EVALUATION OF MERCURY EMISSIONS FROM COAL-FIRED FACILITIES WITH SCR AND FGD SYSTEMS

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ABSTRACT

CONSOL Energy Inc., Research & Development (CONSOL), with support from the U.S. Department of Energy, National Energy Technology Laboratory (DOE) is evaluating the effects of selective catalytic reduction (SCR) on mercury (Hg) capture in coal-fired plants equipped with an electrostatic precipitator (ESP) - wet flue gas desulfurization (FGD) combination or a spray dyer absorber – fabric filter (SDA-FF) combination. In this program CONSOL is determining mercury speciation and removal at 10 coal-fired facilities. The objectives are 1) to evaluate the effect of SCR on mercury capture in the ESP-FGD and SDA-FF combinations at coal-fired power plants, 2) evaluate the effect of catalyst degradation on mercury capture; 3) evaluate the effect of low load operation on mercury capture in an SCR-FGD system, and 4) collect data that could provide the basis for fundamental scientific insights into the nature of mercury chemistry in flue gas, the catalytic effect of SCR systems on mercury speciation and the efficacy of different FGD technologies for mercury capture.

This document, the third in a series of topical reports, describes the results and analysis of mercury sampling performed on a 245 MW unit burning a bituminous coal containing 1.8% sulfur. The unit is equipped with a SCR, SDA, and FF to control NO_x, SO_2, and particulate emissions, respectively. Four sampling tests were performed in May 2003. Flue gas mercury speciation and concentrations were determined at the SCR inlet, air heater outlet (SDA inlet), and at the stack (FF outlet) using the Ontario Hydro method. Process stream samples for a mercury balance were collected to coincide with the flue gas measurements.

The results show that the SCR/air heater combination converted more than 95% of the elemental mercury to the oxidized and particulate forms. Mercury removal, on a coal-to-stack basis, was 95%. The mercury material balance closures for the four tests ranged from 93% to 104%, with an average of 99%.

These results show that the SCR had a positive effect on mercury oxidation. In earlier programs, CONSOL sampled mercury at six plants with wet FGDs for SO_2 control without SCR catalysts. At those plants, an average of 61±15% of the mercury was in the oxidized and particulate forms at the air heater outlet, and the average coal-to-stack mercury removal was 66±8%.

The principal purpose of this work is to develop a better understanding of the potential mercury removal "co-benefits" achieved by NOx, and SO_2 control technologies. It is expected that this data will provide the basis for fundamental scientific insights into the nature of mercury chemistry in flue gas, the catalytic effect of SCR systems on mercury speciation and the efficacy of different FGD technologies for mercury capture. Ultimately, this insight could help to design and operate SCR and FGD systems to maximize mercury removal.

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LIST OF ABBREVIATIONS

acfm	-	actual cubic feet per minute (wet)
am	-	morning
Btu	-	heating value in British Thermal Units
Ca/S	-	Calcium-sulfur ratio
cfm	-	cubic feet per minute
CO_2	-	carbon dioxide
CONSOL R&D	-	CONSOL Energy Inc., Research and Development
CVAA	-	cold vapor atomic absorption
DI	-	deionized water
dscf	-	dry standard cubic feet
dscfm	-	dry standard cubic feet per minute
EPA	-	U.S. Environmental Protection Agency
ESP	-	electrostatic precipitator
FGD	-	wet flue gas desulphurization
ft	-	feet
ft^2	-	square feet
ft^3	-	cubic feet
gpm	-	gallons per minute
gr	-	grains
HCl	-	hydrochloric acid
Hg	-	mercury
Hg^{part}	-	mercury in particulate form
Hg^{total}	-	total mercury in particulate, oxidized, and elemental forms
Hg^{++}	-	mercury in oxidized form
Hg^{o}	-	mercury in elemental form
HNO_3	-	nitric acid
H_2O	-	water
hr	-	hour
ICP-AES	-	inductively coupled plasma-atomic emission spectrometer
in	-	inch
kpph		thousand pounds per hour
KCl	-	potassium chloride
$KMnO_4$	-	potassium permanganate
L	-	liter
lb	-	pound
m	-	meter
m^3	-	cubic meter
mg	-	milligram, 10^{-3} gram

LIST OF ABBREVIATIONS (continued)

min	-	minute
mL	-	milliliter
M	-	molar, mol/L
MM	-	million
mol	-	mole
ng	-	nanogram, 10^{-9} gram
N_2	-	molecular nitrogen
NIST	-	National Institute of Standards and Technology
NO	-	nitric oxide
NO_2	-	nitrogen dioxide
O_2	-	molecular oxygen
O_3	-	ozone
pm	-	afternoon
PM	-	particulate matter
ppb	-	parts per billion
ppm	-	parts per million
ppmv	-	parts per million by volume
PRSD	-	percent relative standard deviation
QA	-	quality assurance
QC	-	quality control
rpm	-	revolutions per minute
scf	-	standard cubic feet (68EF and 29.92"Hg)
scfm	-	standard cubic feet per minute
SRM	-	Standard Reference Material
temp	-	temperature
tph	-	tons per hour
wt	-	weight
v	-	volts
vs	-	versus
°F	-	temperature in degrees Fahrenheit
<	-	less than
>	-	more than
µg	-	microgram, 10^{-6} gram

INTRODUCTION

The CONSOL Energy Inc. Research and Development (CONSOL R&D) is determining mercury speciation and removal at 10 coal-fired facilities with SCR/FGD combinations (Table 1). CONSOL R&D's Exploratory and Environmental Research Group conducted a series of flue gas mercury (Hg), measurements at Plant 2 during the week of May 19, 2003, under U. S. Department of Energy (DOE) Cooperative Agreement No. DE-FC26-02NT41589. The test program consisted of four sets of measurements across the combustion emission control system that consists of a selective catalytic reduction (SCR) unit, spray dryer absorber (SDA), and baghouse.

The mercury measurements were made using the Ontario-Hydro Flue Gas Hg Speciation Method at the SCR inlet, Air Heater Outlet (upstream from the spray dryer), and the Stack. The testing conducted by CONSOL R&D is documented in this report.

Table 1. Coal-fired Facilities in Program

Site #	MW	Air Pollution Control Devices	Coal	Ozone Unit
1	330	SCR / Spray Dryer / Baghouse	Bit	year round
2	245	SCR / Spray Dryer / Baghouse	Bit	year round
3	550	SCR / Spray Dryer / Baghouse	Sub	year round
4	468	SCR / ESP/ Limestone FGD, natural oxidation	Bit	year round
5 Unit 1	1,300	SCR / ESP/ Limestone FGD, in-situ oxidation	Bit	yes
5 Unit 2	1,300	ESP/ Limestone FGD, in-situ oxidation	Bit	yes
6	544	SCR / ESP/ Limestone FGD, ex-situ oxidation	Bit	yes
7	566	SCR / ESP/ Limestone FGD, ex-situ oxidation	Bit	yes
8	684	SCR / ESP / Lime FGD, ex-situ oxidation	Bit	yes
9	640	SCR / ESP/ Lime FGD, inhibited oxidation	Bit	yes
10	1,300	SCR / ESP/ Lime FGD, natural oxidation	Bit	yes

HOST UTILITY DESCRIPTION

Plant 2 is a 245 MW pulverized bituminous coal-fired cogeneration facility with an SCR unit, spray dryer absorber (SDA) designed for 93% SO_2 reduction, and fabric filter (FF) baghouse to control particulate matter. These pollution control devices are operated year-round. The plant typically burns bituminous coal containing 1.5% to 2% sulfur.

MERCURY SAMPLING RESULTS

I. Test Matrix

The mercury measurements consisted of a total of four tests over three days. The test matrix is shown in Table 2.

Table 2. Sampling Test Matrix

Date	Activity	Hg Sampling			Process Sampling			
		SCR Inlet	Air Heater Outlet	Stack Outlet	Coal Samples	Bottom Ash	Lime Slurry	Baghouse Ash
05/19/03	Arrive, Setup	---	---	---	---	---	---	---
05/20/03	Setup, Test 1	X	X	X	X	X	X	X
05/21/03	Test 2	X	X	X	X	X	X	X
	Test 3	X	X	X	X	X	X	X
05/22/03	Test 4	X	X	X	X	X	X	X
	Pack, Demobilize	---	---	---	---	---	---	---

A total of twelve flue gas mercury measurements were conducted using ASTM Method D-6784-02 (Ontario Hydro Method. Mercury measurements were a maximum of 120 minutes in duration. Details of sampling conditions are provided later in this report.

To calculate a material balance, CONSOL R&D and plant personnel obtained process samples simultaneously during the gas sampling periods. Laboratory analyses were performed by CONSOL R&D and are included in this report.

II. Flue Gas Mercury Sampling Results

Figure 1 shows the mercury speciation for the four tests at each location. All tests were made isokinetically. A complete listing of mercury analyses is in Appendix C. The results at each location are discussed below.

A. SCR Inlet

Four mercury measurements were conducted at the SCR inlet. Table 3 summarizes the mercury measurements at the SCR inlet. The results show that more than 99% of the mercury was in the gas phase. The high percentage of gas phase mercury is

expected due to the gas temperature (758 °F) at this location. More than 80% of the total mercury was in the elemental form. The average concentrations of the oxidized and elemental mercury were 2.46 and 11.6 μg/m^3, respectively. The average concentration of total mercury measured at this location was 14.1 μg/m^3.

Table 3. Flue Gas Hg Speciation at the SCR Inlet

Date	Test No.	Hg Concentration, μg/m^3 (dry std conditions)				Hg Flow, mg/sec			
		Hg^{part}	Hg^{++}	Hg^{0}	Hg^{total}	Hg^{part}	Hg^{++}	Hg^{0}	Hg^{total}
05/20/03	1	<0.04	3.68	11.1	14.8	<0.006	0.550	1.66	2.22
05/21/03	2	0.08	0.85	13.0	14.0	0.011	0.117	1.81	1.94
05/21/03	3	0.13	1.91	10.6	12.6	0.018	0.258	1.43	1.70
05/22/03	4	0.05	3.41	11.6	15.1	0.007	0.477	1.63	2.11
	Average	0.08	2.46	11.6	14.1	0.011	0.350	1.63	1.99
	Standard Deviation	0.04	1.33	1.06	1.12	0.005	0.199	0.16	0.23
	PRSD	53	54	9	8	50	57	10	11

B. Air Heater Outlet

Four mercury measurements were conducted at the Air Heater outlet location. Table 4 summarizes the mercury measurements. There was very little elemental mercury detected at this location. The average concentrations of the particulate-bound, oxidized and elemental mercury measured at this location were 1.06, 9.28 and 0.34 μg/m^3, respectively. The average concentration of total mercury was 10.7 μg/m^3.

Table 4. Flue Gas Hg Speciation at the Air Heater Outlet

Date	Test No.	Hg Concentration, µg/m^3 (dry std conditions)				Hg Flow, mg/sec			
		Hg^{part}	Hg^{++}	Hg^{0}	Hg^{total}	Hg^{part}	Hg^{++}	Hg^{0}	Hg^{total}
05/20/03	1	0.65	10.5	0.57	11.8	0.098	1.60	0.087	1.79
05/21/03	2	0.19	9.23	0.24	9.7	0.030	1.38	0.035	1.44
05/21/03	3	1.23	8.67	0.29	10.1	0.176	1.24	0.042	1.46
05/22/03	4	2.16	8.67	0.24	11.1	0.307	1.24	0.035	1.58
	Average	1.06	9.28	0.34	10.7	0.152	1.36	0.050	1.57
	Standard Deviation	0.85	0.88	0.16	0.93	0.120	0.17	0.025	0.16
	PRSD	80	9	48	9	78	13	51	10

C. Stack

Four mercury measurements were conducted at the Stack. Table 5 summarizes the mercury measurements. About two thirds of the mercury in the stack flue gas was in the oxidized form. The average concentrations of the particulate-bound, oxidized, and elemental mercury were 0.002, 0.40 and 0.21 µg/m^3. The average concentration of the total mercury was 0.61 µg/m^3.

Table 5. Flue Gas Hg Speciation at the Stack

Date	Test	Hg Concentration, µg/m^3 (dry std conditions)				Hg Flow mg/sec			
		Hg^{part}	Hg^{++}	Hg^{0}	Hg^{total}	Hg^{part}	Hg^{++}	Hg^{0}	Hg^{total}
05/20/03	1	<0.002	0.39	0.21	0.60	<0.0003	0.060	0.033	0.092
05/21/03	2	<0.002	0.39	0.21	0.60	<0.0003	0.062	0.033	0.095
05/21/03	3	<0.002	0.41	0.21	0.62	<0.0003	0.063	0.033	0.096
05/22/03	4	0.003	0.39	0.22	0.62	0.0004	0.058	0.032	0.090
	Average	0.002	0.40	0.21	0.61	0.0003	0.061	0.033	0.093
	Standard Deviation	0.0005	0.008	0.004	0.01	0.00006	0.0024	0.0004	0.0028
	PRSD	20	2	2	2	17	4	1	3

III. SCR/FGD System Hg Removal

Table 6 summarizes the flue gas mercury removal across the SCR/FGD system. The coal-to-stack average mercury removal was 94.7 percent. Comparing the mercury at the stack to the mercury at the air heater outlet, the average removal was 94.0%.

Table 6. Flue Gas Mercury Removal

Date	Test No.	System Mercury Reduction					
		Ontario Hydro Results, mg Hg^{total} /sec			Coal Feed Based Reduction, mg Hg^{total} /sec		
		Air Heater Outlet	Stack Emissions	% Reduction	Coal Feed	Stack Emissions	% Reduction
05/20/03	1	1.79	0.092	94.8	1.81	0.092	94.9
05/21/03	2	1.44	0.095	93.4	1.76	0.095	94.6
05/21/03	3	1.46	0.096	93.4	1.69	0.096	94.3
05/22/03	4	1.58	0.090	94.3	1.73	0.090	94.8
	Average	1.57	0.093	94.0	1.67	0.093	94.7
	Standard Deviation	0.16	0.0028	0.70	0.05	0.0028	0.26
	PRSD	10	3	<1	3	3	<1

IV. Mercury Material Balance

An important criterion to gauge the overall quality of the tests is to conduct a mass balance to account for the mercury entering and leaving the plant during the tests. The mercury material balance closure is the total mercury output from the plant divided by the total mercury input (expressed as %). The total mercury input is the sum of the amounts of mercury in the coal and lime slurry entering the plant. The total mercury output is the sum of the amounts of mercury leaving the plant through bottom ash, baghouse hopper ash, and stack flue gas. Table 7 shows the mercury material balance closure for the four tests conducted at the plant. The calculated mercury material balance closures ranged from 93% to 104%. The material balance closures for mercury for all four tests are within the QA/QC criterion of 70-130% for a single test and the average value is 99%, which is within the QA/QC criterion of 80-120% for multiple tests. The measurements, calculations, and assumptions for calculating the material balances are described later in this report.

Table 7. Material Balance for Mercury.

Test No.	1	2	3	4
Hg input from Coal (mg/sec)	1.81	1.76	1.69	1.73
Hg input from lime slurry (mg/sec)	0.0007	0.0007	0.0007	0.0008
Hg input to the system (mg/sec)	**1.81**	**1.76**	**1.69**	**1.73**
Hg output from bottom ash (mg/sec)	0.0046	0.0007	0.0008	0.0007
Hg output from baghouse hopper ash (mg/sec)	1.59	1.74	1.63	1.60
Hg output from stack gas (mg/sec)	0.092	0.095	0.096	0.090
Hg output from the system (mg/sec)	**1.69**	**1.84**	**1.73**	**1.69**
Hg material balance closure	**93%**	**104%**	**102%**	**98%**
Average Hg Material Balance	**99±5%**			

V. Comparison with Previous Results Obtained at Plants with No SCR

CONSOL R&D conducted sampling at several plants with an ESP and wet FGD combination.[1] These results are listed in Table 8. Because Plant 2 had a spray dryer/baghouse, the total mercury removals are not directly comparable. However, the mercury speciation at the air heater outlet can be compared to examine the effect of the SCR on mercury oxidation. At most of the plants without an SCR (Table 8) the average Hg^{2+}+Hg^{part}:Hg^{0} ratio was about 80:20 at the air heater outlet. At Plant 2 a higher oxidation ratio (about 97:3, Table 4) was observed.

