605
52		2.8470 10/2/06 1642	2.8474 10/3/06 1107				2.8474
53		2.7349 10/2/06 1643	2.7352 10/3/06 1108				2.7352
54	11/20/06 1360	3.5794 11/21/06 1350	3.5795 11/22/06 0745				3.5795
55		2.8785 11/21/06 1351	2.8788 11/22/06 0746				2.8788
56		2.4725 11/21/06 1352	2.4724 11/22/06 0747				2.4724
57		2.9916 11/21/06 1353	2.9911 11/22/06 0748				2.9911
58		3.4660 11/21/06 1354	3.4656 11/22/06 0749				3.4656
59		3.1165 11/21/06 1355	3.1160 11/22/06 0750				3.1160

AIR SAMPLING ASSOCIATES, INC.

Thimble Tare Weight Log
EPA Method 17

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
60		2.7215	2.7210 ✓				2.7210
	11/20/06 1300	11/21/06 1358	11/22/06 0752				
61		2.7531	2.7530 ✓				2.7530
	11/20/06 1300	11/21/06 1359	11/22/06 0753				
62		2.7516	2.7514 ✓				2.7514
	11/20/06 1300	11/21/06 1400	11/22/06 0754				
63		2.7846	2.7848 ✓				2.7848
	11/20/06 1300	11/21/06 1401	11/22/06 0755				
64		2.9993	2.9992 ✓				2.9992
	11/20/06 1300	11/21/06 1402	11/22/06 0756				
65		2.6385	2.6381 ✓				2.6381 ✓
	11/20/06 1300	11/21/06 1403	11/22/06 0757				
66		2.8663	2.8660 ✓				2.8660
	11/20/06 1300	11/21/06 1404	11/22/06 0800				
67		2.9442	2.9439 ✓				2.9439
	11/20/06 1300	11/21/06 1404	11/22/06 0801				
68		2.5183	2.5182 ✓				2.5182
	11/20/06 1300	11/21/06 1405	11/22/06 0802				
69		2.7293	2.7291 ✓				2.7291
	11/20/06 1300	11/21/06 1406	11/22/06 0803				
70		2.5250	2.5248 ✓				2.5248
	11/20/06 1300	11/21/06 1407	11/22/06 0804				
71		2.4725	2.4721 ✓				2.4721
	11/20/06 1300	11/21/06 1408	11/22/06 0805				
72		2.7991	2.7988 ✓				2.7988
	11/20/06 1300	11/21/06 1409	11/22/06 0806				
73		3.1339	3.1336 ✓				3.1336
	11/20/06 1300	11/21/06 1410	11/22/06 0807				
74		2.8562	2.8561 ✓				2.8561
	11/20/06 1300	11/21/06 1410	11/22/06 0808				

AIR SAMPLING ASSOCIATES, INC.

Thimble Tare Weight Log
EPA Method 17

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
90		2.2367	2.2364	✓			2.2364
	8/10/07	8/11/07	8/13/07				
	0700	0737	0805				
91		2.8053	2.8050	✓			2.8050
	8/10/07	8/11/07	8/13/07				
	0700	0738	0807				
92		2.3373	2.3369	✓			2.3369
	8/10/07	8/11/07	8/13/07				
	0700	0740	0810				
93		2.2907	2.2904	✓			2.2904
	8/10/07	8/11/07	8/13/07				
	0700	0741	0812				
94		2.3437	2.3436	✓			2.3436
	0600	8/13/07	8/13/07				
	8/12/07	0800	1430				
95		2.4924	2.4926	✓			2.4926
	0600	8/13/07	8/13/07				
	8/12/07	0800	1430				
96		2.4515	2.4518	✓			2.4518 ✓
	0600	8/13/07	8/13/07				
	8/12/07	0800	1430				
97		2.4844	2.4846	✓			2.4846
	0600	8/13/07	8/13/07				
	8/12/07	0800	1430		✓		
98		~~2.6578~~	2.6580	2.6581 ✓			2.6581
	1155	6/5/08		6/6/08			
	5/30/08	~~1247~~ 0630		1240			
99		2.3832	2.3835 ✓				2.3835
	5/30/08	6/6/08	6/6/08				
	1155	~~1253~~ 0630	1242				
100		2.1985	2.1983 ✓				2.1983
	5/30/08	6/6/08	6/6/08				
	1155	0633	1244				
101		2.4363	2.4364 ✓				2.4364
	5/30/08	6/6/08	6/6/08				
	1155	0635	1246				
102		2.1281	2.1285 ✓				2.1285
	5/30/08	6/6/08	6/6/08				
	1155	0638	1248				
103		2.1338	2.1340 ✓				2.1340
	5/30/08	6/6/08	6/6/08				
	1155	0640	1250				
104		2.5574	2.5573 ✓				2.5573
	5/30/08	6/6/08	6/6/08				
	1155	0644	1251				

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 17

Front Wash

Project No. 08. 026
Project Name ADA-ES

Location Hardin, MT
Unit Tested SDA Inlet Duct

Desiccator Time In	9.7.08 0900	10.10.08 1000	10.13.08 1400		
Desiccator Time Out	10.10.08 0930	10.13.08 1350	10.14.08 1434		

Run No. 1		Volume (ml) 230		Sample I.D.	
Final Weight (g)	107.4009	107.4031	107.4035 ✓		
Initial Weight (g)		~~105.4181~~	105.4181 ✓		
Particulate Weight (g)		~~1.9850~~	1.9854 ✓		

Particulate Average (mg) 1,985.4 ✓
Less Acetone Blank (mg) 0.7 ✓
Total Particulate (mg) 1984.7 ✓

Run No. 2		Volume (ml) 150		Sample I.D.	
Final Weight (g)	113.9015	113.9017 ✓			
Initial Weight (g)		113.2288 ✓			
Particulate Weight (g)		0.6729			

Particulate Average (mg) 672.9 ✓
Less Acetone Blank (mg) 0.4 ✓
Total Particulate (mg) 672.5 ✓

Run No. 3		Volume (ml) 104		Sample I.D.	
Final Weight (g)	113.7768	113.7768 ✓			
Initial Weight (g)		112.5588 ✓			
Particulate Weight (g)		1.2180			

Particulate Average (mg) 1,218.0 ✓
Less Acetone Blank (mg) 0.3 ✓
Total Particulate (mg) 1217.7 ✓

Acetone Blank		Volume (ml) 206		Sample I.D.	
Final Weight (g)	113.9258	113.9254 ✓			
Initial Weight (g)		113.9248 ✓			
Particulate Weight (g)		0.0006 ✓			

Average (mg) 0.6 ✓
* mg/l 2.9 ✓

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

Adl C Stanley
~~B~~-7 Analyst

Date: 10/14/08

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 17

Front Half Tare Weights

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested SDA Inlet Duct

Desiccator Time In	10-1 0830	10-2 1028	~~10-3 811~~		
Desiccator Time Out	10-2 ~~0830~~ 1017	10-3 800			

Run No. 1				Sample I.D.	
Weight (g)	105.4177	105.4181 ✓			

Run No. 2				Sample I.D.	
Weight (g)	113.2286	113.2288 ✓			

Run No. 3				Sample I.D.	
Weight (g)	112.5583	112.5588 ✓			

Acetone Blank				Sample I.D.	
Weight (g)	113.9246	113.9248 ✓			

John C Stanley 10/3/08
Analyst

AIR SAMPLING ASSOCIATES, INC.

Appendix H:

EPA Test Methods 201A and 202 (PM10/2.5) Analytical Data- Stack

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 08-026

Date Analysis Completed: 10/30/08

Project Name: ADA-ES

Unit Tested: Stack

Project Location: Hardin, MT

Run Number:	1	2	3
Particulate Matter >PM10 (mgs):	10.7	3.4	6.8
Particulate Matter < PM10 >PM2.5 (mgs):	3.3	2.2	6.0
Particulate Matter PM2.5 Rinse (mgs):	1.0	0.0	0.6
Particulate Matter PM2.5 Filter (mgs):	0.5	1.3	1.7
Total Particulate Matter as PM2.5 (mgs):	1.5	1.3	2.3
Particulate Matter in "Back-Half" (mgs):	79.2	74.9	90.3
Total Particulate Matter in Sample – MT (mg):	94.7	81.8	105.4

John C Stanley
Analyst

Billy J. Mullins **Date:** 11/09/08
Data Checked By

AIR SAMPLING ASSOCIATES, INC.

Air Sampling Associates, Inc.

Particulate Analysis Summary

Project Number: 08-026

Date Analysis Completed: _____

Project Name: ADA-ES

Unit Tested: Stack

Project Location: Hardin, MT

Run Number:	4		
Particulate Matter >PM10 (mgs):	7.4		
Particulate Matter < PM10 >PM2.5 (mgs):	4.4		
Particulate Matter PM2.5 Rinse (mgs):	0.9		
Particulate Matter PM2.5 Filter (mgs):	4.1		
Total Particulate Matter as PM2.5 (mgs):	5.0		
Particulate Matter in "Back-Half" (mgs):	59.2		
Total Particulate Matter in Sample – MT (mg):	76.0		

John C Stanley
Analyst

Billy J. Mullins Jr. **Date:** 11/07/08
Data Checked By

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 201A/202

Stack Filters

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	10-1-08 0905	10-3-08 0920			
Desiccator Time Out	10-3-08 0910	10-6-08 0900			

Run No. 1		Filter No. 21		Sample I.D.	
Filter & Particulate (g)	0.1218	0.1219 ✓			

Filter & Particulate Average (g) 0.1219 ✓
Initial Filter Weight (g) 0.1214 ✓
Total Particulate (mg) 0.5 ✓

Run No. 2		Filter No. 22		Sample I.D.	
Filter & Particulate (g)	0.1105	0.1105 ✓			

Filter & Particulate Average (g) 0.1105 ✓
Initial Filter Weight (g) 0.1092 ✓
Total Particulate (mg) 1.3 ✓

Run No. 3		Filter No. 23		Sample I.D.	
Filter & Particulate (g)	0.1086	0.1084 ✓			

Filter & Particulate Average (g) 0.1084 ✓
Initial Filter Weight (g) 0.1067 ✓
Total Particulate (mg) 1.7 ✓

Jol C Stanley 10/6/09
Analyst

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 201A 1202

Stack Filters

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	10-1-08 0905	10-3-08 0900			
Desiccator Time Out	10-3-08 0914	10-6-08 0900			

Run No. 4		Filter No. 24		Sample I.D.	
Filter & Particulate (g)	0.1254	0.1253 ✓			

Filter & Particulate Average (g) 0.1253 ✓
Initial Filter Weight (g) 0.1212 ✓
Total Particulate (mg) 4.1 ✓

Run No.		Filter No.		Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) _____
Initial Filter Weight (g) _____
Total Particulate (mg) _____

Run No.		Filter No.		Sample I.D.	
Filter & Particulate (g)					

Filter & Particulate Average (g) _____
Initial Filter Weight (g) _____
Total Particulate (mg) _____

Joel C Stanley 10/6/08
Analyst

AIR SAMPLING ASSOCIATES, INC.

Filter Weight Log
47 mm

Filter No.	Into Desicator Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Date Time	Weight Used
16	8/1/07 0800	0.1214 8/28/07 0910	0.1217 ✓ 8/28/07 1520				0.1217
17	8/1/07 0800	0.1084 8/28/07 0910	0.1088 ✓ 8/28/07 1520				0.1088
18	8/1/07 0800	0.1211 8/28/07 0910	0.1213 ✓ 8/28/07 1520				0.1213
19	8/1/07 0800	0.1075 8/28/07 0915	0.1078 ✓ 8/28/07 1525	8/28/07			0.1078
20	8/1/07 0800	0.1229 ~~8/28/07~~ 8/28/07 0915	~~8/28/07~~ ✓ 0.1232 1525				0.1232
21	8/1/07 0800	0.1212 8/28/07 0915	0.1214 ✓ 8/28/07 1525				0.1214
22	8/1/07 0800	0.1087 8/28/07 0920	0.1092 ✓ 8/28/07 1530				0.1092
23	8/1/07 0800	0.1067 8/28/07 0920	0.1067 ✓ 8/28/07 1530				0.1067
24	8/1/07 0800	0.1212 8/28/07 0920	0.1212 ✓ 8/28/07 1530				0.1212
25	8/1/07 0800	0.1188 8/28/07 0925	0.1189 ✓ 8/28/07 1535				0.1189
26	8/1/07 0800	0.1053 8/28/07 0925	0.1053 8/28/07 1535				0.1053
27	8/1/07 0800	0.1211 8/28/07 0925	0.1216 ✓ 8/28/07 1535				0.1216
28							
29							
30							

AIR SAMPLING ASSOCIATES, INC.