[1] DeVito, M.S., J.A. Withum and R.M. Statnick, "Flue Gas Hg Measurements from Coal-Fired Boilers Equipped with Wet Scrubbers," *International Journal of Environment and Pollution*, Vol. 17, Nos. 1/2, p. 126-142 (2002).

Table 8. CONSOL Energy's Previous Test Data – Plants Without SCR.

Plants Without SCR	Coal Content, dry basis			% Elemental Mercury at		Scrubber Type	Range of Observed Total Hg Removals (%)
	% Sulfur	% Chlorine	ppm Hg	Economizer Outlet	AH Outlet		
A	3.5	0.11	0.12	NM	19	Mg-Lime	64 to 70
B	3.8	0.16	0.09	NM	22	LSFO	53 to 60
C	3.5	0.11	0.09	NM	13	LSFO	62 to 80
D	4.2	0.23	0.09	NM	24	Chiyoda Limestone	69 to 82
E	4.1	0.14	0.08	NM	20	LSFO	63 to 70
E[a]	4.3	0.17	0.06	89	27	LSFO	NM
F	3.5	0.13	0.19	NM	29	Mg-Lime	60 to 67

NM = Not Measured [a]Measured after the installation of Low-NOx burners

VI. Comparison with Previous Results at Plants with SCR

In the current project, CONSOL R&D is determining mercury speciation and removal at 10 coal-fired facilities with SCR/FGD combinations. The results from two plants (Plants 1 and 8, Table 1) have been reported previously.[2,3]

A. Mercury Speciation at the SCR Inlet and Air Heater Outlet

At all three plants with SCR, the mercury exiting the air heater was >95% in the particulate and oxidized forms, even though the speciation at the SCR Inlet was different at Plant 1 compared to the other two plants. Table 9 lists the mercury speciation data from the two plants reported previously and the data from Plant 2, along with the coal parameters and boiler parameters.

It should be noted at this point that the Ontario Hydro method has not been validated at high flue gas temperatures, such as the >600 °F flue gas typically observed at the SCR inlet. However, at such high temperatures, mercury should not be present in

[2] Evaluation of Mercury Emissions from Coal-Fired Facilities with SCR and FGD Systems, Topical Report No. 1, issued May 2004.
[3] Evaluation of Mercury Emissions from Coal-Fired Facilities with SCR and FGD Systems, Topical Report No. 2, issued October 2004.

the particulate form; furthermore, modeling studies[4] predict that 40% to 90% of the mercury should be in the elemental form in flue gas exiting the boiler economizer, which agrees with our measurements. Thus, the SCR inlet data are presented assuming that the speciation is properly represented by the Ontario Hydro Method.

The Ontarion Hydro Method has not been validated at the high-dust-loading (>1 gr/dscf) conditions that exist at the air heater outlet. CONSOL has seen evidence that some of the oxidized and elemental mercury can condense on the particulate matter collected on the filter thimble of in-stack filters, especially at temeratures below 250 °F; however, the total mercury measurement appears to be valid.[5] At temperatures above 300 °F, condensation on the particulate matter on the filter is less likely to occur. At Plant No. 1, the average air heater outlet gas temperature was 255 °F, so the measured fraction of particulate mercury might be higher than the actual flue gas fraction. At Plant Nos. 2 and 8, the air heater outlet gas temperature was above 300 °F, so the mercury speciation is more likely to be a true representation of the actual flue gas values.

Table 9 shows that there are substantial differences in the coal parameters that have been suspected to affect speciation. For example, the coal sulfur content ranges from 1.0 to 4.7% and the coal ash iron content ranges from 9% to 32%; the chlorine content of the coal burned at Plant 8 was half as much as the chlorine content of the coal burned at the other two plants. Despite these differences, very little of the mercury was in the elemental form at the exit of the SCR/air heater combination.

Table 9 also shows that there are differences in boiler operating parameters that have been suspected to affect speciation. For example, the boiler load ranged from 65% to 100%, the air heater outlet gas temperature ranged from 255 to 355 °F, and the flue gas oxygen content ranged from 3% to 5% at the SCR inlet and from 5% to 7% at the air heater outlet. Even the SCR catalyst type was not the same for each plant. Despite these differences, very little of the mercury was in the elemental form at the exit of the SCR/air heater combination.

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[4] Senior, C. L., "Behavior of Mercury in Air Pollution Control Devices on Coal-Fired Utility Boilers," Engineering Foundation Conference, Power Production in the 21st Century: Impacts of Fuel Quality and Operations, Snowbird, UT, Oct. 28 – Nov. 2, 2001.

[5] Winschel, R. A., Fenger, M. L., Payette, K. H., Brickett, L. A., "Control of Mercury Emissions by Absorption on Flyash – Experimental Results of the CONSOL/Allegheny Pilot Plant Program," presented at the Power Plant Air Pollution Control Mega Symposium, Aug. 30-Sept.2, 2004.

Table 9. Mercury Speciation – Plants With SCR.

	Plant No.	1	2	8
Mercury Speciation at SCR Inlet	Particulate Mercury (%)	<1	<1	<1
	Oxidized Mercury (%)	45	17	8
	Elemental Mercury (%)	54	82	92
Mercury Speciation at Air Heater Outlet	Particulate Mercury (%)	23	10	7
	Oxidized Mercury (%)	72	87	88
	Elemental Mercury (%)	5	3	5
Coal Parameters	Chlorine, dry wt %	0.10	0.10	0.05
	Sulfur, dry wt %	1.0	1.9	4.7
	Coal Ash SiO_2, %	54	48	39
	Coal Ash Al_2O_3, %	26	24	19
	Coal Ash Fe_3O_4, %	9	18	32
Boiler Parameters	Boiler Load	65%	100%	95%
	SCR Inlet Temperature, °F	630	760	680
	AH Outlet Temperature, °F	255	350	335
	% O_2 at SCR Inlet	5.0	4.0	3.1
	% O_2 at AH Outlet	7.0	5.1	5.3
	SCR Type	Plate	Honey-comb	Plate

B. Total Mercury Removal

Although the mercury exiting the air heater was >95% in the particulate and oxidized forms, this did not translate into 95% mercury removal at each plant. Table 10 lists the mercury removal data from the two plants reported previously and the data from Plant 2, along with other parameters that might affect mercury removal. Only Plant 2 showed 95% mercury removal; Plants 1 and 8 showed below 90% removal. Plants 1 and 2 had spray dryers and baghouses, which tend to have high mercury removals because of good solid-gas contact in the baghouse. Plant 8 had an ESP followed by an ex-situ oxidation lime wet scrubber, which tend to have lower mercury removals than a spray dryer/baghouse. Also, 15% of the flue gas bypassed the scrubber at Plant 8; it was estimated that the removal would have been 84% if all of the flue gas went through the scrubber. The results indicate that not all of the oxidized mercury is captured by the FGD system in Plants 1 and 8.

Table 10. Mercury Speciation – Plants With SCR.

	Plant No.	1	2	8
Mercury Speciation at Air Heater Outlet	Particulate Mercury (%)	23	10	7
	Oxidized Mercury (%)	72	87	88
	Elemental Mercury (%)	5	3	5
Coal-to-Stack Mercury Removal (%)		87	95	72 (a)
Air Pollution Control Devices After Air Heater		Spray Dryer / Baghouse	Spray Dryer / Baghouse	ESP / Lime FGD, ex-situ oxidation
Air Heater Outlet temperature, °F		255	350	335
Stack Temperature, °F		190	180	150
Carbon Content in ESP/Baghouse Ash, wt %		5.1	6.3	5.4
Particulate Loading to Baghouse/ESP, gr/dscf		6.0	5.5	2.4

(a) 15% of flue gas by-passed FGD; Hg removal in the scrubbed portion of the flue gas was 84%

EXPERIMENTAL AND SAMPLING METHODS

CONSOL R&D performed flue gas mercury determinations using the Ontario-Hydro sampling method. As a quality assurance/quality control (QA/QC) measure, samples of the coal, bottom ash, spray dryer lime slurry, and baghouse ash, were taken to determine a mercury balance across the system.

I. Flue Gas Sampling Locations and Sampling Points

Three sampling locations, the SCR inlet, Air Heater Outlet (upstream of the spray dryer), and Stack outlet, were tested. Figure 2 is a flow schematic indicating the sampling locations at Plant 2.

A. SCR Inlet

Figure 3 is a schematic of the SCR inlet sampling location. The SCR inlet duct is approximately 8'-6" deep and 32'-9" wide. Preliminary pitot surveys conducted on May 20, 2003, indicated that the gas flow was laminar. The duct was sampled

through four test ports evenly spaced across the duct width. Six traverse points were measured in each port, for a total of 24 sample points, as determined by EPA Method 1. Each point was sampled for five minutes. Mercury measurements were conducted with the sampling nozzle oriented parallel to and directly into the flow.

Four mercury measurements were performed at the SCR inlet. The sample train was prepared in EPA Method 17 configuration using an in-stack 19 mm x 90 mm quartz-fiber thimble filter. The filter apparatus was attached to a heated probe that was connected to the impinger train with a flexible heated Teflon sample line. Figure 4 is a photograph of the mercury sampling train on the SCR inlet. Mercury measurements were conducted isokinetically.

Ideally, each sampling run would have been of 120-minute duration. However, due to high particulate loading at this site, excessive vacuum, caused by filter particulate loading, forced the early termination of each test run. Filters were changed midway through the test in an attempt to prolong the sampling; however, it was necessary to stop the tests prematurely. Runs 1 through 4 were 100, 115, 105, and 85 minutes, respectively.

B. Air Heater Outlet (Spray Dryer Inlet)

Figure 5 is a schematic of the air heater outlet sampling location. The air heater outlet duct is approximately 9' deep and 18'-6" wide. Preliminary pitot surveys conducted on May 20, 2003, indicated that the gas flow was laminar. The duct was sampled through six test ports; three traverse points were sampled in each, for a total of 18 sample points, as determined by EPA Method 1. Each point was sampled for seven minutes, for a total test time of 126 minutes. Only Test 3 had to be shortened due to an increase in sample train vacuum with 18 minutes remaining in the test. Mercury measurements were conducted with the sampling nozzle oriented parallel to and directly into the flow.

Four mercury measurements were performed at the air heater outlet. The sample train was prepared in EPA Method 17 configuration using an in-stack 19 mm x 90 mm quartz-fiber thimble filter. The filter apparatus was attached to a heated probe that was connected to the impinger train with a flexible heated Teflon sample line. mercury measurements were conducted with the sampling nozzle oriented parallel to and directly into the gas flow. Figure 6 is a photograph of the mercury sampling train on the air heater outlet. Mercury measurements were conducted isokinetically.

C. Stack (Baghouse Outlet)

Figure 7 is a schematic of the stack sampling location. The stack is approximately 10 feet in diameter. Preliminary pitot surveys conducted on May 19, 2003, indicated that the gas flow was laminar. Sampling was conducted through two sample access ports, each with six traverse points, as determined by EPA Method 1, for a total of twelve sample points. Each point was sampled for ten minutes, for a total test time of 120 minutes.

Four 120-minute sample runs were performed at the stack sampling location. A standard EPA Method 5 sample train configuration with a heated quartz filter was utilized for this location. Mercury measurements were conducted with the nozzle oriented parallel to and directly into the flow. Figure 8 is a photograph of the mercury sampling train on the stack. Mercury measurements were conducted isokinetically.

II. Flue Gas Mercury Measurements

Flue gas mercury measurements were obtained using the Ontario-Hydro Hg speciation train. The sampling train schematic is shown in Figure 9.

Flue gas was extracted from the flue gas stream and pulled through a heated glass-lined probe and quartz filter. Total particulate matter mass loading was calculated from the solids collected prior to and on the filter. Probe and filter temperatures were maintained at 325 ± 25 °F at the SCR inlet and the air heater outlet, and 250 ± 25 ^{o}F at the stack. Where particle loading is high, the probe and filter are maintained as close as practical to the flue gas temperature.

Mercury collected prior to and on the filter is assumed to be particulate Hg (Hg^{part}). The flue gas exits the quartz filter and passes through a series of chilled impingers. The first three impingers are filled with 100 ml of a 1M-potassium chloride (KCl) solution. It is assumed these impingers capture oxidized forms of mercury in the flue gas (Hg^{++}). The next impinger is filled with 100 ml of a 5% nitric acid and 10% H_2O_2 solution. The purpose of this impinger is to remove SO_2 from the flue gas to preserve the oxidizing strength of the permanganate impingers. Mercury collected in this impinger is assumed to be the elemental form (Hg^0). The next two impingers are filled with 100 ml of an acidic potassium permanganate ($KMnO_4$) solution. It is assumed that these impingers collect elemental mercury (Hg^0). The next impinger is blank to catch any excess moisture. The gas exits the impinger train through a silica gel-filled impinger that removes the moisture from the flue gas. The mercury species collected by the Ontario-Hydro sampling train component are listed in Table 11.

Table 11. Mercury Speciation by Train Component

Train Component	Species Measured
Probe & Nozzle Rinse	Hg^{part}
Quartz Filter	Hg^{part}
KCl Impingers	Hg^{++}
HNO_3/H_2O_2 Impinger	Hg^0
$KMnO_4$ Impingers	Hg^0
HCl Rinse of $KMnO_4$ Impingers	Hg^0

The absorbing solutions were made fresh daily. The impingers were charged and the sampling components were transported to the required locations. The sampling trains were assembled, pre-heated, and checked for pitot and sample line leaks as detailed in EPA Methods 2 and 5, respectively. After passing the leak-check procedure, the sampling probes were inserted into their respective ducts, in-stack filters were allowed to heat to stack temperature, and sampling was initiated. Leak checks were also performed during port changes.

Oxygen readings were monitored at the outlet of the sampling train using a Teledyne Model Max 5 portable analyzer (electrochemical O_2 sensor). At the completion of the sampling period, the sample trains were checked for leaks, purged for 10 min, and then disassembled. The components were transported back to the lab trailer for recovery. The mercury concentration of the individual impinger solutions was determined by cold vapor atomic absorption (CVAA) as specified in the methodology. The concentration of mercury on the solids was determined by acid digestion followed by CVAA.

The amount of mercury collected in the impinger solutions was determined as outlined in EPA Method 29 and the Ontario-Hydro Draft Method. An aliquot of the impinger solution is acidified and the mercury is determined using cold vapor-atomic absorption spectroscopy. The atomic absorption spectrometer is calibrated with commercial mercury standard. The calibration is verified using NIST Standard 1641D. The calibration is reassessed periodically by analyzing a quality control standard. The instrument is recalibrated as required. Each sample matrix is analyzed as a set and an individual calibration curve is used for each set. Depending on sample type, selected samples are spiked with 2, 5, 10, or 15 ng/ml (ppb) of mercury and reanalyzed. Spike recovery must be within ±30% or the sample is diluted and reanalyzed. Selected samples are analyzed in duplicate. The duplicates must be within ±30% or the analyses are repeated.

Where sufficient solids are collected, particulate mercury is analyzed using a 0.5-1.0 gm ash sample. In cases where the particulate catch is low (primarily stack filters) the filter sample is digested. The samples are digested with aqua-regia in pressure vessels prior to analysis by CVAA.

III. Coal Sampling and Analysis

A. Coal Samples

Two coal samples were collected during each test by the control room operators. The first sample was collected during the first hour of the test and the second sample during the second hour of the test. The samples were taken through a sampling port located at the bottom of the coal bins, just above where the coal enters the pulverizers, Figure 10 is a picture showing the sampling device and the sampling port at the bottom of the coal bin.

CONSOL R&D and plant personnel collected coal samples with each test run. Each coal sample was sealed and stored in a 5-gallon plastic bucket after it was collected. The buckets were transported in company vehicles to the CONSOL R&D laboratory at the end of the test week for analysis.

Table 12 is a list of the coal samples collected during the four tests at this plan.

Table 12. List of Coal Samples.