Page 1 of 1

Particulate Analysis EPA Method 201A/202

Front Wash

Project No. 08-026
Project Name AQA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	10-13-08 1350	10-17-08 0840			
Desiccator Time Out	10-17-08 0830	10-31-08 1300			

Run No. 1		Volume (ml) 46		Sample I.D. > PM10	
Final Weight (g)	115.3016	115.3020 ✓			
Initial Weight (g)		115.2913 ✓			
Particulate Weight (g)		0.0107 ✓			

Particulate Average (mg) 10.7 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Run No. 1		Volume (ml) 19		Sample I.D. < PM10 > PM2.5	
Final Weight (g)	104.2970	104.2973 ✓			
Initial Weight (g)		104.2940 ✓			
Particulate Weight (g)		0.0033 ✓			

Particulate Average (mg) 3.3 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Run No. 1		Volume (ml) 19		Sample I.D. < PM2.5	
Final Weight (g)	80.3041	80.3045 ✓			
Initial Weight (g)		80.3035 ✓			
Particulate Weight (g)		0.0010 ✓			

Particulate Average (mg) 1.0 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Acetone Blank		Volume (ml)		Sample I.D.	
Final Weight (g)					
Initial Weight (g)					
Particulate Weight (g)					

Average (mg)
* mg/l

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

Jeff C Stanley
Analyst

Date: 10/30/08

Version No.2 10/22/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 201A/202

Front Half Tare Weights

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	0845 10-1-08	10-2-08 1038	~~10-3 835~~		
Desiccator Time Out	10-2-08 1035	10-3-08 0824			

Run No. 1					Sample I.D. > PM10
Weight (g)	115.2910	115.2913 ✓			

Run No. 1					Sample I.D. < PM10 > PM2.5
Weight (g)	104.2940	104.2940 ✓			

Run No. 1					Sample I.D. < PM 2.5
Weight (g)	80.3030	80.3035 ✓			

Acetone Blank					Sample I.D.
Weight (g)					

John C Stanley 10/3/08
Analyst

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 201A/202

Front Wash

Project No. 08-026
Project Name ADA-ES

Location Hardin MT
Unit Tested Stack

Desiccator Time In	10.13.08 1350	10.17.08 0850			
Desiccator Time Out	10.17.08 0830	10-30-08 1300			

Run No. 2		Volume (ml) 42		Sample I.D. >PM 10	
Final Weight (g)	80.6809	80.6813 ✓			
Initial Weight (g)		80.6779 ✓			
Particulate Weight (g)		0.0034 ✓			

Particulate Average (mg) 3.4
Less Acetone Blank (mg)
Total Particulate (mg)

Run No. 2		Volume (ml) 37		Sample I.D. <PM 10 >PM 2.5	
Final Weight (g)	106.1168	106.1172 ✓			
Initial Weight (g)		106.1150 ✓			
Particulate Weight (g)		0.0022 ✓			

Particulate Average (mg) 2.2 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Run No. 2		Volume (ml) 21		Sample I.D. < PM 2.5	
Final Weight (g)	111.8531	111.8533 ✓			
Initial Weight (g)		111.8537 ✓			
Particulate Weight (g)		-0.0004			

Particulate Average (mg) 0.0 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Acetone Blank		Volume (ml)		Sample I.D.	
Final Weight (g)					
Initial Weight (g)					
Particulate Weight (g)					

Average (mg)
* mg/l

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

John C Stanley
Analyst

Date: 10/30/08

Version No.2 10/22/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 201A/202

Front Half Tare Weights

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	10-1-08 0845	10-2-08 1034	~~10-3 0820~~		
Desiccator Time Out	10-2-08 1029	10-3-08 0811			

Run No. 2					Sample I.D. >PM 10
Weight (g)	80.6774	~~80.6780~~ 80.6779 gs ✓			

Run No. 2					Sample I.D. <PM10 >PM2.5
Weight (g)	106.1147	106.1150 ✓			

Run No. 2					Sample I.D. <PM 2.5
Weight (g)	111.8536	111.8537 ✓			

Acetone Blank					Sample I.D.
Weight (g)					

J. C. Stanley 10/3/08
Analyst

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 201A/202

Front Wash

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	10-13 08 1350	10-17-08 0845			
Desiccator Time Out	10-17-08 0830	10-30-08 1300			

Run No. 3		Volume (ml) 53		Sample I.D. > PM 10	
Final Weight (g)	107.8367	107.8367 ✓			
Initial Weight (g)		107.8299 ✓			
Particulate Weight (g)		0.0068 ✓			

Particulate Average (mg) 6.8 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Run No. 3		Volume (ml) 37		Sample I.D. < PM 10 > PM 2.5	
Final Weight (g)	104.2325	104.2327 ✓			
Initial Weight (g)		104.2267 ✓			
Particulate Weight (g)		0.0060 ✓			

Particulate Average (mg) 6.0 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Run No. 3		Volume (ml) 32		Sample I.D. < PM 2.5	
Final Weight (g)	103.9187	103.9191 ✓			
Initial Weight (g)		103.9185 ✓			
Particulate Weight (g)		0.0006 ✓			

Particulate Average (mg) 0.6 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Acetone Blank		Volume (ml)		Sample I.D.	
Final Weight (g)					
Initial Weight (g)					
Particulate Weight (g)					

Average (mg)
* mg/l

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

Analyst

Date: 10/30/08

Version No.2 10/22/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 201A/202

Front Half Tare Weights

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	10-1-08 0850	10-2-08 1052	10-3-08 0852		
Desiccator Time Out	10-2-08 1049	10-3-08 849	10-6-08 0900		

Run No. 3				Sample I.D. > PM 10	
Weight (g)	107.8290	107.8297	107.8299 ✓		

Run No. 3				Sample I.D. < PM10 > PM2.5	
Weight (g)	104.2263	104.2267 ✓			

Run No. 3				Sample I.D. < PM 2.5	
Weight (g)	103.9181	103.9185 ✓			

Acetone Blank				Sample I.D.	
Weight (g)					

JL C Stark 10/6/08
Analyst

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 201A/202

Front Wash

Project No. 08-026
Project Name AOA-E5

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	10-17-08 1350	10-17-08 0855			
Desiccator Time Out	10-17-08 0930	10-30-08 1300			

Run No. 4		Volume (ml) 56		Sample I.D. > PM10	
Final Weight (g)	106.6105	106.6109 ✓			
Initial Weight (g)		106.6035 ✓			
Particulate Weight (g)		0.0074 ✓			

Particulate Average (mg) 7.4 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Run No. 4		Volume (ml) 28		Sample I.D. <PM10 > PM2.5	
Final Weight (g)	81.1873	81.1878 ✓			
Initial Weight (g)		81.1834 ✓			
Particulate Weight (g)		0.0044 ✓			

Particulate Average (mg) 4.4 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Run No. 4		Volume (ml) 21		Sample I.D. < PM2.5	
Final Weight (g)	81.9966	81.9969 ✓			
Initial Weight (g)		81.9960 ✓			
Particulate Weight (g)		0.0009 ✓			

Particulate Average (mg) 0.9 ✓
Less Acetone Blank (mg)
Total Particulate (mg)

Acetone Blank		Volume (ml)		Sample I.D.	
Final Weight (g)					
Initial Weight (g)					
Particulate Weight (g)					

Average (mg)
* mg/l

* Note: if greater than 7.9 mg/l, use 7.9 mg/l

H13 Analyst

Date: 10/30/08

Version No.2 10/22/06

AIR SAMPLING ASSOCIATES, INC.

Particulate Analysis EPA Method 201A/202

Front Half Tare Weights

Project No. 08-026
Project Name ADA-ES

Location Hardin, MT
Unit Tested Stack

Desiccator Time In	10-1-08 0850	10-2-08 1057	10-3-08 858		
Desiccator Time Out	10-2-08 1053	10-3-08 852			

Run No. 4				Sample I.D. > PM10	
Weight (g)	106.6032	106.6038	106.6035 ✓		

Run No. 4				Sample I.D. BH10-1 < PM10 > PM2.5	
Weight (g)	81.1835	81.1834 ✓			

Run No. 4				Sample I.D. < PM2.5	
Weight (g)	81.9959	81.9960 ✓			

Acetone Blank				Sample I.D.	
Weight (g)					

John C Stanley 10/3/08
Analyst

Methylene Chloride Rinse

Job Number	**08-4117**	**Run Date**	9/24/2008
Client Name	**Air Sampling Associates- Hardin, MT**		
Unit Name	**Stack-Impingers 1&2**	Method: 202	

RUN 1	**BEAKER**	A 2378	**VOLUME**	ml	240	**AVERAGE**
Beaker + Particulate (g)		113.4120	113.4120			113.4120
Beaker Tare (g)		113.4088	113.4087			113.4088
Particulate Weight (g)		0.0032	0.0033			0.0032

RUN 2	**BEAKER**	A 2380	**VOLUME**	ml	238	**AVERAGE**
Beaker + Particulate (g)		105.4972	105.4974			105.4973
Beaker Tare (g)		105.4964	105.4964			105.4964
Particulate Weight (g)		0.0008	0.0010			0.0009

RUN 3	**BEAKER**	A 2382	**VOLUME**	ml	230	**AVERAGE**
Beaker + Particulate (g)		106.4479	106.4480			106.4480
Beaker Tare (g)		106.4470	106.4468			106.4469
Particulate Weight (g)		0.0009	0.0012			0.0011

Analyst KP

FINAL REPORT

Started 9/25/2008
Completed 10/12/2008

Methylene Chloride Rinse

Job Number	**08-4117**	**Run Date**	9/24/2008
Client Name	**Air Sampling Associates- Hardin, MT**		
Unit Name	**Stack- Impingers 1& 2**	Method: 202	

RUN 4	**BEAKER**	A 2384	**VOLUME**	ml	230	**AVERAGE**
Beaker + Particulate (g)		106.8155	106.8154			106.8155
Beaker Tare (g)		106.8144	106.8145			106.8145
Particulate Weight (g)		0.0011	0.0009			0.0010

Analyst KP

FINAL REPORT

Started 9/25/2008
Completed 10/12/2008

Methylene Chloride Rinse

Job Number	**08-4117**	**Run Date**	9/24/2008
Client Name	**Air Sampling Associates- Hardin, MT**		
Unit Name	**Stack-Reagent Blank**	Method:	202

BLANK	**BEAKER**	A 2386	**VOLUME**	ml	230	**AVERAGE**
Beaker + Particulate (g)		112.7456	112.7457			112.7457
Beaker Tare (g)		112.7449	112.7448			112.7449
Particulate Weight (g)		0.0007	0.0009			0.0008

Analyst KP

FINAL REPORT

Started 9/25/2008
Completed 10/12/2008

DI Water Analysis (Back)

Job Number	**08-4117**	**Run Date**	9/24/2008
Client Name	**Air Sampling Associates**		
Unit Name	**Impingers 1 & 2 + BH**	Method:	202

RUN 1	**BEAKER**	A 2377	**VOLUME**	ml	400	**AVERAGE**
Beaker + Particulate (g)		119.0689	119.0688			119.0689
Beaker Tare (g)		118.9564	118.9565			118.9565
Particulate Weight (g)		0.1125	0.1123			0.1124

RUN 2	**BEAKER**	A 2379	**VOLUME**	ml	400	**AVERAGE**
Beaker + Particulate (g)		119.0768	119.0769			119.0769
Beaker Tare (g)		118.9653	118.9657			118.9655
Particulate Weight (g)		0.1115	0.1112			0.1114

RUN 3	**BEAKER**	A 2381	**VOLUME**	ml	400	**AVERAGE**
Beaker + Particulate (g)		105.9272	105.9276			105.9274
Beaker Tare (g)		105.7945	105.7945			105.7945
Particulate Weight (g)		0.1327	0.1331			0.1329

Analyst KP

FINAL REPORT

Started 9/25/2008
Completed 10/12/2008

DI Water Analysis (Back)

Job Number	**08-4117**	**Run Date**	9/24/2008
Client Name	**Air Sampling Associates- Hardin, MT**		
Unit Name	**Impingers 1 & 2 + BH**	Method: 202	

RUN 4	**BEAKER**	A 2383	**VOLUME**	ml	400	**AVERAGE**
Beaker + Particulate (g)		97.7884	97.7888			97.7886
Beaker Tare (g)		97.6983	97.6985			97.6984
Particulate Weight (g)		0.0901	0.0903			0.0902

Analyst KP

FINAL REPORT

Started 9/25/2008
Completed 10/12/2008

DI Water Analysis (Back)

Job Number	**08-4117**	**Run Date**	9/24/2008
Client Name	**Air Sampling Associates- Hardin, MT**		
Unit Name	**Stack-Reagent Blank**	Method:	202

BLANK	**BEAKER**	A 2385	**VOLUME**	ml	580	**AVERAGE**
Beaker + Particulate (g)		100.2991	100.2995			100.2993
Beaker Tare (g)		100.2874	100.2875			100.2875
Particulate Weight (g)		0.0117	0.0120			0.0118

Analyst KP

FINAL REPORT

Started 9/25/2008
Completed 10/12/2008

Sulfate

08-4117

				Sample Volume, ml	Lab Volume, ml	Lab Results, mg/l	Final Results, mg
ADA-ES	9/23-24/2008	5B/202	Sample No.				
	Run 1	Stack	4117-1	590	20	569	118.841
	Run 2	Stack	4117-2	590	20	486	101.506
	Run 3	Stack	4117-3	580	20	622	127.709
ADA-ES	9/24/2008	201A/202	Sample No.				
	Run 1	Stack	4117-4	320	20	243	27.527
	Run 2	Stack	4117-5	320	20	252	28.547
	Run 3	Stack	4117-6	320	20	307	34.777
	Run 4	Stack	4117-7	320	20	204	23.109

Chloride **08-4117**

				Lab Results, mg	Final Results, mg Corrected to NH4Cl
ADA-ES	9/23-24/2008	5B/202			
	Run 1	Stack	A2371	0.58	0.001
	Run 2	Stack	A2473	ND	ND
	Run 3	Stack	A2375	ND	ND
ADA-ES	9/24/2008	201A/202			
	Run 1	Stack	A2377	ND	ND
	Run 2	Stack	A2379	ND	ND
	Run 3	Stack	A2381	ND	ND
	Run 4	Stack	A2383	ND	ND

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ANALYTICAL SUMMARY REPORT

October 20, 2008

Western Environmental
913 Foster Rd
Casper, WY 82601

Workorder No.: C08100503

Project Name: 08-4117

Energy Laboratories, Inc. received the following 8 samples from Western Environmental on 10/10/2008 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C08100503-001	08-4117-1 Stack Impringers 1&2	09/23/08 00:00	10/10/08	Aqueous	E300.0 Anions
C08100503-002	08-4117-2 Stack-Impringers 1&2	09/23/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-003	08-4117-3 Stack Impringers 1&2	09/24/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-004	08-4117-4 Stack Impringers 1&2 &BH	09/24/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-005	08-4117-5 Stack Impringers 1&2 &BH	09/24/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-006	08-4117-6 Stack Impringers 1&2 &BH	09/24/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-007	08-4117-7 Stack Impringers 1&2 &BH	09/24/08 00:00	10/10/08	Aqueous	Same As Above
C08100503-008	08-4117-8 Blank	09/24/08 00:00	10/10/08	Aqueous	Same As Above

As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By: Stephanie Waldrop

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LABORATORY ANALYTICAL REPORT

Client: Western Environmental
Site Name: 08-4117
Report Date: 10/20/08

Lab ID: C08100503-001
Client Sample ID: 08-4117-1 Stack Impringers 1&2
Matrix: Aqueous
Collection Date: 09/23/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	569	mg/L		1		E300.0	10/14/08 17:28 / lji

Lab ID: C08100503-002
Client Sample ID: 08-4117-2 Stack-Impringers 1&2
Matrix: Aqueous
Collection Date: 09/23/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	486	mg/L		1		E300.0	10/14/08 17:42 / lji

Lab ID: C08100503-003
Client Sample ID: 08-4117-3 Stack Impringers 1&2
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	622	mg/L		1		E300.0	10/14/08 17:56 / lji

Lab ID: C08100503-004
Client Sample ID: 08-4117-4 Stack Impringers 1&2 &BH
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	243	mg/L		1		E300.0	10/14/08 18:11 / lji

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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LABORATORY ANALYTICAL REPORT

Client: Western Environmental
Site Name: 08-4117
Report Date: 10/20/08

Lab ID: C08100503-005
Client Sample ID: 08-4117-5 Stack Impringers 1&2 &BH
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	252	mg/L		1		E300.0	10/14/08 18:25 / lji

Lab ID: C08100503-006
Client Sample ID: 08-4117-6 Stack Impringers 1&2 &BH
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	307	mg/L		1		E300.0	10/14/08 18:40 / lji

Lab ID: C08100503-007
Client Sample ID: 08-4117-7 Stack Impringers 1&2 &BH
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	204	mg/L		1		E300.0	10/14/08 18:54 / lji

Lab ID: C08100503-008
Client Sample ID: 08-4117-8 Blank
Matrix: Aqueous
Collection Date: 09/24/08
DateReceived: 10/10/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Sulfate	ND	mg/L		1		E300.0	10/14/08 19:08 / lji

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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QA/QC Summary Report

Client: Western Environmental
Project: 08-4117

Report Date: 10/20/08
Work Order: C08100503

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Batch: R109332
Sample ID: LCS	Laboratory Control Sample				Run: IC1-C_081014B				10/14/08 16:44
Sulfate	40.7	mg/L	1.0	102	90	110			
Sample ID: MBLK	Method Blank				Run: IC1-C_081014B				10/14/08 16:59
Sulfate	ND	mg/L	0.06						
Sample ID: C08100507-001AMS	Sample Matrix Spike				Run: IC1-C_081014B				10/14/08 19:37
Sulfate	73.0	mg/L	1.0	97	90	110			
Sample ID: C08100507-001AMSD	Sample Matrix Spike Duplicate				Run: IC1-C_081014B				10/14/08 19:52
Sulfate	74.4	mg/L	1.0	100	90	110	1.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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(307)789-6420 FAX (307)789-6446

CHAIN OF CUSTODY RECORD

PROJECT NO.: 08-4117 CONTACT NAME Alan Roylance TELEPHONE NO. 307)234-5511

Recovered By: Print Name | Signature

SAMPLE ID	SAMPLE LOCATION	RUN	RECOVERY DATE	RECOVERY TIME	SOLUTION / FILTER #	No. of Containers	ANALYSIS: Sulfates								REMARKS
08-4117-1	Stack - Impingers 1+2	1	9/23/08		DI H_2O										20 ml Aliquot
-2	↓	2	↓		↓										↓
-3	↓	3	9/24/08		↓										↓
-4	Stack Impingers 1+2 + BH	1	9/24/08		↓										↓
-5	↓	2	↓		↓										↓
-6	↓	3	↓		↓										↓
-7	↓	4	↓		↓										↓
-8	Blank	B	↓		↓										↓

H-27

COMMENTS:

Relinquished by: (Signature)	Company WES	Date 10/10/08	Time 11:49	Received by: (Signature)	Company ELL C	Date 10/10/08	Time 11:49
Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
Dispatched by: (Signature)	Company	Date	Time	Received for Laboratory by:	Company	Date	Time
Method of Shipment:							

WHITE COPY—WEST YELLOW COPY—CUSTOMER PINK COPY—COPY

9 HAN

08100503

M00953 7/06

Energy Laboratories Inc
Workorder Receipt Checklist

Western Environmental

C08100503

Login completed by: Edith McPike

Reviewed by:

Reviewed Date:

Date and Time Received: 10/10/2008 11:49 AM

Received by: em

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature:	9°C		
Water - VOA vials have zero headspace?	Yes ☐	No ☑	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Contact and Corrective Action Comments:

Headspace in vials; but not pertinant for this analysis

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CLIENT: Western Environmental
Project: 08-4117
Sample Delivery Group: C08100503

Date: 20-Oct-08

CASE NARRATIVE

The following Case Narrative contains exceptions or comments pertaining to the analysis of samples submitted by Western Environmental on 10/10/2008 11:49:00. These samples were assigned ELI Workorder Number C08100503.

ORIGINAL SAMPLE SUBMITTAL(S)
All original sample submittals have been returned with the data package.

SAMPLE TEMPERATURE COMPLIANCE: 4°C (±2°C)
Temperature of samples received may not be considered properly preserved by accepted standards. Samples that are hand delivered immediately after collection shall be considered acceptable if there is evidence that the chilling process has begun.

GROSS ALPHA ANALYSIS
Method 900.0 for gross alpha and gross beta is intended as a drinking water method for low TDS waters. Data provided by this method for non potable waters should be viewed as inconsistent.

RADON IN AIR ANALYSIS
The desired exposure time is 48 hours (2 days). The time delay in returning the canister to the laboratory for processing should be as short as possible to avoid excessive decay. Maximum recommended delay between end of exposure to beginning of counting should not exceed 8 days.

SOIL/SOLID SAMPLES
All samples reported on an as received basis unless otherwise indicated.

ATRAZINE, SIMAZINE AND PCB ANALYSIS USING EPA 505
Data for Atrazine and Simazine are reported from EPA 525.2, not from EPA 505. Data reported by ELI using EPA method 505 reflects the results for seven individual Aroclors. When the results for all seven are ND (not detected), the sample meets EPA compliance criteria for PCB monitoring.

SUBCONTRACTING ANALYSIS
Subcontracting of sample analyses to an outside laboratory may be required. If so, ENERGY LABORATORIES will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

BRANCH LABORATORY LOCATIONS
eli-b - Energy Laboratories, Inc. - Billings, MT
eli-g - Energy Laboratories, Inc. - Gillette, WY
eli-h - Energy Laboratories, Inc. - Helena, MT
eli-r - Energy Laboratories, Inc. - Rapid City, SD
eli-t - Energy Laboratories, Inc. - College Station, TX

CERTFICATIONS:
USEPA: WY00002; FL-DOH NELAC: E87641; California: 02118CA
Oregon: WY200001; Utah: 3072350515; Virginia: 00057; Washington: C1903

ISO 17025 DISCLAIMER:
The results of this Analytical Report relate only to the items submitted for analysis.

ENERGY LABORATORIES, INC. - CASPER,WY certifies that certain method selections contained in this report meet requirements as set forth by the above accrediting authorities. Some results requested by the client may not be covered under these certifications. All analysis data to be submitted for regulatory enforcement should be certified in the sample state of origin. Please verify ELI's certification coverage by visiting www.energylab.com

ELI appreciates the opportunity to provide you with this analytical service. For additional information and services visit our web page www.energylab.com.

THIS IS THE FINAL PAGE OF THE LABORATORY ANALYTICAL REPORT

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ANALYTICAL SUMMARY REPORT

October 24, 2008

Western Environmental
913 Foster Rd
Casper, WY 82601

Workorder No.: C08100558 Quote ID: C2258 - Chlorides

Project Name: Not Indicated

Energy Laboratories, Inc. received the following 8 samples from Western Environmental on 10/13/2008 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C08100558-001	08-4117-A2371	09/23/08 00:00	10/13/08	Solid	E300.0 Anions DI Water Soil Extract
C08100558-002	08-4117-A2373	09/23/08 00:00	10/13/08	Solid	Same As Above
C08100558-003	08-4117-A2375	09/24/08 00:00	10/13/08	Solid	Same As Above
C08100558-004	08-4117-A2377	09/24/08 00:00	10/13/08	Solid	Same As Above
C08100558-005	08-4117-A2379	09/24/08 00:00	10/13/08	Solid	Same As Above
C08100558-006	08-4117-A2381	09/24/08 00:00	10/13/08	Solid	Same As Above
C08100558-007	08-4117-A2383	09/24/08 00:00	10/13/08	Solid	Same As Above
C08100558-008	08-4117-A2385	09/24/08 00:00	10/13/08	Solid	Same As Above

As appropriate, any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these tests results, please call.

Report Approved By: David Pelsto

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LABORATORY ANALYTICAL REPORT

Client: Western Environmental
Site Name: Not Indicated
Report Date: 10/24/08

Lab ID: C08100558-001
Client Sample ID: 08-4117-A2371
Matrix: Solid
Collection Date: 09/23/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	0.58	mg/beaker		0.05		E300.0	10/15/08 01:52 / ijl

Lab ID: C08100558-002
Client Sample ID: 08-4117-A2373
Matrix: Solid
Collection Date: 09/23/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 02:06 / ijl

Lab ID: C08100558-003
Client Sample ID: 08-4117-A2375
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 02:21 / ijl

Lab ID: C08100558-004
Client Sample ID: 08-4117-A2377
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 02:35 / ijl

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Client: Western Environmental
Site Name: Not Indicated
Report Date: 10/24/08

Lab ID: C08100558-005
Client Sample ID: 08-4117-A2379
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 02:50 / ljl

Lab ID: C08100558-006
Client Sample ID: 08-4117-A2381
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 03:33 / ljl

Lab ID: C08100558-007
Client Sample ID: 08-4117-A2383
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	ND	mg/beaker		0.05		E300.0	10/15/08 03:47 / ljl

Lab ID: C08100558-008
Client Sample ID: 08-4117-A2385
Matrix: Solid
Collection Date: 09/24/08
DateReceived: 10/13/08

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Chloride	0.16	mg/beaker		0.05		E300.0	10/15/08 04:16 / ljl

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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QA/QC Summary Report

Client: Western Environmental
Project: Not Indicated

Report Date: 10/24/08
Work Order: C08100558

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Batch: R109332
Sample ID: LCS	Laboratory Control Sample				Run: IC1-C_081014B				10/14/08 16:44
Chloride	10.0	mg/L	1.0	100	90	110			
Sample ID: MBLK	Method Blank				Run: IC1-C_081014B				10/14/08 16:59
Chloride	ND	mg/L	0.02						
Sample ID: C08100534-001AMS	Sample Matrix Spike				Run: IC1-C_081014B				10/15/08 01:09
Chloride	85.4	mg/L	1.0	101	90	110			
Sample ID: C08100534-001AMSD	Sample Matrix Spike Duplicate				Run: IC1-C_081014B				10/15/08 01:23
Chloride	86.2	mg/L	1.0	103	90	110	0.9	20	
Sample ID: C08100558-007ADUP	Sample Duplicate				Run: IC1-C_081014B				10/15/08 04:02
Chloride	0.00581	mg/beaker	0.050				0	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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☐ PO Box 754, Evanston, WY 82935 (307)789-6420 FAX (307)789-6446

CHAIN OF CUSTODY RECORD

PROJECT NO.: 08-4117 CONTACT NAME Alan Roylance TELEPHONE NO. 307)234-5511

Recovered By: Print Name | Signature

SAMPLE ID	SAMPLE LOCATION	RUN	RECOVERY DATE	RECOVERY TIME	SOLUTION / FILTER #	No. of Containers	ANALYSIS: Chloride	REMARKS
08-4117-A2371	STACK - impingers 1+2	1	9/23/08		DI		X	
-A2373	↓	2	9/23/08		↓		X	
-A2375	↓	3	9/24/08		↓		X	
-A2377	STACK - impingers 1+2 + B1+	1	9/24/08		↓		X	
-A2379	↓	2	↓		↓		X	
-A2381	↓	3	↓		↓		X	
-A2383	↓	4	↓		↓		X	
-A2385	BLANK	B	↓		↓		X	C08100558

H-34

COMMENTS: ☆ use Quote 2258 for chloride

Hand

Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
[signature]	WEST	10/13/08	1235	[signature]	ELI-C	10/13/08	12:35
Relinquished by: (Signature)	Company	Date	Time	Received by: (Signature)	Company	Date	Time
Dispatched by: (Signature)	Company	Date	Time	Received for Laboratory by:	Company	Date	Time
Method of Shipment:							

WHITE COPY—WEST YELLOW COPY—CUSTOMER PINK COPY—COPY

M00953 7/06

Energy Laboratories Inc
Workorder Receipt Checklist

C08100558

Western Environmental

Login completed by: Kimberly Humiston

Reviewed by:

Reviewed Date:

Date and Time Received: 10/13/2008 12:35 PM

Received by: kh

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature:	N/A°C		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Contact and Corrective Action Comments:

None

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CLIENT: Western Environmental
Project: Not Indicated
Sample Delivery Group: C08100558

Date: 24-Oct-08

CASE NARRATIVE

The following Case Narrative contains exceptions or comments pertaining to the analysis of samples submitted by Western Environmental on 10/13/2008 12:35:00. These samples were assigned ELI Workorder Number C08100558.