Test No.	Test Date	Sample Time	Sample ID
1	5/20/2003	13:45	Plant-02 Coal-T1-1
		15:25	Plant-02 Coal-T1-2
2	5/21/2003	10:05	Plant-02 Coal-T2-1
		10:30	Plant-02 Coal-T2-2
3	5/21/2003	14:30	Plant-02 Coal-T3-1
		15:35	Plant-02 Coal-T3-2
4	5/22/2003	9:00	Plant-02 Coal-T4-1
		11:00	Plant-02 Coal-T4-2

B. Summary of the Results of Coal Analyses

Coal Samples were analyzed using a direct mercury analyzer following the procedures of ASTM Method D6722. Detailed results of the coal analyses for each test are presented in Appendix D and summarized in Table 13.

Table 13. Coal Analyses
(Units are dry wt% basis, unless otherwise noted)

Sample Description	Plant 02 Coal-T1-1	Plant 02 Coal-T1-2	Plant 02 Coal-T2-1	Plant 02 Coal-T2-2	Plant 02 Coal-T3-1	Plant 02 Coal-T3-2	Plant 02 Coal-T4-1	Plant 02 Coal-T4-2
Test Date	05/20/03	05/20/03	05/21/03	05/21/03	05/21/03	05/21/03	05/22/03	05/22/03
Test No,	1	1	2	2	3	3	4	4
Analytical No.	31640	31641	31642	31643	31644	31645	31626	31627
Moisture (as det'd, %)	2.10	2.07	2.10	2.17	2.20	2.22	1.99	1.97
Ash (dry, %)	7.03	7.05	7.05	7.38	7.40	7.44	7.06	7.21
Volatile Matter	37.1	38.3	38.1	37.5	37.9	38.1	38.0	37.9
Fixed Carbon	55.1	54.6	54.9	55.1	54.7	54.5	55.0	54.9
HHV (Btu/lb)	14,210	14,020	14,050	14,000	14,020	13,940	13,970	13,980
MAF (Btu/lb)	15,090	15,090	15,120	15,110	15,140	15,070	15,030	15,070
Sulfur, total	1.86	1.87	1.87	1.84	1.87	1.85	1.92	1.99
Pyritic S	0.81	0.85	0.85	0.86	0.88	0.93	0.86	0.87
Sulfate S	0.03	0.01	0.01	0.01	0.01	0.02	0.01	0.01
Organic S	1.02	1.01	1.01	0.97	0.98	0.90	1.05	1.11
Carbon	78.0	77.8	77.9	77.7	78.0	77.8	77.9	77.7
Hydrogen	4.90	4.82	4.88	4.78	4.86	4.83	4.84	4.89
Nitrogen	1.51	1.52	1.53	1.51	1.53	1.51	1.52	1.57
Chlorine	0.104	0.087	0.096	0.096	0.097	0.107	0.099	0.114
Oxygen – by difference	6.65	6.82	6.65	6.70	6.22	6.47	6.62	6.49
Mercury (as det'd, ppm)	0.11	0.12	0.11	0.10	0.11	0.10	0.10	0.11

Table 13. Coal Analyses (continued)
(Units are dry wt% basis)

Sample Description	Plant 02 Coal-T1-1	Plant 02 Coal-T1-2	Plant 02 Coal-T2-1	Plant 02 Coal-T2-2	Plant 02 Coal-T3-1	Plant 02 Coal-T3-2	Plant 02 Coal-T4-1	Plant 02 Coal-T4-2
Test Date	05/20/03	05/20/03	05/21/03	05/21/03	05/21/03	05/21/03	05/22/03	05/22/03
Test No,	1	1	2	2	3	3	4	4
Analytical No.	31640	31641	31642	31643	31644	31645	31626	31627
Major Ash Elements (ignited at 750 °C)								
SiO_2	48.0	47.9	48.7	48.6	47.7	47.9	48.1	47.4
Al_2O_3	23.7	23.7	24.1	24.1	23.7	23.5	23.9	23.6
TiO_2	1.02	1.03	1.03	1.03	1.01	1.02	1.02	1.00
Fe_2O_3	17.4	18.5	17.9	17.1	18.3	18.2	18.5	19.8
CaO	2.30	2.04	1.90	1.96	2.13	2.31	2.11	1.98
MgO	0.80	0.77	0.78	0.80	0.77	0.81	0.77	0.75
Na_2O	0.66	0.59	0.60	0.61	0.63	0.67	0.57	0.59
K_2O	1.89	1.79	1.91	1.94	1.94	2.04	1.79	1.83
P_2O_5	0.34	0.34	0.32	0.35	0.34	0.33	0.33	0.34
SO_3	1.90	1.67	1.60	1.64	1.84	2.00	1.68	1.71
UND	2.00	1.66	1.20	1.96	1.61	1.14	1.33	1.06

IV. Process Sample Collection

CONSOL R&D and plant personnel collected samples of the bottom ash, baghouse ash, and pebble lime during each test run.

A. Bottom Ash

Samples of the bottom ash were collected with each test run. Normally, the sluiced bottom ash is continuously pulled out of the trough at the bottom of the boiler by a drag chain. The ash is then conveyed to the "Bottom Ash Pit" as shown in Figure 11.

Any ash accumulated in the pit was removed prior to the start of a test. To collect a sample during a test, the boiler control room operator deactivated the drag chain at the start of the test and the bottom ash was allowed to accumulate inside the trough. After the test was completed, all the bottom ash in the trough was then pulled out and conveyed to the pit. The bottom ash was collected at the bottom ash pit by a plant engineer or CONSOL personnel. Each sample was kept and sealed in a clean plastic container. Table 14 is a list of the bottom ash samples collected at the plant.

Table 14. List of Bottom Ash Samples

Test No.	Test Date	Sample Time	Sample ID
1	05/20/03	16:35	Plant-02 BmAsh-T1
2	05/21/03	13:00	Plant-02 BmAsh-T2
3	05/21/03	17:20	Plant-02 BmAsh-T3
4	05/22/03	12:45	Plant-02 BmAsh-T4

B. Baghouse Hopper Ash

There are 10 baghouse hoppers on each unit at the plant. The arrangement and identification of these hoppers are shown in Figure 12. CONSOL R&D and a plant operator collected samples of the baghouse hopper ash with each test run. These samples were taken from the rod-out ports located at the conical section near the bottom of the hoppers, shown in Figure 13. Ash from Hoppers 2-1, 2-3, 2-5, 2-7, and 2-9 were sampled twice in each test using a three-foot long ash-sampling device called a "sampling thief," shown in Figure 14.

The samples were collected using the following procedure. The rod-out port cap was removed and the sampling thief was inserted into the hopper. This device is made of two concentric metal tubes with openings in both tubes. Once the thief was inside the hopper, the inner tube was rotated to allow the ash to fall into the inner tube through these openings. The inner tube was then rotated to close all the openings and the device was pulled out of the hopper. The collected ash was then discharged into a one gallon sized zip-lock bag through an opening at the end of the device. The sampling time was written on the bag, which was then sealed. The cap was then screwed back on to the port. This procedure was followed at each hopper. After all five hoppers were sampled and the bags were double-sealed and placed in a plastic bucket to prevent moisture from entering and reacting with the ash in the bags. The baghouse hopper ash samples taken during the tests are listed in Table 15.

Table 15. List of Baghouse Hopper Ash Samples

Test No.	Test Date	Hopper No.	Sample Time	Sample ID
1	5/20/2003	#2-9	13:44	Plant-02 BHA T1-2-9-1
			15:10	Plant-02 BHA T1-2-9-2
		#2-7	13:46	Plant-02 BHA T1-2-7-1
			15:12	Plant-02 BHA T1-2-7-2
		#2-5	13:49	Plant-02 BHA T1-2-5-1
			15:14	Plant-02 BHA T1-2-5-2
		#2-3	13:54	Plant-02 BHA T1-2-3-1
			15:16	Plant-02 BHA T1-2-3-2
		#2-1	14:05	Plant-02 BHA T1-2-1-1
			15:17	Plant-02 BHA T1-2-1-2
2	5/21/2003	#2-9	9:38	Plant-02 BHA T2-2-9-1
			10:44	Plant-02 BHA T2-2-9-2
		#2-7	9:39	Plant-02 BHA T2-2-7-1
			10:45	Plant-02 BHA T2-2-7-2
		#2-5	9:41	Plant-02 BHA T2-2-5-1
			10:46	Plant-02 BHA T2-2-5-2
		#2-3	9:43	Plant-02 BHA T2-2-3-1
			10:48	Plant-02 BHA T2-2-3-2
		#2-1	9:45	Plant-02 BHA T2-2-1-1
			10:55	Plant-02 BHA T2-2-1-2
3	5/21/2003	#2-9	14:39	Plant-02 BHA T3-2-9-1
			15:52	Plant-02 BHA T3-2-9-2
		#2-7	14:40	Plant-02 BHA T3-2-7-1
			15:53	Plant-02 BHA T3-2-7-2
		#2-5	14:41	Plant-02 BHA T3-2-5-1
			15:54	Plant-02 BHA T3-2-5-2
		#2-3	14:42	Plant-02 BHA T3-2-3-1
			15:56	Plant-02 BHA T3-2-3-2
		#2-1	14:44	Plant-02 BHA T3-2-1-1
			15:58	Plant-02 BHA T3-2-1-2
4	5/22/2003	#2-9	9:24	Plant-02 BHA T4-2-9-1
			11:02	Plant-02 BHA T4-2-9-2
		#2-7	9:26	Plant-02 BHA T4-2-7-1
			11:04	Plant-02 BHA T4-2-7-2
		#2-5	9:29	Plant-02 BHA T4-2-5-1
			11:05	Plant-02 BHA T4-2-5-2
		#2-3	9:32	Plant-02 BHA T4-2-3-1
			11:07	Plant-02 BHA T4-2-3-2
		#2-1	9:34	Plant-02 BHA T4-2-1-1
			11:08	Plant-02 BHA T4-2-1-2

C. Pebble Lime Samples

A plant operator collected lime samples from the lime storage silo inside the slaker building during each test. Two samples were collected during each test. Each lime sample was sealed and kept in a 2-gallon plastic bucket. Table 16 is a list of the lime samples collected during the tests.

Table 16. List of Pebble Lime Samples.

Test No.	Test Date	Sample Time	Sample ID
1	5/20/2003	14:15	Plant-02 Pebble Lime T1-1
		15:30	Plant-02 Pebble Lime T1-2
2	5/21/2003	9:50	Plant-02 Pebble Lime T2-1
		10:55	Plant-02 Pebble Lime T2-2
3	5/21/2003	14:50	Plant-02 Pebble Lime T3-1
		16:10	Plant-02 Pebble Lime T3-2
4	5/22/2003	9:50	Plant-02 Pebble Lime T4-1
		11:15	Plant-02 Pebble Lime T4-2

V. Process Sample Analyses

Solid samples were analyzed using a direct mercury analyzer, following the procedures of ASTM D6722. Detailed results of the process material analyses are presented in Appendix D.

A. Bottom Ash Analyses

Table 17 is a list of the analyses of the four bottom ash samples collected at Plant 2 during each test. The amount of mercury detected in the first sample was 0.02 ppm, while the other three samples were found to have 0.003 ppm.

Table 17. Results of analyses of bottom ash samples.
(Units are dry wt% basis, unless otherwise noted)

Sample ID	Plant-02 BmAsh-T1	Plant-02 BmAsh-T2	Plant-02 BmAsh-T3	Plant-02 BmAsh-T4
Test Date	05/20/03	05/21/03	05/21/03	05/22/03
Test No.	1	2	3	4
Analytical No.	31628	31629	31630	31631
Moisture (as det'd, %)	0.42	0.25	0.69	0.44
Ash	90.7	94.4	85.7	89.7
Sulfur, total	0.09	0.08	0.10	0.10
Mercury (as det'd, ppm)	0.02	0.003	0.003	0.003
Major Ash Elements				
SiO_2	44.0	46.4	42.1	44.2
Al_2O_3	20.4	21.4	19.3	20.3
TiO_2	0.91	0.97	0.87	0.90
Fe_2O_3	21.3	21.2	18.9	20.2
CaO	2.37	2.54	2.17	2.36
MgO	0.73	0.78	0.69	0.73
Na_2O	0.51	0.55	0.50	0.55
K_2O	1.56	1.73	1.57	1.69
P_2O_5	0.25	0.25	0.22	0.24
SO_3	0.23	0.19	0.26	0.26
UND	7.76	3.99	13.37	8.59

B. Baghouse Hopper Ash Analyses

Results of analyses of the baghouse hopper ash samples collected in Test 1, 2, 3, and 4, are listed in Tables 18, 19, 20 and 21, respectively.

The carbon contents in the baghouse hopper ash samples ranged from 4.06 to 8.04% and the mercury concentrations ranged from 0.58 to 0.76 ppm. The undetermined fraction is typically carbonate and water of hydration. The mercury content was not correlated with the carbon content in the baghouse hopper ash samples, as shown in Figure 15.

Table 18. Analyses of Baghouse Hopper Ash Samples Collected During Test 1.
(Units are dry wt% basis, unless otherwise noted)

Sample ID	Plant-02 BHA T1-2-9-1	Plant-02 BHA T1-2-9-2	Plant-02 BHA T1-2-7-1	Plant-02 BHA T1-2-7-2	Plant-02 BHA T1-2-5-1	Plant-02 BHA T1-2-5-2	Plant-02 BHA T1-2-3-1	Plant-02 BHA T1-2-3-2	Plant-02 BHA T1-2-1-1	Plant-02 BHA T1-2-1-2
Analytical No.	31649	31654	31650	31655	31651	31656	31652	31657	31653	31658
Moisture (as det. %)	0.85	0.91	0.75	0.77	1.23	1.13	0.72	1.14	0.86	1.08
Ash	91.9	90.9	91.8	91.7	90.7	90.8	89.0	92.1	90.1	92.1
Sulfur, total	9.91	9.47	9.70	9.63	9.71	9.49	9.06	10.27	8.92	10.21
SO_3 as S	10.30	9.84	10.10	9.84	9.80	9.96	9.28	10.50	8.32	10.50
Carbon, total	5.30	5.96	5.21	5.41	6.42	6.13	7.47	4.86	6.79	5.06
Inorg. Carbon (as det. %)	0.89	0.93	0.86	0.86	0.88	0.95	0.93	0.79	0.91	0.82
Chlorine	0.69	0.69	0.70	0.73	0.66	0.63	0.54	0.74	0.68	0.77
Mercury (as det. ppm)	0.76	0.70	0.70	0.68	0.72	0.68	0.60	0.70	0.67	0.72
Major Ash Elements										
SiO_2	20.6	20.1	20.3	20.2	20.8	20.3	19.5	19.6	20.2	19.8
Al_2O_3	9.73	9.49	9.60	9.51	9.85	9.56	9.02	9.35	9.48	9.41
TiO_2	0.44	0.43	0.43	0.43	0.45	0.43	0.40	0.42	0.42	0.43
Fe_2O_3	6.71	6.83	6.88	6.80	7.10	7.10	7.59	6.17	7.28	6.32
CaO	27.0	27.2	27.6	27.4	26.4	26.8	27.7	28.0	26.8	27.7
MgO	0.68	0.67	0.68	0.67	0.64	0.66	0.67	0.67	0.66	0.67
Na_2O	0.29	0.28	0.29	0.29	0.28	0.28	0.26	0.3	0.28	0.29
K_2O	0.82	0.80	0.82	0.82	0.83	0.81	0.77	0.82	0.81	0.82
P_2O_5	0.14	0.14	0.14	0.13	0.13	0.13	0.12	0.13	0.13	0.14
SO_3	23.9	23.0	23.9	23.4	22.9	22.5	21.4	23.9	22.6	23.7
UND	9.7	11.2	9.4	10.4	10.7	11.4	12.6	10.6	11.4	10.7

Table 19. Analyses of Baghouse Hopper Ash Samples Collected During Test 2.
(Units are dry wt% basis, unless otherwise noted)

Sample ID	Plant-02 BHA T2-2-9-1	Plant-02 BHA T2-2-9-2	Plant-02 BHA T2-2-7-1	Plant-02 BHA T2-2-7-2	Plant-02 BHA T2-2-5-1	Plant-02 BHA T2-2-5-2	Plant-02 BHA T2-2-3-1	Plant-02 BHA T2-2-3-2	Plant-02 BHA T2-2-1-1	Plant-02 BHA T2-2-1-2
Analytical No.	31659	31664	31660	31665	31661	31666	31662	31667	31663	31668
Moisture (as det. %)	0.45	0.55	1.15	1.68	3.91	0.94	0.89	0.73	1.65	2.60
Ash	88.7	90.0	91.7	90.7	89.3	88.7	87.6	87.9	92.4	91.8
Sulfur, total	9.93	9.07	9.74	9.97	9.23	9.36	9.58	9.84	10.27	10.68
SO_3 as S	10.10	8.99	10.00	9.95	5.87	9.49	9.78	9.44	10.40	10.40
Carbon, total	6.96	6.15	5.41	5.87	6.61	6.52	8.04	7.36	5.19	5.30
Inorg. Carbon (as det. %)	0.89	1.02	0.78	1.19	1.10	0.97	1.04	0.91	1.07	1.13
Chlorine	0.63	0.64	0.68	0.67	0.61	0.58	0.70	0.65	0.76	0.77
Mercury (as det. ppm)	0.71	0.71	0.71	0.68	0.69	0.68	0.72	0.68	0.70	0.73
Major Ash Elements										
SiO_2	17.1	18.0	20.3	19.9	18.6	17.2	17.0	16.9	21.0	20.1
Al_2O_3	8.24	8.60	9.70	9.51	8.88	8.17	8.11	8.05	10.12	9.75
TiO_2	0.36	0.38	0.44	0.43	0.40	0.35	0.35	0.35	0.46	0.44
Fe_2O_3	5.10	5.70	6.72	6.53	5.74	5.28	4.95	5.17	6.53	6.34
CaO	30.5	30.3	27.2	27.1	29.7	31.5	30.6	31.1	26.0	26.7
MgO	0.66	0.66	0.67	0.65	0.66	0.67	0.66	0.66	0.66	0.65
Na_2O	0.26	0.25	0.29	0.28	0.27	0.24	0.23	0.23	0.32	0.30
K_2O	0.69	0.73	0.81	0.80	0.75	0.70	0.69	0.67	0.85	0.83
P_2O_5	0.11	0.12	0.14	0.13	0.11	0.10	0.10	0.11	0.14	0.13
SO_3	22.4	22.6	23.8	23.3	23.6	22.4	22.8	22.4	25.1	24.1
UND	14.5	12.6	9.9	11.4	11.2	13.4	14.6	14.3	8.9	10.8

Table 20. Analyses of Baghouse Hopper Ash Samples Collected During Test 3.
(Units are dry wt% basis, unless otherwise noted)

Sample ID	Plant-02 BHA T3-2-9-1	Plant-02 BHA T3-2-9-2	Plant-02 BHA T3-2-7-1	Plant-02 BHA T3-2-7-2	Plant-02 BHA T3-2-5-1	Plant-02 BHA T3-2-5-2	Plant-02 BHA T3-2-3-1	Plant-02 BHA T3-2-3-2	Plant-02 BHA T3-2-1-1	Plant-02 BHA T3-2-1-2
Analytical No.	31669	31674	31670	31675	31671	31676	31672	31677	31673	31678
Moisture (as det. %)	0.48	0.37	1.54	0.88	0.83	0.36	0.82	0.34	1.93	1.00
Ash	89.2	89.6	90.7	91.1	89.1	88.9	89.0	88.7	90.8	88.4
Sulfur, total	9.94	10.34	9.82	9.72	9.85	9.59	9.63	9.39	9.76	9.12
SO_3 as S	8.98	8.38	9.84	9.73	9.61	9.85	9.68	4.78	9.57	9.34
Carbon, total	6.73	6.55	6.07	6.23	6.59	6.67	6.79	6.82	5.86	7.00
Inorg. Carbon (as det. %)	0.89	0.92	0.90	0.89	0.96	0.99	0.90	0.95	1.01	1.04
Chlorine	0.63	0.64	0.75	0.70	0.66	0.61	0.62	0.57	0.78	0.59
Mercury (as det. ppm)	0.73	0.67	0.69	0.67	0.70	0.65	0.68	0.66	0.65	0.63
Major Ash Elements										
SiO_2	18.5	17.5	20.4	20.7	17.7	17.3	17.9	17.6	20.4	17.6
Al_2O_3	8.88	8.46	9.68	9.81	8.32	8.14	8.40	8.22	9.86	8.25
TiO_2	0.38	0.36	0.43	0.43	0.36	0.35	0.36	0.36	0.43	0.37
Fe_2O_3	5.25	5.34	6.52	6.88	5.62	5.43	5.73	5.64	6.53	5.62
CaO	29.6	28.9	27.0	27.0	31.1	32.3	31.5	31.9	29.5	31.9
MgO	0.66	0.65	0.68	0.69	0.69	0.69	0.69	0.69	0.71	0.70
Na_2O	0.27	0.26	0.29	0.29	0.24	0.24	0.24	0.24	0.32	0.24
K_2O	0.76	0.73	0.84	0.86	0.72	0.71	0.75	0.71	0.83	0.73
P_2O_5	0.12	0.11	0.11	0.12	0.09	0.09	0.09	0.10	0.13	0.10
SO_3	22.7	22.5	23.4	23.4	22.7	22.9	23.2	22.6	25.1	22.5
UND	12.9	15.1	10.7	9.8	12.5	11.9	11.2	12.0	6.2	11.9

Table 21. Analyses of Baghouse Hopper Ash Samples Collected During Test 4.
(Units are dry wt% basis, unless otherwise noted)

Sample ID	Plant-02 BHA T4-2-9-1	Plant-02 BHA T4-2-9-2	Plant-02 BHA T4-2-7-1	Plant-02 BHA T4-2-7-2	Plant-02 BHA T4-2-5-1	Plant-02 BHA T4-2-5-2	Plant-02 BHA T4-2-3-1	Plant-02 BHA T4-2-3-2	Plant-02 BHA T4-2-1-1	Plant-02 BHA T4-2-1-2
Analytical No.	31679	31684	31680	31685	31681	31686	31682	31687	31683	31688
Moisture (as det. %)	0.76	0.64	0.78	0.97	0.74	1.01	1.09	0.96	0.82	1.16
Ash	90.9	89.3	89.1	89.6	91.2	90.3	90.94.	90.5	90.0	89.2
Sulfur, total	9.60	9.11	9.65	9.05	10.18	9.75	9.57	9.69	9.37	9.52
SO_3 as S	7.70	7.51	9.62	4.74	10.10	9.38	9.15	7.56	9.42	9.59
Carbon, total	6.14	6.28	7.17	6.86	5.63	6.25	5.91	6.12	6.45	6.81
Inorg. Carbon (as det. %)	0.86	1.19	1.08	1.05	1.03	0.97	1.08	0.99	1.05	1.07
Chlorine	0.67	0.67	0.66	0.65	0.63	0.63	0.73	0.66	0.65	0.61
Mercury (as det. ppm)	0.66	0.58	0.63	0.62	0.65	0.63	0.66	0.62	0.63	0.60
Major Ash Elements										
SiO_2	21.5	19.4	19.9	19.9	20.1	19.3	20.6	20.8	20.2	19.7
Al_2O_3	10.29	9.23	9.53	9.53	9.71	9.23	9.91	10.08	9.65	9.42
TiO_2	0.45	0.40	0.41	0.42	0.43	0.41	0.44	0.43	0.42	0.41
Fe_2O_3	6.96	6.57	6.38	6.38	6.24	5.86	6.49	6.54	6.48	6.25
CaO	26.1	28.7	27.7	27.6	27.8	28.8	27.3	28.3	27.5	28.1
MgO	0.70	0.69	0.69	0.68	0.69	0.69	0.70	0.71	0.69	0.68
Na_2O	0.33	0.29	0.31	0.30	0.31	0.30	0.32	0.34	0.31	0.29
K_2O	0.90	0.82	0.84	0.84	0.86	0.81	0.88	0.92	0.83	0.82
P_2O_5	0.12	0.11	0.11	0.11	0.12	0.11	0.12	0.13	0.13	0.11
SO_3	22.7	22.2	22.6	23.0	24.2	23.9	24.1	23.8	21.3	22.7
UND	10.0	11.6	11.6	11.3	9.5	10.7	9.2	8.0	12.5	11.5

C. Pebble Lime Analyses

Results of the analyses of the pebble lime are listed in Table 22. The amount of mercury detected in seven of the eight lime samples was 0.001 ppm. Pebble Lime-T3-1 was found to have slightly higher amount of mercury, 0.003 ppm. These values were two orders of magnitude less than amounts of mercury measured in the coal or baghouse ash samples. The undetermined content is typically carbonate and water of hydration.

Table 22. Analyses of Pebble Lime Samples.
(Units are dry wt% basis, unless otherwise noted)

Sample ID	Plant-02	Plant-02	Plant-02	Plant-02	Plant-02	Plant-02	Plant-02	Plant-02
Test Date	05/20/03	05/20/03	05/21/03	05/21/03	05/21/03	05/21/03	05/22/03	05/22/03
Test No.	1	1	2	2	3	3	4	4
Analytical No.	31632	31633	31634	31635	31636	31637	31638	31639
Moisture (as det'd, %)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulfur, total	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04
Mercury (as det'd, ppm)	0.001	0.001	0.001	0.001	0.003	0.001	0.001	0.001
Major Ash Elements								
SiO_2	1.45	1.33	1.28	1.26	1.45	1.34	1.24	1.22
Al_2O_3	0.45	0.44	0.43	0.40	0.48	0.45	0.42	0.41
TiO_2	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Fe_2O_3	0.20	0.16	0.17	0.14	0.18	0.16	0.14	0.15
CaO	92.9	93.5	91.0	92.4	88.7	88.4	89.7	89.7
MgO	1.20	1.19	1.15	1.20	1.18	1.17	1.17	1.14
Na_2O	0.02	0.03	0.02	0.02	0.02	0.02	0.01	0.02
K_2O	0.10	0.10	0.10	0.09	0.10	0.11	0.09	0.09
P_2O_5	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.02
SO_3	0.11	0.10	0.09	0.10	0.11	0.09	0.08	0.11
UND	3.52	3.08	5.75	4.39	7.73	8.2	7.16	7.14

QUALITY ASSURANCE/QUALITY CONTROL

The sampling and analysis QA/QC procedures are described below.

- Personnel specifically trained and experienced in power plant sampling methods, including the Ontario-Hydro mercury sampling method, conducted all sampling,
- The sampling equipment was maintained and calibrated as required,
- Consistent sample preparation and recovery procedures were used,
- Samples were logged and tracked under the direction of sample team Group Leader,
- Individual calibration curves were developed for each sample matrix,
- NIST Standard Reference Material (SRM) and lab QC samples were analyzed to verify calibration curves,
- Duplicates of selected samples were analyzed to assure repeatability,
- Analyses of selected "spiked" samples were analyzed to assure sample recovery, and
- Interim data were reviewed to assure sample completeness.

All samples were obtained using the procedures described in EPA Method 5 and the Ontario-Hydro mercury Speciation draft method. Data were recorded on standard forms, which are included in Appendix A. The field data were reduced using standard "in-house" spreadsheets. Copies of the summary sheets are included in Appendix A. To assure consistency, all of the Ontario-Hydro train components were prepared and recovered under the supervision of a senior technician experienced in the Ontario-Hydro mercury speciation lab techniques. Copies of the recovery sheets are included in Appendix C.

The Ontario-Hydro sampling train analysis consisted of eight sub-samples. Each sub-sample analysis consisted of developing a calibration curve (absorbance versus mercury concentration in solution), checks of field and lab blanks, calibration checks with SRM and lab standards, selected duplicates and selected sample spikes. The laboratory summaries for each of these runs are contained in Appendix C.

A total of 151 individual Ontario-Hydro mercury determinations were completed. This included 24 calibration standards, 13 blank samples, 24 NIST SRM or lab QC checks, 16 sample spikes, and 16 duplicate analyses.

Blank Samples

A total of 13 blank liquid samples were analyzed. The average blank value was <1.0 ng/ml (ppb in solution). The average blank value is much less than any individual

Hg^{part}, Hg^{++}, or Hg^{0} determination in ng/ml and, more importantly, is much less than the mercury concentration detection limit (discussed later in this report). Consequently, in this report, blank concentrations were not subtracted out from any mercury determination.

NIST SRM Checks

Twenty-four NIST SRM checks were conducted throughout the mercury determinations. Two standards were used in the determinations as detailed in Table 23.

Table 23. NIST SRM Analyses

NIST SRM	Standard Value (ng/ml)	Sample Fraction	Samples Analyzed	Average Result (ng/ml)	Percent of Standard	Standard Deviation (%)	Percent Relative Standard Deviation
1641D	8.0	Ontario Hydro Liquids	21	8.05	100.7	0.28	3.5
		Ontario Hydro Filters	3	8.07	100.8	0.05	0.6
1633b	149.0	Ontario Hydro Filters	1	149	105.7	NA	NA

Spike Sample Recoveries

A total of 16 samples were spiked with a 2, 5, or 10 ppb mercury standard and then re-analyzed to determine the percent spike recovery. The result of this QA/QC procedure was an average spike recovery of 94.3% recovery with a ±4.1% standard deviation.

Duplicate Analyses

A total of 16 duplicate analyses were conducted periodically throughout the mercury determinations. The result of this QA/QC procedure was an average mercury determination that was within 2.8% of the original mercury determination, with a ±4.6% standard deviation.

Flue Gas Mercury Concentration Detection Limits

For liquid samples, the flue gas mercury concentration was calculated using the following equation:

$$Hg\left[\mu g / m^3\right] = \frac{\left(C_{imp}\ x V_{imp}\right)}{\left(V_{gas}\ x 1000\right)}$$

where: C_{imp} = Mercury concentration of impinger solution [ng/mL (ppb)]
V_{imp} = Liquid volume of impinger solution [mL]
V_{gas} = Flue gas sample volume [dry standard m^3]
1000= Conversion factor [1000 ng per µg]

The flue gas mercury detection limit is reduced when the flue gas sample volume is increased or liquid volume of impinger solution is decreased. The CVAA is calibrated between 0 and 20 ng/ml. Over this range, the calibration curve between absorbance and concentration is linear. The lowest concentration standard used to develop the calibration curve is 0.500 ng/ml. In addition, the detection limit of the liquid CVAA analysis was <1.0 ng/ml. The prescribed sampling and recovery procedures result in final liquid volumes varying between 50 and 756 ml. The volume of flue gas collected varied between 0.915 and 2.535 dscm. The sampling variables result in sample-specific flue gas detection limit. The flue gas mercury detection limit for each sample matrix is listed in Table 24.

Table 24. Flue Gas Hg Detection Limits

Matrix	Maximum Liquid Volume [ml]	Minimum Gas Volume [dscm]	Flue Gas Detection Limit [$\mu g/m^3$]
Probe Rinse	137	0.915	0.15
KCl Impinger	756	0.915	0.83
HNO_3/H_2O_2 Impingers	181	0.915	0.20
$KMnO_4$ Impingers	256	0.915	0.28
HCl Rinse	100	0.915	0.11

Depending on the matrix, the flue gas mercury detection limit ranged from 0.11-0.83 $\mu g/m^3$.

Mercury Material Balance Calculation Method

One important criterion to gauge the overall quality of the tests is to conduct a mass balance to account for the mercury entering and leaving the plant during the time of the tests. Mercury entered the plant through coal and lime slurry. Mercury left the plant via bottom ash, baghouse hopper ash, and stack flue gas. No SDA hopper ash sample was collected in the test. For material balance calculation purpose, it is further assumed that the mercury output via the SDA hopper ash is combined with that via the baghouse hopper ash. The calculation of each process stream's contribution to the mercury balance is described in the following sections.

Mercury input from the coal. The coal feed rate data were recorded and provided by the plant. Two coal samples were collected in each test and the average values of the results of analyses of these two samples were used for material balance calculations. Summarized in Table 25 are the average values of the results of analyses for the coal samples collected in the four tests. The mercury input from coal can then be calculated, and the results are summarized in Table 26.