ORIGINAL SAMPLE SUBMITTAL(S)
All original sample submittals have been returned with the data package.

SAMPLE TEMPERATURE COMPLIANCE: 4°C (±2°C)
Temperature of samples received may not be considered properly preserved by accepted standards. Samples that are hand delivered immediately after collection shall be considered acceptable if there is evidence that the chilling process has begun.

GROSS ALPHA ANALYSIS
Method 900.0 for gross alpha and gross beta is intended as a drinking water method for low TDS waters. Data provided by this method for non potable waters should be viewed as inconsistent.

RADON IN AIR ANALYSIS
The desired exposure time is 48 hours (2 days). The time delay in returning the canister to the laboratory for processing should be as short as possible to avoid excessive decay. Maximum recommended delay between end of exposure to beginning of counting should not exceed 8 days.

SOIL/SOLID SAMPLES
All samples reported on an as received basis unless otherwise indicated.

ATRAZINE, SIMAZINE AND PCB ANALYSIS USING EPA 505
Data for Atrazine and Simazine are reported from EPA 525.2, not from EPA 505. Data reported by ELI using EPA method 505 reflects the results for seven individual Aroclors. When the results for all seven are ND (not detected), the sample meets EPA compliance criteria for PCB monitoring.

SUBCONTRACTING ANALYSIS
Subcontracting of sample analyses to an outside laboratory may be required. If so, ENERGY LABORATORIES will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

BRANCH LABORATORY LOCATIONS
eli-b - Energy Laboratories, Inc. - Billings, MT
eli-g - Energy Laboratories, Inc. - Gillette, WY
eli-h - Energy Laboratories, Inc. - Helena, MT
eli-r - Energy Laboratories, Inc. - Rapid City, SD
eli-t - Energy Laboratories, Inc. - College Station, TX

CERTFICATIONS:
USEPA: WY00002; FL-DOH NELAC: E87641; California: 02118CA
Oregon: WY200001; Utah: 3072350515; Virginia: 00057; Washington: C1903

ISO 17025 DISCLAIMER:
The results of this Analytical Report relate only to the items submitted for analysis.

ENERGY LABORATORIES, INC. - CASPER,WY certifies that certain method selections contained in this report meet requirements as set forth by the above accrediting authorities. Some results requested by the client may not be covered under these certifications. All analysis data to be submitted for regulatory enforcement should be certified in the sample state of origin. Please verify ELI's certification coverage by visiting www.energylab.com

ELI appreciates the opportunity to provide you with this analytical service. For additional information and services visit our web page www.energylab.com.

THIS IS THE FINAL PAGE OF THE LABORATORY ANALYTICAL REPORT

AIR SAMPLING ASSOCIATES, INC.

Appendix I:

Chain of Custodies

AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 1 of 24	
Address: 1 Sugar Factory Rd	Unit No.: SDA Inlet Duct	Lab: Brian Tyler	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Enthalpy	
Run No.: 1	Test Method: EPA 17/26A/CTM-027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Particulate	Halogens	Halids	Ammonia
Container No. 1	9/23/08	1147	—	1	Thimble Filter No. 58	X			
Container No. 2	9/23/08	1150	—	1	ACE FW	X			
Container No. 3	9/23/08	1123	0.1N H_2SO_4	1	Impingers 1 & 2			X	X
Container No. 4	9/23/08	1125	0.1N NaOH	1	Impingers 3 & 4		X		
No 3 + 4 to Enthalpy									

DID NOT RECEIVE 10/2/08 9:54 1-2

Special Instructions: Ammonium Thiosulfate not added to the samples.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

1. Recovered By: Bill Mullins	Date: 9/23/08	Time: 1150	1. Relinquished By: Bill Mullins	Date: 9/24/08	Time: 1952
2. Received By: [illegible]	Date: 9/24/08	Time: 1952	2. Relinquished By: [illegible]	Date: 10/1/08	Time: 800
3. Received By: [illegible]	Date: 10/2/08	Time: 9.56AM	3. Relinquished By:	Date:	Time:

Comments: Temp 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 2 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: SDA Inlet Duct	Lab: Brian Tyler	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Enthalpy	
Run No.: 2	Test Method: EPA 17 / 26A / CTM-027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Halogens	Halids	Ammonia	
Container No. 1	9/23/08	1648	—	1	Thimble Filter 65	X				
Container No. 2	9/23/08	1650	—	1	ACE FW	X				
Container No. 3	9/23/08	1623	0.1 N H_2SO_4	1	Impingers 1 & 2			X	X	
Container No. 4	9/23/08	1625	0.1 N NaOH	1	Impingers 3 & 4		X			
No 3 + 4 to Enthalpy										

DID NOT RECEIVE 10/2/08 -3 rec

Special Instructions: Ammonium Thiosulfate not added to the samples

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1650	1. Relinquished By: Bill Mullins	9/24/08	1953
2. Received By: Nat C Stanley	9/24/08	1953	2. Relinquished By: Nat C Stanley	10/1/08	801
3. Received By:	10/2/08	9:56AM	3. Relinquished By:		

Comments: Temp = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA - ES	Project No.: 08-026	Page 3 of 24	
Address: 1 Sugar Factory Rd	Unit No.: SDA Inlet Duct	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: 3	Test Method: EPA 17 / 26A / CTM-027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Particulate	Halogens	Halids	Ammonia
Container No. 1	9/23/08	2013	—	1	Thimble No. 96	X			
Container No. 2	9/23/08	2012	—	1	ACE FW	X			
Container No. 3	9/23/08	2001	0.1 N H_2SO_4	1	Impingers 1 & 2			X	X
Container No. 4	9/23/08	2004	0.1 N NaOH	1	Impingers 2 & 3		X		
No 3+4 to Enthalpy									

DID NOT RECEIVE 10/2/08 TK

Special Instructions: Ammonium Thiosulfate not added to the samples

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mulling	9/23/08	2013	1. Relinquished By: Bill Mulling	9/24/08	1953
2. Received By: Jack C Stanley	9/24/08	1953	2. Relinquished By: Jack Stanley	10/1/08	801
3. Received By:	10/2/08	9:56AM	3. Relinquished By:		

Comments: Temp = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 4 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: SDA Inlet Duct	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: Reagent Blanks	Test Method: EPA 17/26A/CTM-027	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Halogens	Halides	Particulate	NH4 Meria BPT 10/2/08
Container No. 6	9/24/08	0722	0.1 N H_2SO_4	1	~~100~~ 200 ml volumed to sample vol.		X		X
Container No. 7	9/24/08	0724	0.1 N NaOH	1	~~100~~ 200 ml volumed to sample vol.	X			
Container No. 8	9/24/08	0719	Acetone	1	200 ml			X	
No 6+7 → Enthalpy									

Special Instructions:

DID NOT RECEIVE 1-5 10/2/08 TG

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: [signature]	9/24/08	0724	1. Relinquished By: [signature]	9/24/08	1953
2. Received By: [signature]	9/27/08	1953	2. Relinquished By: [signature]	10/1/08	802
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By:		

Comments: Temp= 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA - ES	Project No.: 08-026	Page 5 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: 1	Test Method: EPA 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Halogens	Analysis: Halids			
Container No. 3	9/23/08	1232	0.1 N H_2SO_4	1	Impingers 1 & 2		X			
Container No. 4	9/23/08	1234	0.1 N NaOH	1	Impingers 3 & 4	X				
to Enthalpy										

Special Instructions: Sodium Thiosulfate not added to the samples

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyly	9/23/08	1234	1. Relinquished By: Bill Hyly	9/24/08	1953
2. Received By: [signature]	9/24/08	1953	2. Relinquished By: [signature]	10/1/08	807
3. Received By: [signature]	10/2/08	9:56 AM	3. Relinquished By:		

Comments: Temp = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 6 of 24	
Address: 1 Sugar Factory Rd	Unit No.: Stack	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: 2	Test Method: EPA 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Halogens	Analysis: Halids
Container No. 3	9/23/08	1608	0.1 N H_2SO_4	1	Impingers 1 & 2		X
Container No. 4	9/23/08	1611	0.1 N NaOH	1	Impingers 3 & 4	X	
to Enthalpy							

Special Instructions: Sodium Thiosulfate not added to the samples

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1611	1. Relinquished By: Bill Mullins	9/24/08	2000
2. Received By: [signature]	9/24/08	2000	2. Relinquished By: [signature]	10/1/08	803
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By		

Comments: Temp= 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 7 of 24	
Address: 1 Sugar Factory Rd	Unit No.: Stack	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: 3	Test Method: EPA 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Halogens	Analysis: Halids			
Container No. 3	9/23/08	1954	0.1 N H_2SO_4	1	Impingers 1 & 2		X			
Container No. 4	9/23/08	1956	0.1 N NaOH	1	Impingers 3 & 4	X				
to Enthalpy										

Special Instructions: Sodium Thiosulfate not added to the samples.

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1956	1. Relinquished By: Bill Mullins	9/24/08	2000
2. Received By: [signature]	9/24/08	2000	2. Relinquished By: [signature]	10/1/08	864
3. Received By: [signature]	10/2/08	9:36AM	3. Relinquished By:		

Comments: TEMP = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 8 of 24	
Address: 1 Sugar Factory Rd	Unit No.: Stack	Lab: Enthalpy	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact: Brian Tyler	
Run No.: Reagent Blanks	Test Method: EPA 26A	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: Halogens	Analysis: Halides			
Container No. 6	9/24/08	0757	0.1 N H_2SO_4	1	200 ml volumed to Sample Vol.		X			
Container No. 7	9/24/08	0759	0.1 N NaOH	1	200 ml volumed to Sample Vol.	X				
to Enthalpy										

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/24/08	0759	1. Relinquished By: Bill Mullins	9/24/08	2001
2. Received By: [signature]	9/24/08	2001	2. Relinquished By: [signature]	10/1/08	804
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP= 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 9 of 24	
Address: 1 Surgan Factory Rd	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mulling	Lab Contact:	
Run No.: 1	Test Method: EPA 5/202	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	EVAP volume	Stack volume	Particulate	CPM	Sulfates	Chlorides	Beaker
Container No. 1	9/23/08	1420	—	1	Filter No. A239			X				
Container No. 2	9/23/08	1506	—	1	Acetone Front Wash			X				
Container No. 3	9/23/08	1444	DI Water	1	Impingers 1 & 2	670	590		X	X	X	A237
Container No. 4	9/23/08	1447	—	1	MeCl2 Rinse Imps 1 & 2	234			X			A237
No 3 to waste												
No 4 to waste												

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mulling	9/23/08	1447	1. Relinquished By: Bill Mulling	9/24/08	2001
2. Received By: [illegible]	9/24/08	2001	2. Relinquished By: [illegible]	9/25/08	1000
3. Received By: Dan M. [illegible]	9/25/08	1000	3. Relinquished By		

Comments:

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA - ES	Project No.: 08-026	Page 10 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 2	Test Method: EPA 5/202	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	EVAP. Volume	Image Volume	Particulate	CPM	Sulfates	Chlorides	Beaker
Container No. 1	9/23/08	1825	—	1	Filter No. A240			X				
Container No. 2	9/23/08	1941	—	1	Acetone Front Wash			X				
Container No. 3	9/23/08	1946	DI Water	1	Impingers 1 & 2	690	590		X	X	X	A2373
Container No. 4	9/23/08	1949	—	1	MeCl2 Rinse Imps 1 & 2	230			X			A2374
No 3 to western												
No 4 to western												

Analysis

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1949	1. Relinquished By: Bill Mullins	9/24/08	2005
2. Received By: Jed C Stanley	9/24/08	2005	2. Relinquished By: Jed Stanley	9/25/08	1000
3. Received By: Dan M. Cobble	9/25/08	1000	3. Relinquished By:		

Comments:

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 11 of 24
Address: 1 Sugar Factory Rd	Unit No.: Stack	Lab:
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:
Run No.: 3	Test Method: EPA 5/202	Lab Phone No.:

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Extr. Volume	Sample Volume	Analysis: Particulate	CPM	Sulfates	Chlorides	Beaker
Container No. 1	9/24/08	1035	—	1	Filter No. A241			X				
Container No. 2	9/24/08	1037	—	1	Acetone front wash			X				
Container No. 3	9/24/08	1057	DI water	1	Impinger 1 & 2	660	580		X	X	X	A23 75
Container No. 4	9/24/08	1100	—	1	MeCl2 Rinse Imps 1 & 2	740			X			A23 76
No 3 to western												
No 4 to western												

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/24/08	1100	1. Relinquished By: Bill Mullins	9/24/08	2005
2. Received By: J C Stanley	9/24/08	2005	2. Relinquished By: J C Stanley	9/25/08	1000
3. Received By: Dan M. Oddle	9/25/08	1000	3. Relinquished By:		

Comments:

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA - ES	Project No.: 08-026	Page 12 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: Reagent Blank	Test Method: EPA 5/202	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Evap. Volume	Sample Volume	Analysis: Particulate	CPM	Sulfates	Chlorides	Bot Rec
Container No. 6	9/24/08	1043	—	1	200 ml Acetone			X				
Container No. 7	9/24/08	1046	—	1	~~200~~ 500 ml DI H_2O	580	500		X	X	X	A23 85
Container No. ~~X~~ 5	9/24/08	1045	—	1	$MeCl_2$ Blank	230			X			B23 86
~~Container No 5~~	~~9/24/08~~											
9/24/08												
N. 5 to western												
No. 7 to western												

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☐ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/24/08	1046	1. Relinquished By: Bill Mullins	9/24/08	2010
2. Received By: Joel C Stanley	9/24/08	2010	2. Relinquished By: Joel Stanley	9/25/08	1000
3. Received By: Dan M. Oble	9/25/08	1000	3. Relinquished By:		

Comments:

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 13 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: SDA Inlet Duct	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 1	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3 / H_2SO_4	Analysis: SO_2			
Container No. 2	9/23/08	1725	—	1	Condenser Rinse	X				
Container No. 3	9/23/08	1714	3% H_2O_2	1	Impingers 1 & 2		X			
No 2 to Enthalpy										

Special Instructions:

DID NOT RECEIVE 10/2/08 TRB 1-14

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/23/08	1725	1. Relinquished By: Bill Mullins	9/24/08	2010
2. Received By: [signature]	9/24/08	2010	2. Relinquished By: [signature]	10/1/08	865
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 14 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: SDA Inlet Duct	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 2	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3/H_2SO_4	Analysis: SO_2			
Container No. 2	9/24/08	1024	—	1	Condenser Rinse	X				
Container No. 3	9/24/08	0923	3% H_2O_2	1	Impingers 1 & 2		X			
No 2 to Enthalpy										

DID NOT RECEIVE 10/2/08 JAG

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mulling	9/24/08	1024	1. Relinquished By: Bill Mulling	9/24/08	2010
2. Received By: [signature]	9/24/08	2010	2. Relinquished By: [signature]	10/1/08	808
3. Received By: [signature]	10/2/08	9:56 AM	3. Relinquished By:		

Comments: Temp = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 15 of 24	
Address: 1 Sugar Factory Rd	Unit No.: SDA Inlet Duct	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 3	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3 / H_2SO_4	Analysis: SO_2			
Container No. 2	9/24/08	1141	—	1	Condenser Rinse	X				
Container No. 3	9/24/08	1139	3% H_2O_2	1	Impingers 1 & 2		X			
No. 2 to Enthalpy										

DID NOT RECEIVE 10/2/08

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/24/08	1141	1. Relinquished By: Bill Mullins	9/24/08	2010
2. Received By: Jeff C Stanley	9/24/08	2010	2. Relinquished By: [signature]	10/1/08	809
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 16 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: SDA Inlet Duct	Lab:	
City: Houlin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: Reagent Blank	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3 / H_2SO_4	Analysis: SO_2			
Container No. 4	9/24/08	1048	—	1	D.I. Water - 200 ml	X	X			
to Enthalpy										

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

1. Recovered By: Bill Mullins	Date: 9/24/08	Time: 1048	1. Relinquished By: Bill Mullins	Date: 9/24/08	Time: 2010
2. Received By: C. Stanley	Date: 9/24/08	Time: 2010	2. Relinquished By: C. Stanley	Date: 10/1/08	Time: 809
3. Received By:	Date: 10/2/08	Time: 9:56AM	3. Relinquished By:	Date:	Time:

Comments: EMP = 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	ADA-ES
Address	1 Sugar Factory Rd.
City	Hardin
State	MT
Zip Code	59034
Run No.	1
Project No.	08-026
Unit No.	Stack
Project Manager	Bill Mullins
Test Method	EPA 201A / 202
Page	17 of 24
Lab	
Lab Contact	
Lab Phone No.	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: > PM10	< PM10 > PM2.5	< PM2.5	CPM	Sulfate & Chloride
Container No. 1	9-24-08	1300	—	1	ACE Rinse > PM10	X				
Container No. 2	9-24-08	1250	—	1	ACE Rinse < PM10 > PM2.5		X			
Container No. 3	9-24-08	1253	—	1	ACE Rinse < PM 2.5			X		
Container No. 4	9-24-08	1251	—	1	Filter No. 21 (47 mm)			X		
Container No. 5	9-24-08	1328	D.I. Water	1	Impingers 1 & 2 plus BH 1500 320				X	X
Container No. 6	9-24-08	1331	—	1	MeCl Rinse Imp. 1 & 2 240				X	
No 5, No. 6, to Western										

Extra. vol / Sample Lo 1

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hurley	9-24-08	1331	1. Relinquished By: Bill Hurley	9/24/08	2015
2. Received By: [illegible]	9/24/08	2015	2. Relinquished By: [illegible]	9/25/08	1000
3. Received By: [illegible]	9/25/08	1000	3. Relinquished By		

Comments:

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client	ADA-ES
Address	1 Sugar Factory Rd.
City	Hardin
State	MT
Zip Code	59034
Run No.	2
Project No.	08-026
Unit No.	Stack
Project Manager	Bill Mullins
Test Method	EPA 201A/202
Page	18 of 24
Lab	
Lab Contact	
Lab Phone No.	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Evap. Volume / Sample Volume	Analysis: > PM10	< PM10 > PM2.5	< PM2.5	CPM	Sulfates & Chlorides
Container No. 1	9-24-08	1446	—	1	Ace Rinse > PM10		X				
Container No. 2	9-24-08	1447	—	1	ACE Rinse < PM10 > PM2.5			X			
Container No. 3	9-24-08	1448	—	1	ACE Rinse < PM 2.5				X		
Container No. 4	9-24-08	1449	—	1	Filter No. 22 (47mm)				X		
Container No. 5	9-24-08	1536	D.I. Water	1	Impingers No. 1 & 2 plus BH	400 / 320				X	X A23799
Container No. 6	9-24-08	1538	—	1	$MeCl_2$ Rinse Imp. 1 & 2	238				X	X A23780
No. 5, No. 6 to weather											

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9-24-08		1. Relinquished By: Bill Mullins	9/24/08	2015
2. Received By: [signature]	9/24/08	2015	2. Relinquished By: [signature]	9/25/08	1600
3. Received By: Dan M. Cable	9/25/08	1000	3. Relinquished By:		

Comments:

Berger

1-19

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 19 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 3	Test Method: EPA 201A/202	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	>PM10	<PM10 > PM2.5	<PM2.5	CPM	Sulfate & chloride
Container No. 1	9-24-08	1640	—	1	ACE Rinse >PM10	X				
Container No. 2	9-24-08	1644	—	1	ACE Rinse <PM10> PM2.5		X			
Container No. 3	9-24-08	1647	—	1	ACE Rinse <PM2.5			X		
Container No. 4	9-24-08	1648	—	1	Filter No. ~~22~~ 23 (47mm)			X		
Container No. 5	9-24-08	1800	D.I. Water	1	Impingers Nos. 1 & 2 plus BH				X	X
Container No. 6	9-24-08	1803	—	1	MeCl2 Rinse Imp. 1 & 2				X	
No 5, Note to Western										

Actual volume / Sample volume

400 / 230

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyfy	9/24/08	1803	1. Relinquished By: Bill Hyfy	9/24/08	2015
2. Received By: [illegible]	9/24/08	2015	2. Relinquished By: [illegible]	9/25/08	1000
3. Received By: [illegible]	9/25/08	1000	3. Relinquished By:		

Comments:

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 20 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 4	Test Method: EPA 201A/202	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	EXP. vol	sample vol	>PM10	<PM10 >PM2.5	<PM2.5	CPM	Sulfates & Chlorides
Container No. 1	9-24-08	1841	—	1	ACE Rinse >PM10			X				
Container No. 2	9-24-08	1842	—	1	ACE Rinse <PM10>PM2.5				X			
Container No. 3	9-24-08	1843	—	1	ACE Rinse <PM2.5					X		
Container No. 4	9-24-08	1840	—	1	Filter No. 24 (47 mm)					X		
Container No. 5	9-24-08	1931	D.I. Water	1	Impingers Nos. 1 & 2 plus BM	400	320				X	X
Container No. 6	9-24-08	1933	—	1	MeCl2 Rinse ~~plus~~ Imp. 1 & 2	230					X	X
Nos. 5, 6 to Western												

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/24/08	1933	1. Relinquished By: Bill Mullins	9/24/08	2015
2. Received By: M C Stanley	9/24/08	2015	2. Relinquished By: M C Stanley	9/25/08	1000
3. Received By: Dan M. Odle	9/25/08	1000	3. Relinquished By:		

Comments:

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 21 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 1	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3 / H_2SO_4	Analysis: SO_2
Container No. 2	9/24/08	1541	—	1	Condenser Rinse	X	
Container No. 3	9/24/08	1544	3% H_2O_2	1	Impingers 1 & 2		X
No. 2 to Enthalpy							

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Hyry	9/24/08	1544	1. Relinquished By: Bill Hyry	9/24/08	2020
2. Received By: [signature]	9/24/08	2020	2. Relinquished By: [signature]	10/1/08	810
3. Received By: [signature]	10/2/08	9:56 am	3. Relinquished By:		

Comments: Temp 19.6°C

DID NOT RECEIVE 10/2/08 [illegible]

1-22

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 22 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 2	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3 / H_2SO_4	Analysis: SO_2
Container No. 2	9/24/08	1728	—	1	Condenser Rinse	X	
Container No. 3	9/24/08	1731	3% H_2O_2	1	Impingers 1 & 2		X
No 2 to Enthalpy							

Special Instructions:

Did not receive 10/2/08 JMB 1-23

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mulling	9/24/08	1731	1. Relinquished By: Bill Mulling	9/24/08	2020
2. Received By: Jack C Stamp	9/24/08	2020	2. Relinquished By: Jack Stamp	10/1/08	811
3. Received By: [illegible]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP = 19.6

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AIR SAMPLING ASSOCIATES, INC.

Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 23 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: 3	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3/H_2SO_4	Analysis: SO_2			
Container No. 2	9/24/08	1917	—	1	Condenser Rinse	X				
Container No. 3	9/24/08	1920	3% H_2O_2	1	Impingers 1 & 2		X			
No 2 to Enthalpy										

Special Instructions:

DID NOT RECEIVE 10/2/08 TMS

1-24

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/24/08	1920	1. Relinquished By: Bill Mullins	9/24/08	2020
2. Received By: [signature]	9/24/08	2020	2. Relinquished By: [signature]	10/1/08	815
3. Received By: [signature]	10/2/08	9:56AM	3. Relinquished By:		

Comments: TEMP = 19.6°C

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Chain of Custody Record

Client: ADA-ES	Project No.: 08-026	Page 24 of 24	
Address: 1 Sugar Factory Rd.	Unit No.: Stack	Lab:	
City: Hardin; State: MT; Zip Code: 59034	Project Manager: Bill Mullins	Lab Contact:	
Run No.: Reagent Blank	Test Method: Controlled Condensate	Lab Phone No.:	

Sample I.D.	Date	Time	Absorbing Solution	No. of Containers	Comments	Analysis: SO_3/H_2SO_4	Analysis: SO_2			
Container No. 4	9-24-08	1051	—	1	D.I. Water - 200 ml	X	X			
↓ Enthalpy										

Special Instructions:

Turn Around Time Required: ☒ Normal ☐ Rush

Sample Disposal: ☐ Return to ASAI ☒ Disposal By Lab ☒ Archive For 3 Months

	Date	Time		Date	Time
1. Recovered By: Bill Mullins	9/24/08	1051	1. Relinquished By: Bill Mullins	9/24/08	2020
2. Received By: [illegible]	9/24/08	2020	2. Relinquished By: [illegible]	10/1/08	812
3. Received By: [illegible]	10/2/08	9:56AM	3. Relinquished By		

Comments: Temp= 19.6°C

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AIR SAMPLING ASSOCIATES, INC.