Table 25. Average Values of the Results of Analyses for Coal Samples

Sample Description	Coal Test 1	Coal Test 2	Coal Test 3	Coal Test 4
Test Date	05/20/2003	05/21/2003	05/21/2003	05/22/2003
Test No,	1	2	3	4
Moisture (as det'd, %)	2.09	2.14	2.21	1.98
Ash (dry, %)	7.04	7.22	7.42	7.14
V.M. (dry, %)	37.7	37.8	38.0	37.9
Fixed C (dry, %)	54.9	55.0	54.6	55.0
HHV (Btu/lb)	14,110	14,030	13,980	13,980
MAF (Btu/lb)	15,090	15,120	15,100	15,050
Sulfur, total (dry, %)	1.87	1.86	1.86	1.96
Pyritic S (dry, %)	0.83	0.86	0.91	0.87
Sulfate S (dry, %)	0.02	0.01	0.02	0.01
Organic S (dry, %)	1.02	0.99	0.94	1.08
Carbon (dry, %)	77.9	77.8	77.9	77.8
Hydrogen (dry, %)	4.86	4.83	4.85	4.87
Nitrogen (dry, %)	1.52	1.52	1.52	1.55
Oxygen (dry, %, by difference)	6.74	6.68	6.35	6.56
Chlorine (dry, %)	0.10	0.10	0.10	0.11
Mercury (as det'd, ppm)	0.12	0.11	0.11	0.11
Major Ash Element (dry, %)				
SiO_2	47.9	48.6	47.8	47.7
Al_2O_3	23.7	24.1	23.6	23.7
TiO_2	1.03	1.03	1.02	1.01
Fe_2O_3	18.0	17.5	18.3	19.1
CaO	2.17	1.93	2.22	2.05
MgO	0.79	0.79	0.79	0.76
Na_2O	0.63	0.61	0.65	0.58
K_2O	1.84	1.93	1.99	1.81
P_2O_5	0.34	0.34	0.34	0.34
SO_3	1.79	1.62	1.92	1.70
UND	1.83	1.58	1.38	1.20

Table 26. Mercury Input from Coal

Test No.	1	2	3	4
Coal feed rate (kpph)	120	127	122	125
Coal moisture content (as det'd, %)	2.09	2.14	2.21	1.98
Coal mercury content (ppm)	0.12	0.11	0.11	0.11
Mercury input from the coal (mg/sec)	1.81	1.76	1.69	1.73

Mercury output via bottom ash. The rates of bottom ash leaving the plant were calculated based on the assumption that 20 percent of the coal ash ended up as bottom ash. The results of analyses of the four bottom ash samples collected at the end of each test were previously summarized (Table 17). The mercury output via the bottom ash from each test can then be calculated as the results are summarized in Table 27.

Table 27. Mercury Output via Bottom Ash

Test No.	1	2	3	4
Coal feed rate (kpph)	120	127	122	125
Coal moisture content (%)	2.09	2.14	2.21	1.98
Coal ash content (%, dry)	7.04	7.22	7.42	7.14
Bottom Ash/Coal Ash (wt/wt)	0.20			
Bottom ash mass flow rate (kpph)	1.65	1.79	1.77	1.75
Bottom ash Hg content (ppm, as det'd)	0.020	0.003	0.003	0.003
Hg output via bottom ash (mg/sec)	0.0046	0.0007	0.0008	0.0007

Mercury input from pebble lime. Two pebble lime samples were collected in each test. One was taken during the first hour of the test and the second one was taken during the second hour of the test. For material balance calculation, the average values of the analyses of the two samples collected in one test were used. Summarized in Table 28 are the average values of analyses for the pebble lime samples collected in the four tests.

The plant had no device to record the actual feed rate of lime slurry injected into the SDA. The lime slurry feed rates were estimated based on a Ca/S ratio of 1.4, which was the historical average number provided by the plant. The lime requirement is the amount of Ca theoretically required to remove one mole of sulfur entering the SDA times the Ca/S ratio.

The amount of sulfur reacted with the injected lime slurry in the SDA is simply the difference between that the amount of sulfur in the coal entering the boiler and the amount of sulfur in the bottom ash leaving the boiler. The amount of lime required is the amount of the sulfur entering the SDA times the Ca/S ratio.

The lime slurry sampled collected at the plant was filtered and air-dried in the water laboratory at CONSOL R&D. The air-dried sample was analyzed for mercury and other ingredients. Once the lime slurry flow rate was known, the mercury input from pebble lime was calculated and the results are summarized in Table 29.

Table 28. Average Analyses of the Pebble Lime Samples.

Sample ID	Pebble Lime Test 1	Pebble Lime Test 2	Pebble Lime Test 3	Pebble Lime Test 4
Test Date	05/20/03	05/21/03	05/21/03	05/22/03
Test No.	1	2	3	4
Moisture (as det'd, wt %)	<0.01	<0.01	<0.01	<0.01
Sulfur, total (dry, wt %)	0.04	0.04	0.04	0.04
Mercury (as det'd, ppm)	0.001	0.001	0.002	0.001
Major Ash Element (dry, wt %)				
SiO_2	1.39	1.27	1.40	1.23
Al_2O_3	0.45	0.42	0.47	0.42
TiO_2	0.02	0.02	0.02	0.02
Fe_2O_3	0.18	0.16	0.17	0.15
CaO	93.2	91.7	88.6	89.7
MgO	1.20	1.18	1.18	1.16
Na_2O	0.03	0.02	0.02	0.02
K_2O	0.10	0.10	0.11	0.09
P_2O_5	0.01	0.03	0.02	0.02
SO_3	0.11	0.10	0.10	0.10
UND	3.30	5.07	7.97	7.15

Table 29. Mercury Input from Pebble Lime.

Test No.	1	2	3	4
Coal feed rate (kpph)	120	127	122	125
Coal moisture content (as det'd, %)	2.09	2.14	2.21	1.98
Coal sulfur content, (dry, wt%)	1.87	1.86	1.86	1.96
Sulfur input from coal (kpph)	2.19	2.31	2.22	2.40
Ca/S ratio	1.4			
Lime (as CaO) required (kpph)	5.36	5.65	5.44	5.88
Lime mercury content, (ppm)	0.001	0.001	0.001	0.001
Mercury input from lime (mg/sec)	6.76E-04	7.12E-04	6.85E-04	7.41E-04

Mercury output via baghouse hopper ash. To calculate the mercury output via the baghouse hopper ash, the first step is to calculate the mass flow rate of the baghouse hopper ash. This is the sum of the fly ash (coal ash – bottom ash), lime injected as $Ca(OH)_2$ plus impurities, and sulfur removed as SO_2. The amount of sulfur removed can be calculated by the SO_2 removal efficiency of the SDA/baghouse combination, which is measured by the plant's CEM. In spray dryer systems, calcium hydroxide slurry absorbs SO_2, forming $CaSO_3$ and $CaSO_4$ at about 80:20 molar ratio. Thus, the reactions for SO_2 capture are:

$$Ca(OH)_2 + SO_2 \rightarrow CaSO_3 \cdot ½\, H_2O + ½\, H_2O \qquad 80\%$$
$$Ca(OH)_2 + SO_2 + ½\, O_2 + ½\, H_2O \rightarrow CaSO_4 \cdot 2\, H_2O \qquad 20\%$$

Table 30 shows the results of the calculation of the mercury output via the baghouse ash.

Table 30. Mercury Output via Baghouse Hopper Ash.

Test No.	1	2	3	4
Coal feed rate (kpph)	120	127	122	125
Coal moisture content (as det'd, %)	2.09	2.14	2.21	1.98
Coal ash content (dry, wt %)	7.04	7.22	7.42	7.14
Coal ash fraction going to baghouse	0.8			
Coal ash going to baghouse (kpph)	6.59	7.17	7.08	6.99
Coal sulfur content, (dry, wt%)	1.87	1.86	1.86	1.96
Sulfur input from coal (kpph)	2.19	2.31	2.22	2.40
Ca/S ratio	1.4			
Ca fed to SDA as $Ca(OH)_2$ (kpph)	7.09	7.47	7.18	7.77
Pebble lime purity (wt % CaO)	93%	92%	89%	90%
Impurities fed to SDA/baghouse (kpph)	0.48	0.62	0.82	0.80
Sulfur capture in SDA (%)	94%	96%	94%	95%
SO_2 captured in baghouse (kpph)	4.12	4.42	4.19	4.57
Total mass captured in baghouse (kpph)	18.3	19.7	19.3	20.1
Baghouse ash Hg content (ppm as det'd)	0.69	0.70	0.67	0.63
Hg output via SDA/baghouse ash (mg/sec)	1.59	1.74	1.63	1.60

Mercury output via stack flue gas. The amount of mercury in the stack flue gas was calculated based on the Ontario-Hydro data and the results of the mercury output via the stack flue gas are summarized in Table 31.

Table 31. Mercury Output via Stack Flue Gas

Test No.	1	2	3	4
Hg concentration Stack Gas (μg/Nm^3)	0.60	0.60	0.62	0.62
Stack gas flow rate (Nm^3/min)	9,200	9,470	9,320	8,790
Hg flow rate at stack (mg/sec)	0.092	0.095	0.096	0.090

Mercury material balance closure. The mercury material balance closure is the total mercury output from the plant divided by the total mercury input, expressed in percent. The total mercury input is the sum of the amounts of mercury in the coal

and lime slurry entering the plant. The total mercury output is the sum of the amounts of mercury leaving the plant through bottom ash, baghouse hopper ash, and stack flue gas. Table 32 shows the results of the mercury material balance closure calculations. For the four tests conducted at the plant, the calculated mercury material balance closures ranged from 93.% to 104%. The material balance closures for mercury for all four tests are within the QA/QC criterion of 70-130% for a single test and the average value is 99%, which is within the QA/QC criterion of 80-120% for multiple tests.

Table 32. Material Balance Closure for Mercury.

Test No.	1	2	3	4
Hg input from Coal (mg/sec)	1.81	1.76	1.69	1.73
Hg input from lime slurry solids (mg/sec)	0.0007	0.0007	0.0007	0.0007
Total Hg input (mg/sec)	1.81	1.76	1.69	1.73
Hg output via Bottom Ash (mg/sec)	0.0046	0.0007	0.0008	0.0007
Hg output via baghouse hopper ash (mg/sec)	1.59	1.74	1.63	1.60
Hg output via stack flue gas (mg/sec)	0.092	0.095	0.096	0.090
Total Hg output (mg/sec)	1.69	1.84	1.73	1.69
Hg material balance closure	93%	104%	102%	98%
Average Hg material balance closure	99±5%			

Material Balance Closure for SiO_2, Al_2O_3, Fe_2O_3, and CaO

By following the same procedures, the material balance closure for the major ash oxides can be calculated also. Summarized in Tables 33 through 36 are the results of the material balance closure calculations for the oxides. The material balance closures range from 90% to 112%. The average values of the material balance closures are: 105% for SiO_2; 101% for Al_2O_3; 100% for CaO; and 95% for Fe_2O_3. The good material balance closures for the major ash oxides provide an additional level of confidence in the material balance calculations for mercury.

Table 33. Material Balance Closure for SiO_2.

Test No.	1	2	3	4
SiO_2 input from coal (kpph)	3.95	4.36	4.23	4.17
SiO_2 input from lime (kpph)	0.080	0.078	0.086	0.081
Total SiO_2 input (kpph)	4.03	4.43	4.32	4.25
SiO_2 output via bottom ash (kpph)	0.72	0.83	0.75	0.77
SiO_2 output via baghouse hopper ash (kpph)	3.63	3.59	3.52	3.99
Total SiO_2 output (kpph)	4.36	4.42	4.27	4.76
SiO_2 material balance closure =	108%	100%	99%	112%
Average SiO_2 material balance closure	105±6%			

Table 34. Material Balance Closure for Al_2O_3.

Al_2O_3 input from coal (kpph)	1.95	2.16	2.09	2.07
Al_2O_3 input from lime (kpph)	0.026	0.026	0.029	0.028
Total Al_2O_3 input (kpph)	1.98	2.18	2.12	2.10
Al_2O_3 output via bottom ash (kpph)	0.34	0.38	0.34	0.35
Al_2O_3 output via baghouse hopper ash (kpph)	1.72	1.72	1.67	1.92
Total Al_2O_3 output (kpph)	2.05	2.10	2.01	2.27
Al_2O_3 material balance closure =	104%	96%	95%	108%
Average Al_2O_3 material balance closure	101±6%			

Table 35. Material Balance Closure for Fe_2O_3

Fe_2O_3 input from coal (kpph)	1.48	1.56	1.50	1.58
Fe_2O_3 input from lime (kpph)	0.010	0.010	0.010	0.010
Total Fe_2O_3 input (kpph)	1.49	1.57	1.51	1.59
Fe_2O_3 output via bottom ash (kpph)	0.35	0.38	0.33	0.35
Fe_2O_3 output via baghouse hopper ash (kpph)	1.24	1.12	1.11	1.27
Total Fe_2O_3 output (kpph)	1.59	1.50	1.45	1.63
Fe_2O_3 material balance closure =	107%	95%	96%	103%
Average Fe_2O_3 material balance closure	100±6%			

Table 36. Material Balance Closure for CaO

CaO input from coal (kpph)	0.18	0.17	0.20	0.18
CaO input from lime (kpph)	5.36	5.65	5.43	5.88
Total CaO input (kpph)	5.54	5.82	5.63	6.05
CaO output via bottom ash (kpph)	0.039	0.046	0.038	0.041
CaO output via baghouse hopper ash (kpph)	4.92	5.60	5.71	5.51
Total CaO output (kpph)	4.96	5.65	5.75	5.55
CaO material balance closure =	90%	97%	102%	92%
Average CaO material balance closure	95±6%			

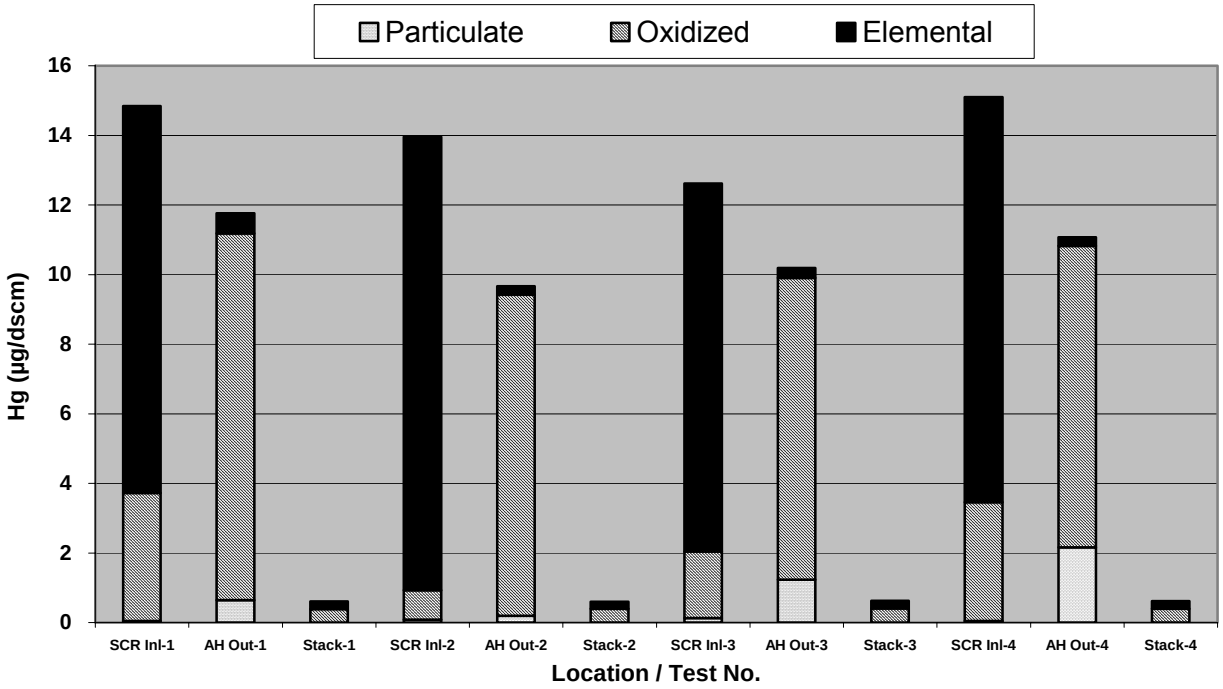


Figure 1. Mercury Speciation.

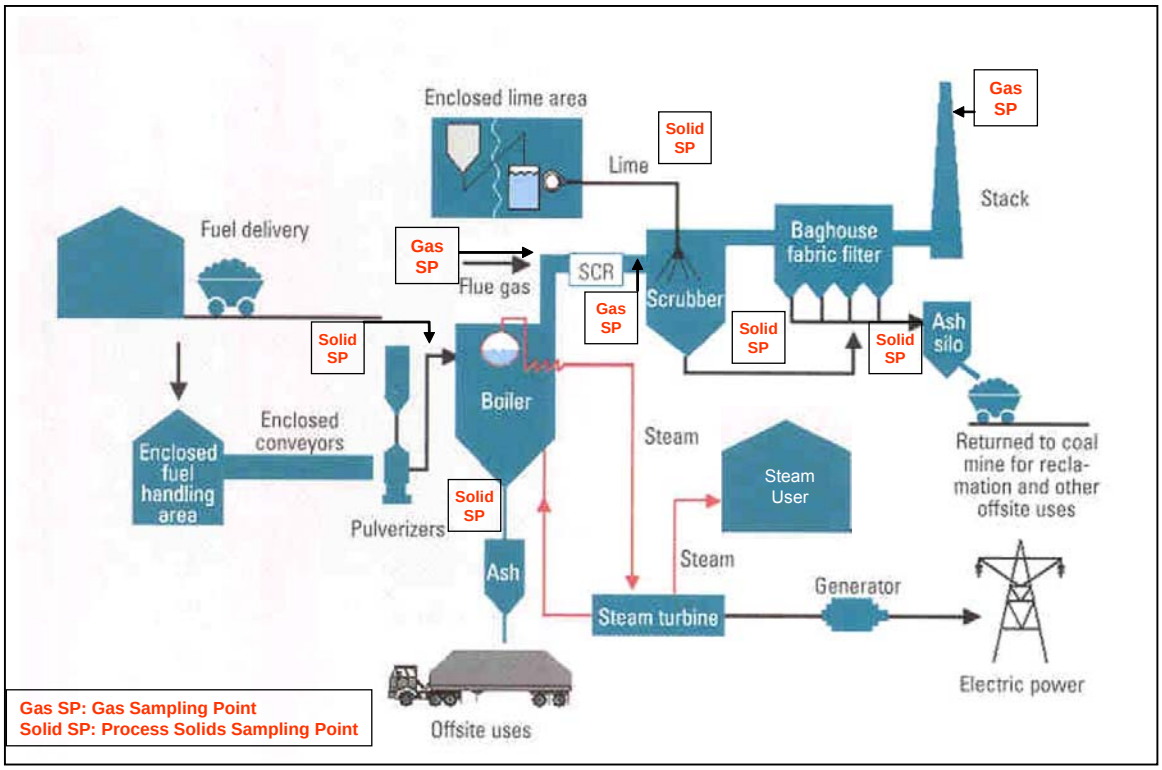
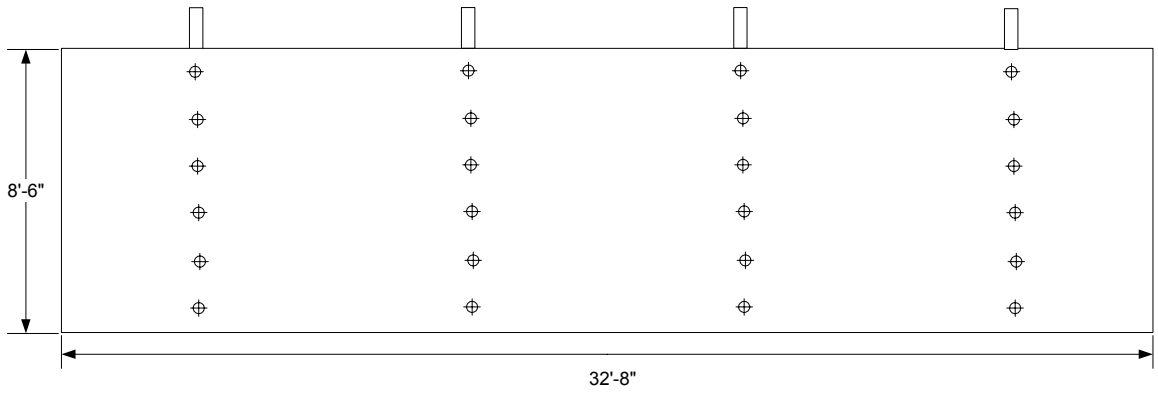


Figure 2. Process Flow Schematic.



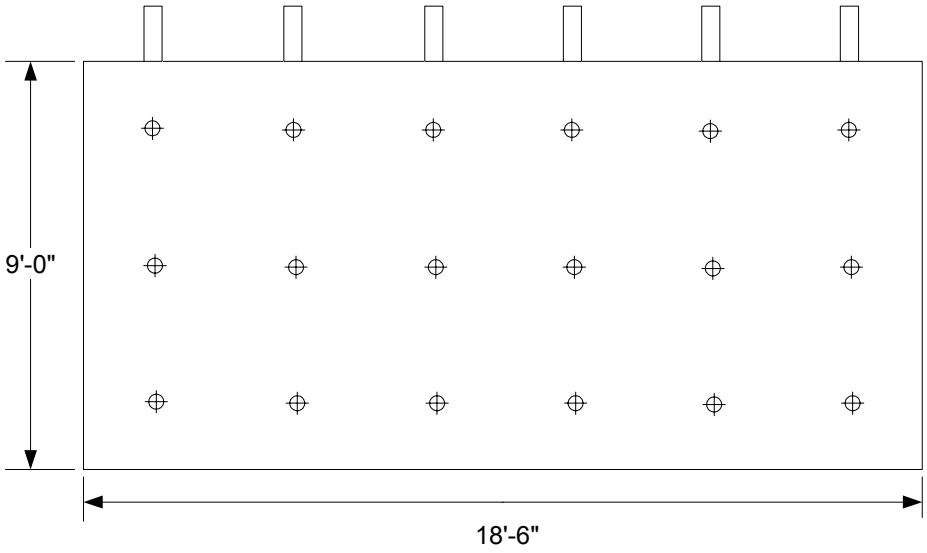
Traverse Point Locations

Point	Location
1	8.5
2	25.5
3	42.5
4	59.5
5	76.5
6	93.5

4 Access Ports
6 Sample Points per Port
24 Total Sample Points

Figure 3. SCR Inlet Sampling Location.

Figure 4. SCR Inlet Mercury Sampling Train.



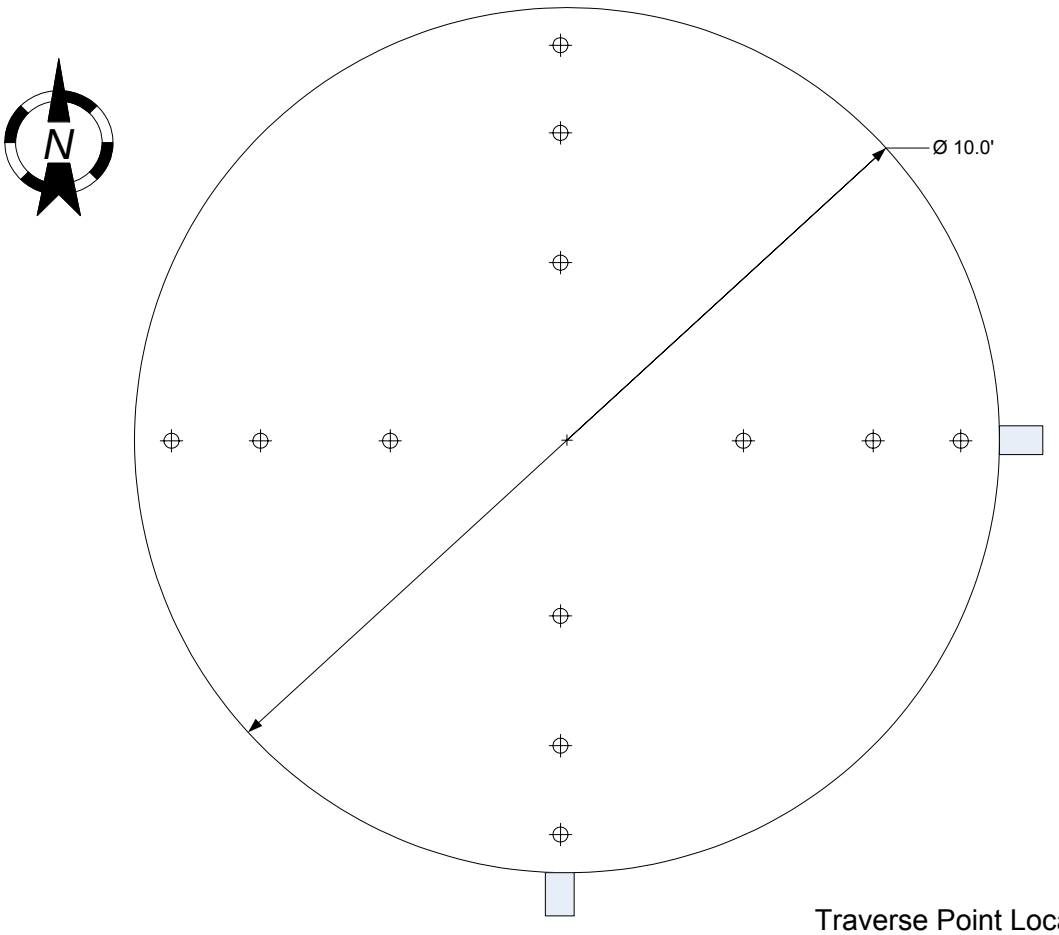
Traverse Point Locations

Point	Location
1	18.0
2	54.0
3	90.0

6 Access Ports
3 Sample Points per Port
18 Total Sample Points

Figure 5. Air Heater Outlet Sampling Location.

Figure 6. Air Heater Outlet Mercury Sampling Train.



Traverse Point Locations

Point	Location (in)
1	5.3
2	17.5
3	35.5
4	84.5
5	102.5
6	114.7

2 Sample Access Ports
6 Points per Access Port
12 Total Sample Points

Figure 7. Stack Sampling Location

Figure 8. Stack Mercury Sampling Train.

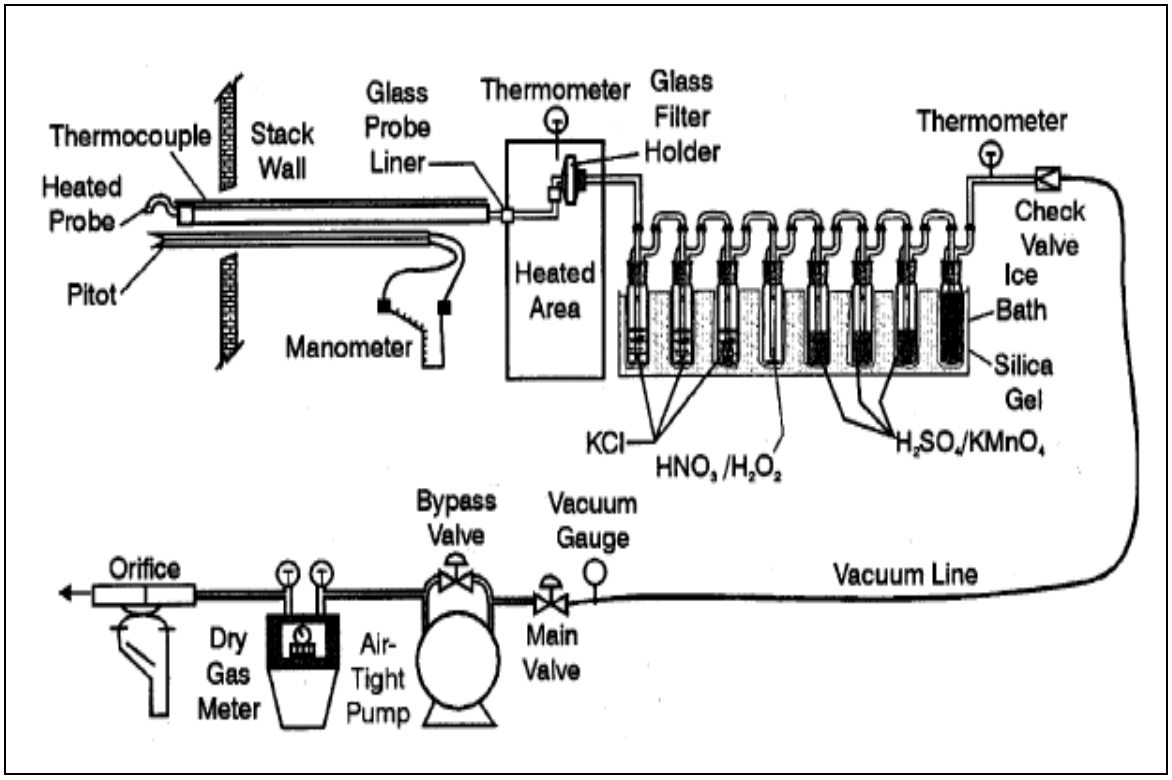


Figure 9. Ontario-Hydro Sampling Train Schematic.

Figure 10. Coal Sampler (left), and Sampling Port at the Bottom of the Coal Bin (right).

Figure 11. Bottom ash sampling location.

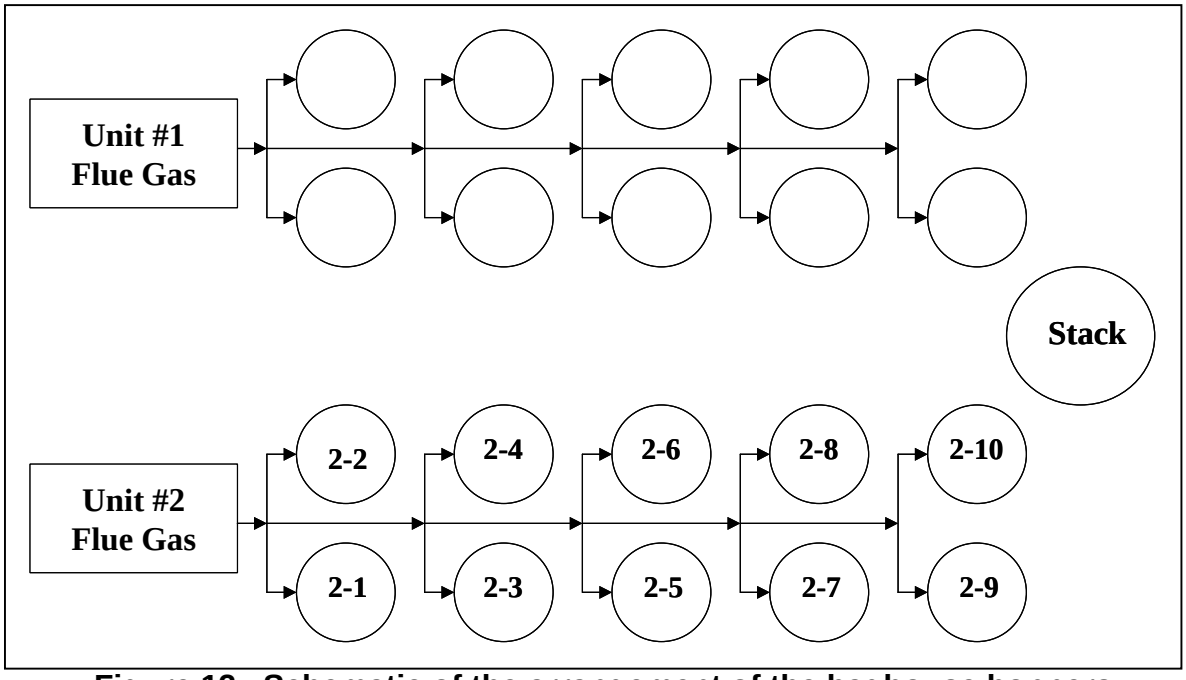


Figure 12. Schematic of the arrangement of the baghouse hoppers.

Figure 13. Location of a baghouse hopper ash sampling port.

Figure 14. Ash sampling thief.