Appendix J:

Resumes of Test Personnel

BILLY J. MULLINS, JR.; President

Education	Post Graduate Study Environmental Engineering at Southern Methodist University; Dallas, Texas 1970. M.S. 1969, New York University; New York, New York, in Civil Engineering (Air Resources). B.S. 1968, Texas Tech University; Lubbock, Texas, in Civil Engineering (Water Resources). Studies in Engineering at the U.S. Naval Academy; Annapolis, Maryland, 1963-1964
Professional Training Courses	Attended Short Course on Air Pollution Engineering at the University of Texas at Austin, February 1970. Attended four-week management course presented by the American Management Association, 1976.
Certification	Registered Professional Engineer Certified Visible Emissions Evaluator Licensed Private Pilot (Multi-Engine-Land, Instrument) Diplomat in the American Academy of Environmental Engineers Inductee into the Stack Sampling Hall of Fame Certified as Qualified Environmental Professional (QEP)
Professional Memberships	**Air & Waste Management Association** – Past Chairman, Past Vice Chairman, and Past Board of Directors of North Texas Chapter and Southwest Section; Past Chairman, Consultants Committee; Past Chairman, Source Measurement Committee **Source Evaluations Society** – Past President, Past Board of Directors **American Management Association**

Publications

Authored "Real World Experience with USEPA's New Sampling and Analytical Methods for Conducting Risk Burn," May 1998.

Co-authored "Sulfur Compound Emissions of the Petroleum Production Industry," December 1974.

Co-authored "Field Procedure for Stabilizing Hydrogen Sulfide Samples to be Analyzed Using Modified Methylene Blue Technique," presented at the Conference on Ambient Air Quality Measurements, Austin, Texas, March 1975.

Co-authored "Atmospheric Emissions Survey of the Sour Gas Industry," October 1975.

Co-authored "Technique for Insuring the Validity of Samples for High Concentrations of Sulfur Dioxide Using the EPA Method 5 Sampling Train," presented at the Third National Conference on Energy and the Environment, College Corner, Ohio, September 1975.

Teaching Experience

Conducted training seminars on sampling methods periodically since 1974 to present.

Conducted a one-day seminar on Part 75 Testing over ten times in 1993 and 1994.

Served as a lecturer in the Environmental Protection Agency's (EPA) training course number 450, "Source Sampling for Particulate Pollutants," for two years from January 1974 to October 1975 and March, 1992.

Conducted a two-day training course entitled "technical Assistance in Source Sampling" at Iowa State University, Ames, Iowa, for the Environmental Protection Agency (EPA), October 1974.

Conducted Environmental Protection Agency's (EPA) training course number 450, "Source Sampling for Particulate Pollutants," at Research Triangle Park, North Carolina, September 1975.

Teaching Experience (Cont'd)

Conducted a two-day short course entitled "Performing and Observing Source Sampling," Dallas, Texas, July 1976, May 1977, October 1977, November 1987 and November 1988; Lake Charles, Louisiana, May 1977; Casper Wyoming, May 1977; Point Comfort, Texas, November 1992.

Served as a lecturer in the Environmental Protection Agency's two-day seminar entitled "Asphalt Industry Environmental Solutions," presented in Dallas, Texas, March 21-22, 1979.

Conducted a two-day short course entitled "Performing and Observing Source Sampling," Phoenix, Arizona, August, 1990, for the State of Arizona, Department of Environmental Quality; Lincoln, Nebraska, March 1980, for the State of Nebraska, Air Quality Control Division.

Technical Experience

Directed and performed stack sampling on over 2000 sources of which over 500 were sampled simultaneously using more than one sampling train at several points in the flue gas stream; 1972-present.

Directed and performed over 200 short-term ambient air studies using mobile sampling vans and various ambient air sampling equipment; 1972-present.

Designed, directed and operated over 20 permanent ambient air networks of various size and duration for a variety of parameters; 1972-present.

Designed surface and underground drainage systems for residential subdivisions, public works projects, and shopping centers; 1969-1972.

Designed several residential subdivisions including lot layout, street design, drainage design, and utility design; 1969-1972.

Research Projects

Supervised and conducted a study made by the Hawaiian Sugar Planters' Association to characterize the emissions for several bagasse-fired boilers, April-May 1976.

Supervised and conducted a study made by the Rio Grande Valley Sugar Growers, Inc. to determine the area affected by the burning of sugarcane fields prior to harvesting, November 1974-April 1975.

Supervised and conducted a study by a lightweight aggregate manufacturer to develop a material balance around the process through sampling and analysis of several parameters, November 1973.

Conducted a study in New York City to attempt to develop a correlation in the ambient air between carbon dioxide and sulfur dioxide to provide a tool for predicting air pollution predicting air pollution episodes, January-May 1969.

Related Projects

Served as Chairman of the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Destin, Florida, 2002, and Santa Barbara, California, 1985.

Served as Co-Chairman of the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Destin, Florida, 2001.

Served as Session Chairman at the Engineering Foundation Conference on Stack Sampling and Source Evaluation in Hershey, Pennsylvania, 1984; San Diego, California, 1993; and in Palm Coast, Florida, 1994.

BILLY L. HEFLEY; Associate

Education	B.S. 1992, East Central University; Ada, Oklahoma, in Environmental Science with a concentration in Environmental Management.
Professional Training	Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, April 1993. Also attended an 8-hour refresher course January 1994, February 1995, January 1996, and May 2004. Attended 8-hour Safe Hazardous Materials Transportation Training Program (HM-126F and HM-181) Dallas, Texas, October 1994. Attended Bill Mullins' Performing and Observing Source Sampling Short Course; Dallas, Texas, January 1995.
Certification	Certified Visible Emissions Evaluator
Professional Memberships	**Air & Waste Management Association** **Source Evaluations Society**
Technical Experience	Participated in the sampling of over 750 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1992-present. Participated in an auditing program for a permanent eight-station sulfur dioxide ambient air network in East Texas, 1992-1993. Participated in a semi-monthly ambient air monitoring survey for organic compounds at a petrochemical facility located in South Texas, 1992-1993. Participated in EPA's Information Collection Request for Mercury conducting more than 46 simultaneous tests for Speciated Mercury using the "Standard Test Method for Elemental, Oxidized, Particle-Bound, and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)." September 1999-May 2000.

HEFLEY (p. 2)

Experienced in the analysis of commercial calibration gas cylinders for NO_x, SO_2, CO_2, and O_2.

Experience with calibration techniques for all field testing equipment.

Thoroughly trained in the operation and routine maintenance of the following:

Anarad Model AR50-C Carbon Dioxide Analyzer
Anarad Model AR880 Oxides of Nitrogen Analyzer
Anarad Model AR23 Oxygen Analyzer
Anarad Model AR30C2 Sulfur Dioxide Analyzer
California Analytical Model 300-HFID Total Hydrocarbon Analyzer
Servomex Model 1440 Carbon Dioxide Analyzer
Servomex Model 1440 Oxygen Analyzer
Teledyne Model 326 Oxygen Analyzer
Thermo Environmental Model 10AR & 10S Oxides of Nitrogen Analyzer
Thermo Electron Model 46C Oxides of Nitrogen Analyzer
Thermo Electron Model 48C Oxides of Nitrogen Analyzer
Western Research Model 721A Sulfur Dioxide Analyzer

PATRICK SELAKOVICH; Associate

Education	B.S.B.A. 1992, University of Arkansas; Fayetteville, Arkansas, in General Business.
Professional Training	Attended 24-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) Dallas, Texas, April 1997. Attended 40-hour Occupational and Environmental Training Program on Hazardous Materials (CFR 1910.120) & 'Train the Trainer', Gettysburg, Pennsylvania, July 1998. Also attended an 8-hour refresher course January 2000, January 2001, and May 2004. Attended OSHA General Industry Safety and Health Training, May 1999.
Professional Memberships	**Society For Human Resource Management**
Technical Experience	Participated in the sampling of over 150 sources, including several of which were sampled simultaneously using more than one sampling train. Thoroughly trained in all EPA testing procedures, 1996-present. Participated in EPA's 3-D probe study. May – August 1997. Experience with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: California Analytical Model 300-HFID Total Hydrocarbon Analyzer Servomex Model 1440 Carbon Dioxide Analyzer Servomex Model 1440 Oxygen Analyzer Thermo Electron Model 46C Oxides of Nitrogen Analyzer Thermo Electron Model 48C Oxides of Nitrogen Analyzer Western Research Model 721A Sulfur Dioxide Analyzer

JOHN STANLEY; Associate

Education	B.A. June 1990, Hendrix College, in Business and Economics.
Certification	Certified Visible Emissions Evaluator
Technical Experience	Participated in the sampling of over 25 sources, including several of which were sampled simultaneously using more than one sampling train. Experience with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: California Analytical Model 300-HFID Total Hydrocarbon Analyzer Servomex Model 1440 Carbon Dioxide Analyzer Servomex Model 1440 Oxygen Analyzer Thermo Electron Model 42CHL Oxides of Nitrogen Analyzer Thermo Electron Model 48C Carbon Monoxide Analyzer Western Research Model 921A Sulfur Dioxide Analyzer

DAN BERT; Associate

Education	Associates of Electronics Engineering Technology, National Education Center 1987.
Technical Experience	Participated in the sampling of over 25 sources, including several of which were sampled simultaneously using more than one sampling train. Experience with calibration techniques for all field testing equipment. Thoroughly trained in the operation and routine maintenance of the following: California Analytical Model 300-HFID Total Hydrocarbon Analyzer Servomex Model 1440 Carbon Dioxide Analyzer Servomex Model 1440 Oxygen Analyzer Thermo Electron Model 42CHL Oxides of Nitrogen Analyzer Thermo Electron Model 48C Carbon Monoxide Analyzer Western Research Model 921A Sulfur Dioxide Analyzer

APPENDIX F: COAL AND ASH ANALYSES

Sample Analyses

The tables below contain all results from the chemical analyses performed on the coal, ash and slurry samples.

Table 1 shows the results for some of the ash samples including Bottom Ash, taken from the drag change in the water seal below the boiler, Bottom+Econ Ash, taken from an ash pit that combines bottom ash and ash from the economizer hoppers, SDA Lime Slurry, taken from a sample port neat the rotary atomizer, and CEGRIT ash, which is ash taken in-flight at the SDA Inlet and after PAC injection by an in-situ sampler called a CEGRIT. Analyses include, moisture (% H2O), mercury (Hg), bromine (Br), carbon by the loss-on-ignition (%LOI) test, total carbon (%C) and total organic carbon (TOC).

Table 2 contains the results for the same analyses as Table 1 but only for fly ash samples taken from the FF or from the rotary valve below the SDA hopper.

Table 3 contains coal analyses including halogens (Br, Cl, F), moisture (%H2O) and dry and as-received mercury (Hg).

Table 4 contains the results of Proximate Analyses for coal.

Table 5 contains the results of Ultimate Analyses for coal.

Finally, Table 6 contains the results from analyses on PAC including moisture (% H2O), leachable bromine (Br %), grind size (PSS-325), Red Cap, Tap Density, and halogens (Br and I).
(ug/g)"

Table 1. Analyses of Bottom Ash, SDA Lime Slurry and CEGRIT Ash.

ADA ID	Date	Type	Location	Comments	% H2O	Hg (ng/g)	Br (ug/g)	% LOI	Total C % C	TOC
7063	11/30/06 16:30	Bottom Ash	Drag Chain	no economizer ash		<10				
7109	12/1/06 3:00	Bottom Ash	Drag Chain			<10				
7108	12/2/06 12:00	Bottom Ash	Drag Chain			<10				
7068	12/4/06 15:00	Bottom Ash	Drag Chain	7% West Elk blend		<10				
7191	12/5/06 15:00	Bottom Ash	Drag Chain			<10				
7198	12/6/06 15:00	Bottom Ash	Drag Chain			<10				
7102	12/7/06 16:00	Bottom Ash	Drag Chain			<10				
8471	5/24/07 12:00	Bottom Ash	Drag Chain	Sample during ACI	34.58	<10				
8474	5/24/07 18:00	Bottom Ash	Drag Chain	Sample during ACI	34.70	<10				
8495	5/30/07 6:00	Bottom Ash	Drag Chain	Sample during ACI	27.65	<10				
8501	5/30/07 18:00	Bottom Ash	Drag Chain	Sample during ACI	34.06	<10				
9842	8/6/07 6:00	Bottom Ash	Drag Chain			<10				
9844	8/6/07 12:00	Bottom Ash	Drag Chain			<10				
9853	8/6/07 20:00	Bottom Ash	Drag Chain			<10				
9855	8/7/07 0:00	Bottom Ash	Drag Chain			<10				
9857	8/7/07 6:00	Bottom Ash	Drag Chain			<10				
9859	8/7/07 12:00	Bottom Ash	Drag Chain			14.0				
9862	8/7/07 18:00	Bottom Ash	Drag Chain			<10				
9864	8/8/07 0:00	Bottom Ash	Drag Chain			<10				
9865	8/8/07 6:00	Bottom Ash	Drag Chain			<10				
9873	8/8/07 12:00	Bottom Ash	Drag Chain			<10				
9880	8/8/07 20:00	Bottom Ash	Drag Chain			<10				
9882	8/9/07 0:00	Bottom Ash	Drag Chain			<10				
9875	8/9/07 6:00	Bottom Ash	Drag Chain			<10				
9885	8/9/07 12:00	Bottom Ash	Drag Chain			<10				
9878	8/9/07 18:00	Bottom Ash	Drag Chain			<10				
8353	4/26/07 12:00	Bottom+Econ Ash	Ash Pit	KNX Test	43.06	<10				
8354	4/26/07 18:00	Bottom+Econ Ash	Ash Pit	KNX Test	29.63	15.0				
8358	4/27/07 0:00	Bottom+Econ Ash	Ash Pit	KNX Test	36.58	<10	1.30			
8365	4/27/07 12:00	Bottom+Econ Ash	Ash Pit	KNX Test	34.76	<10				
8378	4/28/07 18:00	Bottom+Econ Ash	Ash Pit	KNX Test	36.81	<10	3.60			
7064	12/1/06 13:30	SDA Lime Slurry	SDA			<10				
7106	12/2/06 0:00	SDA Lime Slurry	SDA			<10				
7067	12/4/06 15:30	SDA Lime Slurry	SDA	117MW gross		<10				
7192	12/5/06 14:30	SDA Lime Slurry	SDA			<10				
7199	12/6/06 15:30	SDA Lime Slurry	SDA			<10				
7101	12/7/06 16:00	SDA Lime Slurry	SDA			<10				
7099	12/8/06 8:30	Cegrit	SDA Inlet	Cegrit sample	0.02	77.0		0.31		0.10
8328	4/20/07 16:00	Cegrit	SDA Inlet	4/17 to 4/20, 2007		323.0				
11191	9/9/07 14:00	Cegrit	SDA Inlet		0.07	30.0		0.31		
11192	9/11/07 14:00	Cegrit	SDA Inlet		0.05	53.0		0.55		
11193	9/13/07 14:00	Cegrit	SDA Inlet		0.05	22.0		0.13		
11200	9/28/07 14:00	Cegrit	SDA Inlet		0.08	123.0		0.51		
11199	9/29/07 19:00	Cegrit	SDA Inlet		0.06	59.0		1.03		
11194	9/30/07 16:30	Cegrit	SDA Inlet		0.08	68.0		0.60		
11195	10/1/07 17:00	Cegrit	SDA Inlet		0.09	109.0		0.52		
11196	10/2/07 17:00	Cegrit	SDA Inlet		0.05	101.0		0.68		
11197	10/3/07 17:00	Cegrit	SDA Inlet		0.06	71.0		1.01		
11198	10/4/07 17:00	Cegrit	SDA Inlet		0.09	111.0		0.84		
11201	10/6/07 17:25	Cegrit	SDA Inlet		0.06	161.0		0.56		
11202	10/7/07 17:15	Cegrit	SDA Inlet		0.08	249.0		0.52		
11203	10/26/07 9:00	Cegrit	SDA Inlet		0.05	212.0		1.63		