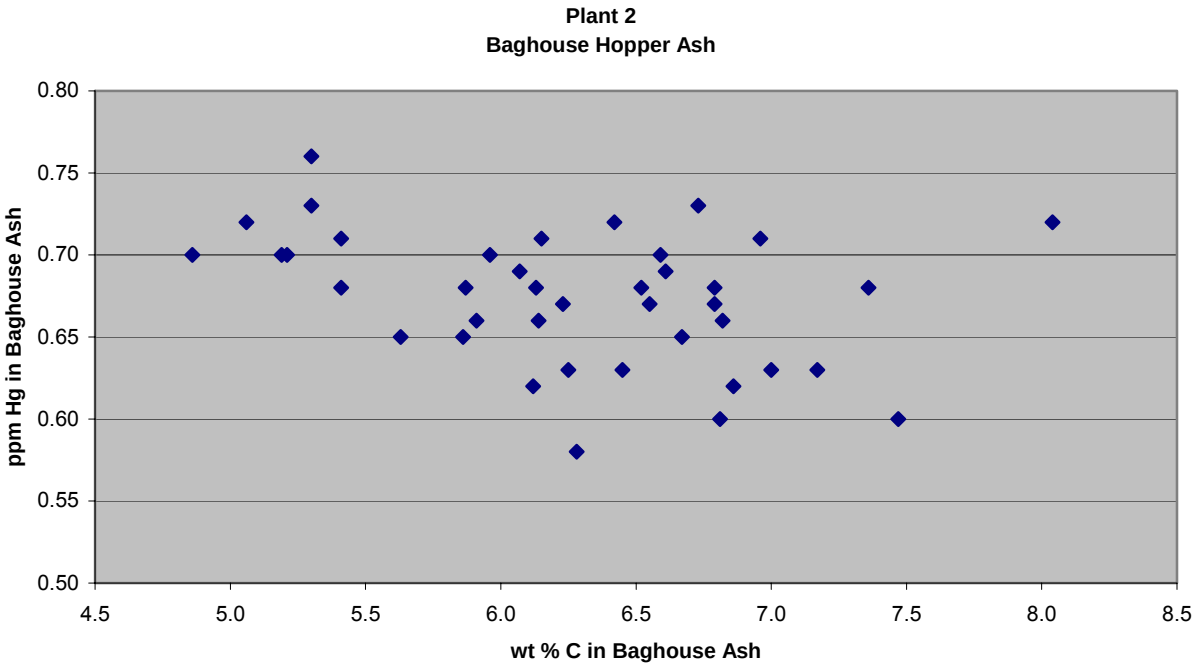


Figure 15. Mercury Concentration vs. Carbon Content in Baghouse Ash Samples.

APPENDIX A

Mercury Sampling Data

- Field Data Sheets
- Mercury Measurement Data Sheets

APPENDIX B

Plant 2 Process Data

APPENDIX C

Flue Gas Mercury Data

- Summary of Ontario-Hydro Impinger Analyses Data Sheets
- Recovery Data Sheets

APPENDIX D

Process Material Data

- Coal Analysis Data Sheets
- Ash Analysis Data Sheets

APPENDIX A

Mercury Sampling Data

- Field Data Sheets
- Mercury Measurement Data Sheets

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	1
PLANT	Plant 2
LOCATION	Unit 2 SCR Inlet
DATE	5-20-03
OPERATOR(S)	AMS/BCS
AMBIENT TEMP [°F]	79
BAR. PRESS. [" Hg]	30.08

METER BOX	1-7
PITOT TUBE DESC	S
PROBE LENGTH [ft]	8'
NOZZLE ID [inch]	0.251
%H_2O (Assumed)	8
FILTER ID	1
K FACTOR	1.52

CAL. DATA: delta H	1.982	Comments:	
Y	0.993		
C(p)	0.84		
FILTER BOX SETTING	325		
PROBE HTR SETTING	250		
DUCT X-SECTION	circ ?	(rect ?)	other:
DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft^2

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
	1330	0					705.02								
-93.5	1335	5		0.16	0.24	4	706.59	74	73	771	175		72	3.2	12.3
-76.5	1340	10		0.14	0.22	4	707.83	74	73	746	214		66	3.4	13.1
-59.5	1345	15		0.45	0.68	7	709.97	76	74	757	246		62	3.0	13.4
-42.5	1350	20		0.53	0.80	8.5	711.29	77	74	751	259		60	3.2	13.3
-25.5		25	-3.104	0.33	0.48	8.0	714.28	79	76	729	269		64	3.0	13.4
-8.5		30		0.25	0.38	6.0	715.74	81	77	227	271		71	2.1	9.6
leak check				10ft³ @ <0.02"			(10.72)								
							(717.22)								
-93.5		35		0.19	0.29	4.0	718.51	83	80	733	210		74	4.9	12.6
-76.5		40		0.21	0.32	4.0	720.09	83	80	770	203		70	4.4	12.4
-59.5		45		0.54	0.84	7.0	722.42	83	80	769	243		67	3.8	12.9
-42.5		50	-3.153	0.64	0.98	8.0	725.04	84	80	762	259		64	3.9	10.7
-25.5		55		0.53	0.80	8.0	727.53	85	81	627	267		65	3.0	13.4
-8.5		60		0.17	0.27	5.0	729.18	85	81	203	270		69	3.4	13.0
leak check				10' @ <0.02"			(11.96)								

Sample Train Pre Test 10 ft^3 @ 0.02 in. Hg

Leak Checks: Post Test _____ ft^3 @ _____ in. Hg

Pitot Tube Leak Checks: PreTest _____ @ _____ in. H_2O; Post Test _____ @ _____ in. H_2O

CONSOL ENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	1
PLANT	Plant 2
LOCATION	Unit 1 SCR Inlet
DATE	5-20-03
OPERATOR(S)	AMS/BES
AMBIENT TEMP [°F]	
BAR. PRESS. [" Hg]	30.09

METER BOX	N-2
PITOT TUBE DESC	S-15
PROBE LENGTH [ft]	8'
NOZZLE ID [inch]	0.251
%H_2O (Assumed)	8
FILTER ID	1
K FACTOR	1.52

CAL. DATA: delta H	1.982	Comments:	
Y	0.993		
C(p)	0.84		
FILTER BOX SETTING	~~285~~ N/A		
PROBE HTR SETTING	325		
DUCT X-SECTION	circ ?	(rect ?)	other:
DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft^2

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
	1450	60					721.81								
-93.50		65	-	0.18	0.28	7.0	733.19	84	82	102	199		76	4.1	12.2
-76.50		70	-	0.22	0.34	11.0	734.83	85	82	101	214		75	4.3	12.4
-59.50		75	-	0.57	0.82	25.0	736.02	84	82	101	216		75	4.2	12.5
-42.50		80	-	0.62	0.92	25	738.55	84	82	94	235		68	3.8	12.5
-25.50		85	- 3.205	0.58	0.86	25	740.11	84	82	99	232		65	3.4	13.1
-8.50		90		0.21	0.32	24	742.22	84	82	101	240		69	5.4	11.6
leak check	1520			10" Hg	@ < 0.02		10.41								
-93.50		95								~~95~~					
-76.50		100	3.15	0.24	.547		33.09	80.3		~~[illegible]~~	235		65.6	4.06	12.6
-59.50		105													
-42.50		110													
-25.50		115													
-8.50		120													
AVERAGE		120													

Sample Train Pre Test _____ ft^3 @ _____ in. Hg

Leak Checks: Post Test OK ft^3 @ <4 in. Hg

Pitot Tube PreTest OK @ 7 in. H_2O

Leak Checks: Post Test OK @ 5 in. H_2O

CONSOL ENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	AH2-1
PLANT	Plant 2
LOCATION	Unit 7 Air Heater Outlet
DATE	5-20-[illegible]
OPERATOR(S)	JS JC
AMBIENT TEMP [°F]	75
BAR. PRESS. [" Hg]	30.09

METER BOX	N-4
PITOT TUBE DESC	C-3
PROBE LENGTH [ft]	6
NOZZLE ID [inch]	0.250
%H_2O (Assumed)	8
FILTER ID	2
K FACTOR	2.302

CAL. DATA: delta H	1.851	Comments:	
Y	0.9935		
C(p)	0.835		
FILTER BOX SETTING	NA		
PROBE HTR SETTING	325		
DUCT X-SECTION	circ ?	(rect ?)	other:
DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft^2

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
	1350	0					305.770								
-90.0	1357	7	-13.0	0.63	1.1	5.5	313.100	75	74	357	285	NA	61	4.3	15.3
-54.0	1404	14		0.70	2.1	6.5	318.720	82	74	350	307	1	54	4.9	15.2
-18.0	1351	21		0.83	1.7	7.0	323.559	87	75	339	320		57	4.8	15.4
leak check							0.004 @ 3.0 in Hg								
	1358						~~328.815~~ 324.102								~~15.7~~
-90.0	1404	28		0.82	1.9	6.5	334.225	86	77	377	319	NA	58	5.0	15.1
-54.0	1412	35	-13.3	0.78	1.8	7.0	334.260	93	78	370	319	1	57	4.7	15.4
-18.0	1419	42		0.63	1.5	7.5	338.335	49	79	2[illegible]2	326		58	4.6	15.5
leak check							0.004 @ 3.0 in Hg								
	1428			~~0.35~~	~~0.31~~	~~4.5~~	339.233								
-90.0	1435	49		.35	0.31	4.5	342.975	88	82	362	313	NA	65	6.3	14.0
-54.0	1442	56	-13.2	0.41	0.74	5.0	346.416	90	83	369	321	1	53	5.2	14.7
-18.0	1449	63		0.49	1.1	6.0	350.375	92	85	363	322		54	5.5	14.7
leak check															

Sample Train Pre Test 0.005 ft^3 @ 12.0 in. Hg

Leak Checks: Post Test 0.007 ft^3 @ 14.0 in. Hg

Pitot Tube PreTest OK @ 2.2 in. H_2O

Leak Checks: Post Test OK @ 2.2 in. H_2O

CONSOLENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	AHO-1	METER BOX	N-11	CAL. DATA: delta H	1.841
PLANT	Plant 2	PITOT TUBE DESC	E-3	Y	0.998
LOCATION	Unit 1 Air Heater Outlet	PROBE LENGTH [ft]	7	C(p)	0.815
DATE	5-20-13	NOZZLE ID [inch]	0.250	FILTER BOX SETTING	NA
OPERATOR(S)	JS JL	$\%H_2O$ (Assumed)	7	PROBE HTR SETTING	325
AMBIENT TEMP [°F]	75	FILTER ID	2	DUCT X-SECTION	circ ? / (rect ?) circled / other:
BAR. PRESS. [" Hg]	30.09	K FACTOR	2.30	DUCT DIMENSIONS	32.67'x8.5' — DUCT AREA 277.67 ft^2

Comments: Run #1

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_20]	PITOT HEAD [" H_20]	METER DIFF PRESSURE [" H_20]	METER VACUUM [" Hg]	METER READING [ft^3] (350.095)	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
	14:53:30	63					357.095								
-90.0	15:00:30	70		0.36	0.83	4.5	-	91	84	348	301	NA	61	5.9	14.1
-54.0	15:07:30	77	-13.1	0.40	0.92	5.0	358.000	91	84	347	282	|	60	6.3	14.4
-18.0	15:14:30	84		0.54	1.2	6.0	361.940	92	85	336	273	|	60	5.7	14.4
leak check							0.003 @ 10" Hg								
	15:53:10						362.200								
-90.0	15:25:20	91		0.88	2.0	6.5	367.374	92	88	346	305	NA	62	5.8	14.5
-54.0	15:32	98	-13.0	0.80	1.8	7.0	372.350	94	86	334	286	|	59	5.1	14.9
-18.0	15:39	105		0.68	1.6	7.5	377.100	96	86	331	294	|	60	5.3	14.8
leak check															
	15:43:20						377.430								
-90.0	15:50:20	112	-13.1	0.88	2.0	7.5	382.530	96	86	336	307	NA	64	5.7	14.5
-54.0	15:57:20	119		0.87	1.9	10.0	387.660	99	89	317	289	|	63	4.6	15.5
-18.0	16:04:20	126		0.82	1.9	13.0	392.713	99	90	349	278	|	66	4.8	15.3
							Purge 10 minutes								
				RMS											
	Avg	126	-13.1	0.865	1.561	8	31.934	96.82		338.0				5.3	14.9
			~~13.1~~												

Sample Train Leak Checks: Pre Test ______ ft^3 @ ______ in. Hg; Post Test 5 sec ft^3 @ 1 in. Hg

Pitot Tube Leak Checks: PreTest ______ @ 12 in. H_2O; Post Test 5 sec @ 12 in. H_2O

CONSOL ENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	[redacted]
PLANT	Plant 2
LOCATION	Unit 1 Stack Unit 2
DATE	5/22/13
OPERATOR(S)	KRL, RLC
AMBIENT TEMP [°F]	
BAR. PRESS. [" Hg]	30.05

METER BOX	3
PITOT TUBE DESC	E-12A
PROBE LENGTH [ft]	10'
NOZZLE ID [inch]	0.160
%H_2O (Assumed)	12
FILTER ID	[redacted] 1
K FACTOR	0.8625

CAL. DATA: delta H	1.917	Comments:	#1
Y	1.014		
E-12A C(p)	0.813		
FILTER BOX SETTING	250		
PROBE HTR SETTING	250		
DUCT X-SECTION	circ ?	rect ?	other:
DUCT DIMENSIONS	120" ID	DUCT AREA	78.54 ft²

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft³]	METER TEMP [oF] (6) inlet	METER TEMP [oF] (7) outlet	STACK TEMP (1) [°F]	PROBE TEMP (2) [°F]	FILTER BOX (3) [°F]	LAST IMP TEMP (5) [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
		0					737.60								
-114.7	13:21	10		2.35	1.78	5.0	744.50	95	94	152	76	261	97	6.2	14.0
-102.5		20		2.35	2.05	5.0	751.72	99	95	152	76	261	97	6.2	14.1
-84.5		30		2.35	1.90	4.5	758.52	102	96	152	76	264	98	6.1	14.0
-35.5		40		2.40	2.50	4.0	766.00	103	98	152	75	266	97	6.0	14.1
-17.5		50	2.49	2.50	2.50	4.0	773.71	107	99	152	77	268	97	6.0	14.1
-5.3		60		2.40	2.50	4.0	781.22	106	100	152	77	270	96	6.1	14.1
leak chk			ok	0	0.10	10" Hg									
							783.20								
-114.7		70		2.40	2.05	5.5	790.71	108	101	152	77	269	97	6.0	14.0
-102.5		80		2.40	2.50	6.0	797.14	110	102	153	78	268	98	6.1	14.0
-84.5		90		3.00	2.50	6.0	804.71	110	103	153	81	266	103	5.9	14.2
-35.5		100	3.50	2.60	2.10	5.5	812.01	111	104	153	59	264	102	6.0	14.1
-17.5		110		2.60	2.10	5.5	819.43	111	104	153	264	264	102	6.0	14.1
-5.3	13:36	120		2.60	2.10	5.5	826.91	111	105	153	266	265	101	5.8	14.3
				2.60		10	minute	purge	After	test					
		120	3.15	2.60	2.10		91.09	103.3		102.4				5.09	14.25

Sample Train Pre Test [illegible] ft³ @ [illegible] in. Hg

Leak Checks: Post Test [illegible] ft³ @ 4 in. Hg

Pitot Tube PreTest OK @ 5 in. H_2O

Leak Checks: Post Test OK @ 7 in. H_2O

CONSOLENERGY

NOTE: Purge for 10 minutes at end of sampling.