Table 2. Analyses of Fly Ash Samples.

ADA ID	Date	Type	Location	Comments	% H2O	Hg (ng/g)	Br (ug/g)	% LOI	Total C % C	TOC
6836	11/3/06 0:00	Fly Ash	FF - A	117 MW gross	3.19	78.0		8.46	1.25	
6837	11/3/06 0:00	Fly Ash	FF - B	117 MW gross	3.58	73.0		8.65	1.43	
6838	11/3/06 0:00	Fly Ash	FF - C	117 MW gross	2.83	76.0		8.40	1.13	
6839	11/3/06 0:00	Fly Ash	FF - D	117 MW gross	2.94	67.0		8.63	1.56	
6840	11/3/06 0:00	Fly Ash	FF - E	117 MW gross	2.91	58.0		9.52	1.76	
6841	11/3/06 0:00	Fly Ash	FF - F	117 MW gross	3.02	77.0		8.66	1.47	
7187	11/17/06 0:00	Fly Ash	FF - B	117MW gross	6.06	66.0		8.47		0.68
7055	11/30/06 15:30	Fly Ash	FF - A	117 MW gross	2.83	37.0		7.25		0.90
7056	11/30/06 15:30	Fly Ash	FF - B	117 MW gross	2.39	41.0		7.21		0.83
7057	11/30/06 15:30	Fly Ash	FF - C	117 MW gross	2.86	25.0		7.68		0.86
7058	11/30/06 15:30	Fly Ash	FF - D	117 MW gross	4.77	57.0		8.99		0.97
7059	11/30/06 15:30	Fly Ash	FF - E	117 MW gross	2.61	36.0		8.04		0.91
7060	11/30/06 15:30	Fly Ash	FF - F	117 MW gross	8.73	42.0		9.96		0.59
7061	12/1/06 11:30	Fly Ash	FF - B	117 MW gross	3.53	36.0		8.38		0.90
7107	12/2/06 12:00	Fly Ash	FF - B		2.18	67.0		7.41		0.39
7190	12/5/06 15:00	Fly Ash	FF - B	117MW gross	2.30	137.0		8.84		1.25
7197	12/6/06 14:30	Fly Ash	FF - B		2.40	46.0		7.56		0.73
7105	12/7/06 16:00	Fly Ash	FF - B		3.24	112.0		9.06		1.13
8313	3/2/07 0:00	Fly Ash	FF - B			47.0				
8314	3/13/07 0:00	Fly Ash	FF - B			111.0				
8352	4/26/07 12:00	Fly Ash	FF - B	KNX Test		49.0				2.30
8317	4/26/07 16:00	Fly Ash	FF - B	KNX Test		52.0	4.80			0.55
8320	4/26/07 16:09	Fly Ash	FF - E	KNX Test		58.0	4.80			0.65
8319	4/26/07 16:16	Fly Ash	FF - D	KNX Test		52.0	2.60			0.57
8316	4/26/07 16:25	Fly Ash	FF - A	KNX Test		56.0	3.60			0.50
8318	4/26/07 16:39	Fly Ash	FF - C	KNX Test		50.0	4.80			0.56
8321	4/26/07 16:43	Fly Ash	FF - F	KNX Test		49.0	4.50			0.69
8356	4/26/07 18:00	Fly Ash	FF - B	KNX Test		18.0				1.70
8357	4/27/07 0:00	Fly Ash	FF - B	KNX Test		31.0	2.80			1.80
8364	4/27/07 12:00	Fly Ash	FF - B	KNX Test		29.0				
8323	4/27/07 14:40	Fly Ash	FF - B	KNX Test		140.0	190.00			0.96
8326	4/27/07 14:46	Fly Ash	FF - E	KNX Test		157.0	173.10			1.50
8327	4/27/07 14:49	Fly Ash	FF - F	KNX Test		151.0	156.10			1.50
8324	4/27/07 14:52	Fly Ash	FF - C	KNX Test		158.0	183.30			1.50
8322	4/27/07 15:00	Fly Ash	FF - A	KNX Test		173.0	202.00			0.83
8325	4/27/07 15:04	Fly Ash	FF - D	KNX Test		168.0	183.30			1.50
8380	4/28/07 18:00	Fly Ash	FF - B	KNX Test		110.0	30.00			2.00
8470	5/24/07 12:00	Fly Ash	SDA Rotary	Sample during ACI		40.0	4.10			1.90
8473	5/24/07 18:00	Fly Ash	SDA Rotary	Sample during ACI		34.0	11.40			1.90
8494	5/30/07 6:00	Fly Ash	SDA Rotary	Sample during ACI		53.0	8.60			2.00
8500	5/30/07 18:00	Fly Ash	SDA Rotary	Sample during ACI		41.0	32.40			2.50
9845	8/6/07 12:30	Fly Ash	FF - A			71.0	4.60			0.47
9846	8/6/07 12:30	Fly Ash	FF - B	Leach Test		74.0	4.30			0.90
9847	8/6/07 12:30	Fly Ash	FF - C			68.0	3.80			0.61
9848	8/6/07 12:30	Fly Ash	FF - D			62.0	3.50			0.73
9849	8/6/07 12:30	Fly Ash	FF - E			66.0	4.50			0.09
9850	8/6/07 12:30	Fly Ash	FF - F			121.0	30.10			0.74
9851	8/6/07 19:00	Fly Ash	FF - B			208.0				1.40
9860	8/7/07 16:30	Fly Ash	FF - B			296.0				0.78
9866	8/8/07 10:30	Fly Ash	FF - A			91.0	12.10			1.00
9867	8/8/07 10:30	Fly Ash	FF - B			90.0	13.20			0.84
9868	8/8/07 10:30	Fly Ash	FF - C			94.0	12.10			1.00
9869	8/8/07 10:30	Fly Ash	FF - D			89.0	13.60			0.64
9870	8/8/07 10:30	Fly Ash	FF - E			90.0	12.70			1.30
9871	8/8/07 10:30	Fly Ash	FF - F			89.0	12.40			1.00
9883	8/9/07 10:45	Fly Ash	FF - B			231.0				0.70
9876	8/9/07 17:00	Fly Ash	FF - B			283.0				0.91
9886	8/10/07 8:00	Fly Ash	FF - B			196.0	49.70			0.65
9887	8/10/07 8:00	Fly Ash	FF - C			142.0	30.00			0.57
9888	8/10/07 8:00	Fly Ash	FF - F			149.0	36.20			0.83
11205	10/5/07 0:00	Fly Ash	FF - B			208.0				
11204	10/26/07 9:00	Fly Ash	FF - B			241.0				

Table 3. Coal Mercury and Halogens.

					Halogens			Mercur Analysis		
ADA ID	Date	Type	Location	Comments	Br (ug/g)	Cl (ug/g)	F (ug/g)	% H2O	Hg as rec (ng/g)	Hg dry (ng/g)
6842	11/3/06 0:00	Coal	Reclaim Coal Belt	Westmoreland sample 1102		47		12.3	53.9	61.5
7188	11/17/06 0:00	Coal	Reclaim Coal Belt	117 mW gross		20		11.5	48.8	55.1
7062	11/30/06 16:00	Coal	Reclaim Coal Belt		1.5	43	25	9.2	29.3	32.3
7104	12/1/06 15:00	Coal	Reclaim Coal Belt	absaloka	1.9	21	60	11.3	61.6	69.5
7110	12/2/06 12:00	Coal	Reclaim Coal Belt	Absaloka		19		10.7	23.1	25.9
7070	12/3/06 21:00	Coal	Blend conveyor	West Elk, 7% blend,from pile		96		0	28.6	28.6
7069	12/4/06 9:00	Coal	Reclaim Coal Belt	Plant coal, 7% West Elk blend		17		10.5	27.7	30.9
7193	12/4/06 14:30	Coal	Reclaim Coal Belt	Absaloka-during 14% WE		6		11.5	12.0	13.6
7194	12/4/06 14:30	Coal	Blend conveyor	West Elk 14% Blend		86		0.0	83.1	83.1
7195	12/5/06 17:00	Coal	Blend conveyor	Bull Mountain 14% Blend		23		7.2	42.4	45.7
7196	12/5/06 17:00	Coal	Reclaim Coal Belt	Absaloka-during 14% BM		<5		11.1	54.1	60.9
7100	12/6/06 16:00	Coal	Reclaim Coal Belt	Absaloka - during 14% BM		43		10.9	57.4	64.4
7103	12/6/06 16:00	Coal	Blend conveyor	Bull Mtn, 7% Blend		30		6.5	36.7	39.3
8351	4/26/07 12:00	Coal	Reclaim Coal Belt	Sample during KNX testing		<10		15.7	41.2	48.9
9472	6/11/07 9:00	Coal	Reclaim Coal Belt	QC-8351 Dup-to FGS/HML		<10		14.5	36.9	43.2
8355	4/26/07 18:00	Coal	Reclaim Coal Belt	Sample during KNX testing		<10		14.6	37.6	44
8359	4/27/07 0:00	Coal	Reclaim Coal Belt	Sample during KNX testing	1.2	<10		15.8	43.0	51.1
8379	4/28/07 18:00	Coal	Reclaim Coal Belt	Sample during KNX testing	2.8	<10		16.1	28.4	33.8
8472	5/24/07 12:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests		<10		14.9	46.0	54.1
8475	5/24/07 18:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests		<10		14.8	36.0	42.3
8496	5/30/07 6:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests		<10		13.5	14.5	16.8
8502	5/30/07 18:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests		<10		15.4	16.7	19.7
9841	8/6/07 6:00	Coal	Reclaim Coal Belt					11.1	38.4	43.2
9843	8/6/07 12:00	Coal	Reclaim Coal Belt					10.4	48.3	53.9
9852	8/6/07 20:00	Coal	Reclaim Coal Belt					10.4	66.3	74
9854	8/7/07 0:00	Coal	Reclaim Coal Belt					10.7	62.7	70.2
9856	8/7/07 6:00	Coal	Reclaim Coal Belt					11.2	38.5	43.3
9858	8/7/07 12:00	Coal	Reclaim Coal Belt					12.1	32.0	36.4
9861	8/7/07 18:00	Coal	Reclaim Coal Belt					11.1	60.4	67.9
9863	8/8/07 0:00	Coal	Reclaim Coal Belt					10.6	25.8	28.9
9872	8/8/07 12:00	Coal	Reclaim Coal Belt					10.4	84.3	94.1
9879	8/8/07 20:00	Coal	Reclaim Coal Belt					10.3	46.0	51.3
9881	8/9/07 0:00	Coal	Reclaim Coal Belt					8.7	51.5	56.4
9874	8/9/07 6:00	Coal	Reclaim Coal Belt					7.8	62.1	67.4
9884	8/9/07 12:00	Coal	Reclaim Coal Belt					9.3	18.5	20.4
9877	8/9/07 18:00	Coal	Reclaim Coal Belt					10.4	26.3	29.4
12167	3/27/08 11:00	Coal	Reclaim Coal Belt		1.2	77		8.9	30.7	33.7

Table 4. Coal Proximate Analyses.

					Proximate Analysis											
ADA ID	Date	Type	Location	Comments	% Ash (as rec)	% Ash (dry)	% FC (as rec)	% FC (dry)	% H2O (as rec)	% S (as rec)	% S (dry)	% Vol (as rec)	% Vol (dry)	Btu/lb (as rec)	Btu/lb (dry)	MAF (Btu/lb)
6842	11/3/06 0:00	Coal	Reclaim Coal Belt	Westmoreland sample 1102	7.92	10.52	37.05	49.21	24.70	0.64	0.84	30.33	40.27	8858	11763	13146
7188	11/17/06 0:00	Coal	Reclaim Coal Belt	117 mW gross	9.87	13.02	38.89	51.31	24.20	0.59	0.78	27.04	35.67	8634	11391	13096
7062	11/30/06 16:00	Coal	Reclaim Coal Belt		8.67	11.31	36.22	47.21	23.29	0.47	0.61	31.82	41.48	8941	11656	13142
7104	12/1/06 15:00	Coal	Reclaim Coal Belt	absaloka	9.25	12.19	38.67	50.99	24.16	0.52	0.69	27.92	36.82	8638	11390	12971
7110	12/2/06 12:00	Coal	Reclaim Coal Belt	Absaloka	6.99	9.22	39.75	52.46	24.21	0.49	0.65	29.05	38.32	9050	11940	13153
7070	12/3/06 21:00	Coal	Blend conveyor	West Elk, 7% blend,from pile	8.62	9.21	51.63	55.17	6.41	0.49	0.52	33.34	35.62	12413	13263	14609
7069	12/4/06 9:00	Coal	Reclaim Coal Belt	Plant coal, 7% West Elk blend	7.49	10.20	36.64	49.88	26.55	0.60	0.82	29.32	39.92	8624	11741	13075
7193	12/4/06 14:30	Coal	Reclaim Coal Belt	Absaloka-during 14% WE	6.17	8.14	39.42	52.05	24.26	0.46	0.60	30.15	39.81	9231	12188	13268
7194	12/4/06 14:30	Coal	Blend conveyor	West Elk 14% Blend	8.98	9.63	51.23	54.90	6.70	0.60	0.64	33.09	35.47	12360	13247	14658
7195	12/5/06 17:00	Coal	Blend conveyor	Bull Mountain 14% Blend	7.22	8.73	46.58	56.30	17.26	0.56	0.67	28.94	34.97	10266	12407	13594
7196	12/5/06 17:00	Coal	Reclaim Coal Belt	Absaloka-during 14% BM	8.34	10.93	39.34	51.60	23.75	0.61	0.81	28.57	37.47	8923	11703	13139
7100	12/6/06 16:00	Coal	Reclaim Coal Belt	Absaloka - during 14% BM	8.30	10.87	39.81	52.11	23.62	0.56	0.74	28.27	37.02	9017	11806	13246
7103	12/6/06 16:00	Coal	Blend conveyor	Bull Mtn, 7% Blend	6.09	7.53	46.39	57.38	19.15	0.49	0.61	28.37	35.09	10122	12520	13539
8351	4/26/07 12:00	Coal	Reclaim Coal Belt	Sample during KNX testing	8.04	10.68	37.53	49.85	24.71	0.63	0.83	29.72	39.47	8855	11761	13167
9472	6/11/07 9:00	Coal	Reclaim Coal Belt	QC-8351 Dup-to FGS/HML												
8355	4/26/07 18:00	Coal	Reclaim Coal Belt	Sample during KNX testing	5.85	7.85	39.37	52.79	25.42	0.50	0.67	29.36	39.36	8725	11699	12695
8359	4/27/07 0:00	Coal	Reclaim Coal Belt	Sample during KNX testing	8.92	11.90	36.78	49.11	25.09	0.62	0.83	29.21	38.99	8571	11441	12986
8379	4/28/07 18:00	Coal	Reclaim Coal Belt	Sample during KNX testing	7.05	9.39	38.41	51.17	24.93	0.61	0.81	29.61	39.44	8871	11817	13042
8472	5/24/07 12:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests	10.04	13.15	37.00	48.46	23.66	0.61	0.80	29.30	38.39	8533	11177	12870
8475	5/24/07 18:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests	8.92	11.70	37.30	48.94	23.78	0.70	0.91	30.00	39.36	8837	11594	13130
8496	5/30/07 6:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests	8.77	11.59	37.35	49.33	24.29	0.55	0.73	29.59	39.08	8756	11565	13081
8502	5/30/07 18:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests	8.21	10.87	37.56	49.68	24.41	0.56	0.74	29.82	39.45	8814	11659	13080
9841	8/6/07 6:00	Coal	Reclaim Coal Belt		9.12	12.06	35.37	46.74	24.34	0.40	0.53	31.17	41.20	8542	11290	12838
9843	8/6/07 12:00	Coal	Reclaim Coal Belt													
9852	8/6/07 20:00	Coal	Reclaim Coal Belt													
9854	8/7/07 0:00	Coal	Reclaim Coal Belt													
9856	8/7/07 6:00	Coal	Reclaim Coal Belt													
9858	8/7/07 12:00	Coal	Reclaim Coal Belt													
9861	8/7/07 18:00	Coal	Reclaim Coal Belt													
9863	8/8/07 0:00	Coal	Reclaim Coal Belt		8.59	11.41	35.94	47.76	24.74	0.44	0.59	30.73	40.83	8772	11656	13157
9872	8/8/07 12:00	Coal	Reclaim Coal Belt													
9879	8/8/07 20:00	Coal	Reclaim Coal Belt													
9881	8/9/07 0:00	Coal	Reclaim Coal Belt													
9874	8/9/07 6:00	Coal	Reclaim Coal Belt													
9884	8/9/07 12:00	Coal	Reclaim Coal Belt													
9877	8/9/07 18:00	Coal	Reclaim Coal Belt													
12167	3/27/08 11:00	Coal	Reclaim Coal Belt		7.60	9.97	37.69	49.50	23.84	0.53	0.70	30.87	40.53	8997	11814	13122

Table 5. Coal Ultimate Analyses.

					Ultimate Analysis												
ADA ID	Date	Type	Location	Comments	% Ash (as rec)	% Ash (dry)	% C (as rec)	% C (dry)	% H (as rec)	% H (dry)	% H2O (as rec)	% N (as rec)	% N (dry)	% O (as rec)	% O (dry)	% S (as rec)	% S (dry)
6842	11/3/06 0:00	Coal	Reclaim Coal Belt	Westmoreland sample 1102	7.92	10.52	51.65	68.60	3.41	4.53	24.70	0.57	0.76	11.11	14.75	0.64	0.84
7188	11/17/06 0:00	Coal	Reclaim Coal Belt	117 mW gross	9.87	13.02	49.73	65.60	3.27	4.32	24.20	0.70	0.92	11.64	15.36	0.59	0.78
7062	11/30/06 16:00	Coal	Reclaim Coal Belt		8.67	11.31	51.91	67.67	3.61	4.70	23.29	0.72	0.94	11.33	14.77	0.47	0.61
7104	12/1/06 15:00	Coal	Reclaim Coal Belt	absaloka	9.25	12.19	50.35	66.39	3.31	4.37	24.16	0.72	0.94	11.69	15.42	0.52	0.69
7110	12/2/06 12:00	Coal	Reclaim Coal Belt	Absaloka	6.99	9.22	52.31	69.01	3.46	4.57	24.21	0.74	0.97	11.80	15.58	0.49	0.65
7070	12/3/06 21:00	Coal	Blend conveyor	West Elk, 7% blend,from pile	8.62	9.21	68.36	73.05	4.92	5.26	6.41	1.57	1.68	9.63	10.28	0.49	0.52
7069	12/4/06 9:00	Coal	Reclaim Coal Belt	Plant coal, 7% West Elk blend	7.49	10.20	50.29	68.47	3.36	4.58	26.55	0.70	0.95	11.01	14.98	0.60	0.82
7193	12/4/06 14:30	Coal	Reclaim Coal Belt	Absaloka-during 14% WE	6.17	8.14	53.40	70.51	3.60	4.75	24.26	0.73	0.96	11.38	15.04	0.46	0.60
7194	12/4/06 14:30	Coal	Blend conveyor	West Elk 14% Blend	8.98	9.63	68.44	73.35	4.84	5.19	6.70	1.57	1.68	8.87	9.51	0.60	0.64
7195	12/5/06 17:00	Coal	Blend conveyor	Bull Mountain 14% Blend	7.22	8.73	58.32	70.48	3.93	4.75	17.26	1.07	1.30	11.64	14.07	0.56	0.67
7196	12/5/06 17:00	Coal	Reclaim Coal Belt	Absaloka-during 14% BM	8.34	10.93	51.49	67.53	3.49	4.58	23.75	0.70	0.92	11.62	15.23	0.61	0.81
7100	12/6/06 16:00	Coal	Reclaim Coal Belt	Absaloka - during 14% BM	8.30	10.87	51.92	67.98	3.50	4.58	23.62	0.72	0.94	11.38	14.89	0.56	0.74
7103	12/6/06 16:00	Coal	Blend conveyor	Bull Mtn, 7% Blend	6.09	7.53	58.15	71.92	3.88	4.80	19.15	1.07	1.33	11.17	13.81	0.49	0.61
8351	4/26/07 12:00	Coal	Reclaim Coal Belt	Sample during KNX testing	8.04	10.68	51.21	68.02	3.43	4.55	24.71	0.66	0.87	11.32	15.05	0.63	0.83
9472	6/11/07 9:00	Coal	Reclaim Coal Belt	QC-8351 Dup-to FGS/HML													
8355	4/26/07 18:00	Coal	Reclaim Coal Belt	Sample during KNX testing	5.85	7.85	50.87	68.20	3.22	4.32	25.42	0.66	0.89	13.48	18.07	0.50	0.67
8359	4/27/07 0:00	Coal	Reclaim Coal Belt	Sample during KNX testing	8.92	11.90	50.64	67.60	3.39	4.53	25.09	0.66	0.88	10.68	14.26	0.62	0.83
8379	4/28/07 18:00	Coal	Reclaim Coal Belt	Sample during KNX testing	7.05	9.39	51.43	68.51	3.45	4.59	24.93	0.65	0.87	11.88	15.83	0.61	0.81
8472	5/24/07 12:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests	10.04	13.15	49.99	65.48	3.43	4.49	23.66	0.64	0.83	11.63	15.25	0.61	0.80
8475	5/24/07 18:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests	8.92	11.70	51.00	66.90	3.47	4.55	23.78	0.65	0.86	11.48	15.08	0.70	0.91
8496	5/30/07 6:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests	8.77	11.59	50.82	67.13	3.50	4.62	24.29	0.66	0.87	11.41	15.06	0.55	0.73
8502	5/30/07 18:00	Coal	Reclaim Coal Belt	Sample during carbon Inj tests	8.21	10.87	51.04	67.52	3.52	4.65	24.41	0.66	0.87	11.60	15.35	0.56	0.74
9841	8/6/07 6:00	Coal	Reclaim Coal Belt		9.12	12.06	50.05	66.16	3.50	4.63	24.34	0.48	0.63	12.11	15.99	0.40	0.53
9843	8/6/07 12:00	Coal	Reclaim Coal Belt														
9852	8/6/07 20:00	Coal	Reclaim Coal Belt														
9854	8/7/07 0:00	Coal	Reclaim Coal Belt														
9856	8/7/07 6:00	Coal	Reclaim Coal Belt														
9858	8/7/07 12:00	Coal	Reclaim Coal Belt														
9861	8/7/07 18:00	Coal	Reclaim Coal Belt														
9863	8/8/07 0:00	Coal	Reclaim Coal Belt		8.59	11.41	50.84	67.55	3.55	4.72	24.74	0.49	0.66	11.35	15.07	0.44	0.59
9872	8/8/07 12:00	Coal	Reclaim Coal Belt														
9879	8/8/07 20:00	Coal	Reclaim Coal Belt														
9881	8/9/07 0:00	Coal	Reclaim Coal Belt														
9874	8/9/07 6:00	Coal	Reclaim Coal Belt														
9884	8/9/07 12:00	Coal	Reclaim Coal Belt														
9877	8/9/07 18:00	Coal	Reclaim Coal Belt														
12167	3/27/08 11:00	Coal	Reclaim Coal Belt		7.60	9.97	51.98	68.25	3.59	4.72	23.84	0.65	0.86	11.81	15.50	0.53	0.70

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Table 6. PAC Analyses.

ADA ID	Date	Type	Location	Comments	% H2O	Leachable Br (%)	PSS -325	Red Cap	Tap Density	Br (ug/g)	I (ug/g)
12166	3/27/08 11:00	Hg-LH	PAC Silo	Questionable Batch	4	2.6	96	12.5	0.57	30300	493
12379	6/17/08 0:00	Hg-LH	PAC Silo	Questionable Batch #2			97.6		0.533	46200	
12246	4/3/08 11:00	Hg-LH	PAC Silo	Darco Hg-LH						50000	
9447	5/24/07 0:00	Hg-LH	PAC Silo	Darco Hg-LH						54000	
9520	6/21/07 0:00	MC Plus	PAC Silo	sample from liner mishap						42500	
9519	6/20/07 0:00	PAC Hg	PAC Silo	sample from liner mishap						24100	

ADA ID	Date	Type	Location	Comments	% Ash (as rec)	% FC (as rec)	% H2O (as rec)	% S (as rec)	% Vol (as rec)	BTU/lb (as rec)	MAF (BTU/lb)
12379	6/17/08 0:00	Hg-LH	PAC Silo	Questionable Batch #2	28.48	56.48	6.36	0.70	8.68	8539	13105