Co - 7
Cor - 16

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	2
PLANT	Plant 2
LOCATION	Unit 1 SCR Inlet
DATE	3/21/05
OPERATOR(S)	AMS / BCS
AMBIENT TEMP [°F]	64
BAR. PRESS. [" Hg]	29.96

METER BOX	N-2
PITOT TUBE DESC	E
PROBE LENGTH [ft]	5'
NOZZLE ID [inch]	0.313
%H_2O (Assumed)	8
FILTER ID	5/7
K FACTOR	4.304

CAL. DATA: delta H	1.982	Comments:	37.6 H_2O
Y	0.993		
C(p)	0.816		
FILTER BOX SETTING	~~285~~ 325		
PROBE HTR SETTING	~~250~~ 325		
DUCT X-SECTION	circ ?	(rect ?)	other:
DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft^2

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
	9:15	0					751.01								
-93.5		5		0.16	0.58	6	752.83	75	72	778	209	HR	58	3.0	17.0
5 -76.5		10		0.16	0.58	6	754.91	74	72	760	211	"	56	3.3	16.7
-59.5		15		0.48	1.75	15	757.91	77	73	755	225		54	2.5	16.5
-42.5	3.341	20		0.54	2.00	10	761.49	78	73	739	268		57	3.2	16.7
-25.5		25		0.26	1.05	7	764.48	80	74	721	294	"	64	2.41	16.6
-8.5		30		0.12 ~~0.26~~	0.44	5	766.41	79	75	~~755~~	287	✓	61	3.9	16.1
leak check		→		10 @	40.02										
							(769.00)								
-93.5		35		0.22	0.80	5	771.15	79	75	743	239	HR	58	4.6	15.6
-76.5		40		0.17	0.62	5	773.32	79	75	752	240	"	55	3.8	16.3
5 -59.5	3.491	45		0.54	1.95	12	776.27	80	76	749	291		57	3.7	16.5
-42.5		50		0.58	2.10	15	780.57	81	76	732	312		57	3.0	16.7
-25.5		55		0.45	1.65	11	784.01	82	77	687	312		54	3.10	17.0
-8.5		60		0.19	0.70	8	786.41	82	77	286	300	✓	54	~~3.7~~	~~16.9~~
leak check				10 @	<0.02									3.1	16.9

Sample Train Leak Checks: Pre Test ____ ft^3 @ ____ in. Hg; Post Test 5.02 ft^3 @ ____ in. Hg

Pitot Tube Leak Checks: PreTest ____ @ 2 in. H_2O; Post Test ____ @ ____ in. H_2O

CONSOLENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	2	METER BOX	N-2	CAL. DATA: delta H	1.782	Comments:			
PLANT	Plant 2	PITOT TUBE DESC	S	Y					
LOCATION	Unit 1 SCR Inlet	PROBE LENGTH [ft]	3'	C(p)	0.712				
DATE	8/5-21/13	NOZZLE ID [inch]	0.313	FILTER BOX SETTING	~~250~~ 248				
OPERATOR(S)	JHS/BCS	%H_2O (Assumed)	5%	PROBE HTR SETTING	~~250~~ 248				
AMBIENT TEMP [°F]	65	FILTER ID	5|7	DUCT X-SECTION	circ ?	(rect ?)	other:		
BAR. PRESS. [" Hg]	29.96	K FACTOR	4.306	DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft^2		

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
	1120	60					795.27								
-93.50		65		0.22	0.80	4	797.48	81	78	782	295	N/A	54	4.2	15.8
-76.50		70		0.15	0.55	3.5	799.53	81	78	788	250		44	4.3	15.7
-59.50		75		0.47	0.97	5	802.14	83	79	782	280		44	4.2	15.7
-42.50	1138	80		0.59	2.19	7	806.15	84	79	761	249		44	3.8	16.2
-25.50		85		0.49	1.80	9	809.99	86	80	710	312		46	3.8	16.5
-8.50		90		0.10	0.37	5	812.23	86	80	230	312	✓	48	3.8	16.7
leak check				to @	<0.02										
							(814.11)								2.4
-93.50		95		0.16	0.58	5	815.62	83	80	777	244	N/A	52	5.5	14.8
-76.50		100		0.18	0.62	5	817.77	84	80	831	246		48	4.3	15.8
-59.50		105		0.41	1.50	10	820.75	84	80	796	273		48	4.4	15.9
-42.50		110		0.60	2.70	15	824.83	85	80	774	292		47	4.1	15.9
-25.50		115		0.29	1.05	7	826.77	85	81	705	305	✓	50	4.5	15.6
-8.50		120		Did not do!											
			343												
AVERAGE		120		0.304	1.18		62.42	72.1		756.5				3.3	16.21

Sample Train Pre Test 10 ft^3 @ <0.02 in. Hg
Leak Checks: Post Test 10.02 ft^3 @ 5 in. Hg

Pitot Tube PreTest OK @ ~~5~~ in. H_2O
Leak Checks: Post Test OK @ ~~5~~ in. H_2O

CONSOL ENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	
PLANT	Plant 2
LOCATION	~~Unit 1~~ Air Heater Outlet
DATE	
OPERATOR(S)	
AMBIENT TEMP [°F]	
BAR. PRESS. [" Hg]	

METER BOX	
PITOT TUBE DESC	
PROBE LENGTH [ft]	
NOZZLE ID [inch]	
%H_2O (Assumed)	
FILTER ID	
K FACTOR	

CAL. DATA: delta H	
Y	
C(p)	
FILTER BOX SETTING	
PROBE HTR SETTING	

Comments: 141.1 ft²

DUCT X-SECTION	circ ?	rect ?	other:
DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft²

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
		0													
-90.0		7													
-54.0		14													
-18.0		21													
leak check															
-90.0		28													
-54.0		35													
-18.0		42													
leak check															
-90.0		49													
-54.0		56													
-18.0		63													
leak check															

Sample Train Pre Test _____ ft^3 @ _____ in. Hg

Leak Checks: Post Test _____ ft^3 @ _____ in. Hg

Pitot Tube PreTest _____ @ _____ in. H_2O

Leak Checks: Post Test _____ @ _____ in. H_2O

CONSOL ENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID		METER BOX		CAL. DATA: delta H		Comments:			
PLANT	Plant 2	PITOT TUBE DESC		Y					
LOCATION	Unit 1 Air Heater Outlet	PROBE LENGTH [ft]		C(p)					
DATE		NOZZLE ID [inch]		FILTER BOX SETTING					
OPERATOR(S)		%H_2O (Assumed)		PROBE HTR SETTING					
AMBIENT TEMP [°F]		FILTER ID		DUCT X-SECTION	circ ?	(rect ?)	other:		
BAR. PRESS. [" Hg]		K FACTOR		DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft^2		

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
		63													
-90.0		70													
-54.0		77													
-18.0		84													
leak check															
-90.0		91													
-54.0		98													
-18.0		105													
leak check															
-90.0		112													
-54.0		119													
-18.0		126													
		126													

Sample Train Leak Checks: Pre Test _____ ft^3 @ _____ in. Hg; Post Test _____ ft^3 @ _____ in. Hg

Pitot Tube Leak Checks: PreTest _____ @ _____ in. H_2O; Post Test _____ @ _____ in. H_2O

CONSOLENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	[redacted]	METER BOX	3	CAL. DATA: delta H	1.917	Comments:	Run 2		
PLANT	Plant 2	PITOT TUBE DESC	E-12A	Y	1.014		3.9.3 H_2O		
LOCATION	Unit 1 Stack Unit 2	PROBE LENGTH [ft]	10	C(p)	0.842				
DATE	5/21/03	NOZZLE ID [inch]	3/16 [redacted]	FILTER BOX SETTING	250				
OPERATOR(S)	KRC, RLC	%H_2O (Assumed)	13	PROBE HTR SETTING	250				
AMBIENT TEMP [°F]	81	FILTER ID	2	DUCT X-SECTION	circ ?	rect ?	other:		
BAR. PRESS. [" Hg]	29.96	K FACTOR	0.819	DUCT DIMENSIONS	120" ID	DUCT AREA	78.54 ft^2		

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet (6)	METER TEMP [oF] outlet (11)	STACK TEMP [°F] (1)	PROBE TEMP [°F] (2)	FILTER BOX [°F] (3)	LAST IMP TEMP [°F] (5)	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]	O_2 (corr)
		0					836.10									
-114.7	09:15	10	0	2.40	.200	5.0	843.47	96	90	180	251	258	52	5.7	14.4	5.7
-102.5	09:25	20		2.60	2.10	5.0	850.74	101	93	181	257	258	54	6.1	14.0	6.1
-84.5	09:35	30		2.40	2.00	5.0	858.01	103	95	181	260	258	57	6.0	14.0	6.0
-35.5	09:45	40		2.90	2.40	5.5	865.44	103	96	182	265	258	56	5.8	14.3	5.7
-17.5	09:55	50		2.90	2.40	6.0	873.27	104	97	182	260	258	56	6.1	13.9	6.0
-5.3	10:05	60	-3.04	2.90	2.40	6.0	881.14	105	98	182	264	258	55	6.0	13.9	5.9
leak chk	10:16			<2.0 @ 9" Hg												
							881.6		another leak @ 10:30, OK							
-114.7	10:20	70		2.70	2.30	5.0	889.15	104	98	182	254	259	53	7.1	13.1	5.8
-102.5	10:34	80		3.10	2.50	6.0	897.40	105	99	182	264	258	52	6.4	13.9	5.9
-84.5	10:44	90		3.20	2.70	6.5	905.60	105	99	182	258	258	54	6.1	14.0	6.0
-35.5	10:54	100		3.00	2.50	6.0	913.81	105	99	182	255	258	53	6.1	14.0	5.9
-17.5	11:04	110		2.80	2.30	6.0	921.60	105	99	182	256	258	54	5.9	14.1	5.9
-5.3	11:14	120	-2.6	2.80	2.30	6.0	929.35	105	99	182	253	258	55	5.7	14.5	5.7
Done	11:24															
2						10	min purge	after	test							
		120	-2.0	2.611	2.325		92.54	100.1		181.7				5.99	14.09	

Sample Train Pre Test <0.01 ft^3 @ 9 in. Hg
Leak Checks: Post Test <0.01 ft^3 @ 4 in. Hg

Pitot Tube PreTest OK @ 8 in. H_2O
Leak Checks: Post Test OK @ 8 in. H_2O

CONSOLENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	3	METER BOX	1N-2	CAL. DATA: delta H	1.982	Comments:	Run 3
PLANT	Plant 2	PITOT TUBE DESC	S	Y	0.993		122.4 ft²
LOCATION	Unit 1 SCR Inlet	PROBE LENGTH [ft]	8'	C(p)	0.816		
DATE	5-21-03	NOZZLE ID [inch]	0.310	FILTER BOX SETTING	~~250~~ 325		
OPERATOR(S)	AMS/BLS	%H_2O (Assumed)	8	PROBE HTR SETTING	~~250~~ 325		
AMBIENT TEMP [°F]	85	FILTER ID	3-11	DUCT X-SECTION	circ ?	(rect ?)	other:
BAR. PRESS. [" Hg]	29.90	K FACTOR	4.304	DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft²

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
		0					(840.95)								
-93.5		10 ~~8~~		0.19	0.72	6	893.69	74	74	735	232	11 ~~2~~	58	5.1	14.6
-76.5		10 ~~8~~	0.19	~~0.19~~	~~0.72~~ 0.45	6	845.01	74	74	765	233		49	4.5	15.5
-59.5		15 ~~10~~	3.313	0.50	1.90	13	898.29	77	74	756	261	✓	48	4.4	15.4
-42.5		20 ~~15~~	~~0.59~~	~~2.35~~											
-25.5		~~25~~			CL 16 @ 0.02										
-8.5		~~30~~													
leak check															
							(872.07)					1		3.7	
-93.5		38 ~~72~~		0.15	0.54	3	874.14	77	75	764	.211	[redacted]	55	[redacted]	16.3
-76.5		40 ~~77~~		0.18	0.64	4	876.32	78	76	764	233	11	46	3.8	16.3
-59.5		45 ~~82~~		0.52	1.90	7	879.83	79	76	750	276	1	45	7.1	16.2
-42.5		50 ~~87~~	3.397	0.68	2.50	10	883.78	80	76	733	294		45	5.2	14.7
-25.5		55 ~~92~~		0.52	1.90	10	887.45	80	76	701	302		48	6.0	14.3
-8.5		60 ~~97~~		0.12	0.46	6	889.96	78	75	~~4~~ 621	305	✓	50	6.1	14.2
leak check			ok	10 @ 2.0						7.5					
		105	.19	0.280	1.194		57.97	(79.6)		764				4.39	15.69

Sample Train Pre Test _____ ft^3 @ _____ in. Hg
Leak Checks: Post Test See ft^3 @ _____ in. Hg

Pitot Tube PreTest _____ @ _____ in. H_2O
Leak Checks: Post Test _____ @ _____ in. H_2O

CONSOLENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	3	METER BOX	#2	CAL. DATA: delta H	1.982	Comments:	
PLANT	Plant 2	PITOT TUBE DESC	S	Y	0.993		
LOCATION	Unit 1 SCR Inlet	PROBE LENGTH [ft]	8'	C(p)	0.84		
DATE	5.21.03	NOZZLE ID [inch]	0.312	FILTER BOX SETTING	~~325~~ NA		
OPERATOR(S)	AHS/BLS	%H_2O (Assumed)	8.0	PROBE HTR SETTING	325		
AMBIENT TEMP [°F]	62	FILTER ID	3/11	DUCT X-SECTION	circ ?	(rect ?)	other:
BAR. PRESS. [" Hg]	29.90	K FACTOR	4.364	DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft²

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft³]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
		60					(850.94)								
-93.50	42	~~57 65 2~~		0.18	0.66	5	852.71	84	81	745	240		57	4.8	15.9
-76.50	47	~~47 70 46~~		0.17	0.62	5	854.88	85	81	773	237		63	4.1	16.1
-59.50	52	~~47 75 46~~		0.52	1.95	12	858.37	84	81	765	270		61	4.3	15.8
-42.50	57	~~52 80 46~~	3.370	0.60	2.20	13	859.99	85	81	757	~~296~~		61	3.7	16.3
-25.50	62	~~57 85 45~~		0.55	2.00	5	865.75	81	79	816	307		59	3.7	16.3
-8.50	67	~~62 90 44~~		0.11	0.40	2	867.88	81	79	~~306~~	306		59	3.8	16.2
leak check				10 @ <0.02											
	1415						(834.02)								
-93.50		~~85~~ 5		0.15	0.55	5	835.81	81	79	801	212		58	4.5	15.6
-76.50		~~100~~ 10		0.14	0.52	8	837.82	82	79	809	249		58	4.3	15.7
-59.50		~~105~~ 15		0.45	1.70	7	841.30	83	80	795	271		60	4.4	15.7
-42.50	5.396	~~110 20~~		0.64	2.50	8	845.28	85	80	773	301		62	4.1	15.9
-25.50		~~115 25~~		0.25	0.92	7	848.19	86	80	750	307		62	3.8	16.0
-8.50		~~120 30~~		0.05	0.18	2	849.82	85	81	~~225~~	304		57	4.1	15.9
AVERAGE		120													

Sample Train Pre Test 10 ft³ @ <0.02 in. Hg
Leak Checks: Post Test ~~<0.02~~ ft³ @ 15 in. Hg

Pitot Tube PreTest OK @ 5 in. H_2O
Leak Checks: Post Test OK @ 5 in. H_2O

CONSOL ENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID		METER BOX		CAL. DATA: delta H		Comments:	Run 3
PLANT	Plant 2	PITOT TUBE DESC		Y			123.5 H_2O
LOCATION	Unit 1 Air Heater Outlet	PROBE LENGTH [ft]		C(p)			
DATE		NOZZLE ID [inch]		FILTER BOX SETTING			
OPERATOR(S)		%H_2O (Assumed)		PROBE HTR SETTING			
AMBIENT TEMP [°F]		FILTER ID		DUCT X-SECTION	circ ?	(rect ?)	other:
BAR. PRESS. [" Hg]		K FACTOR		DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft^2

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
		0													
-90.0		7										N/A			
-54.0		14										↓			
-18.0		21										↓			
leak check															
-90.0		28										N/A			
-54.0		35										↓			
-18.0		42										↓			
leak check															
-90.0		49										N/A			
-54.0		56										↓			
-18.0		63										↓			
leak check															

Sample Train Pre Test _____ ft^3 @ _____ in. Hg
Leak Checks: Post Test _____ ft^3 @ _____ in. Hg

Pitot Tube PreTest _____ @ _____ in. H_2O
Leak Checks: Post Test _____ @ _____ in. H_2O

CONSOLENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID		METER BOX		CAL. DATA: delta H		Comments:	
PLANT	Plant 2	PITOT TUBE DESC		Y			
LOCATION	Unit 1 Air Heater Outlet	PROBE LENGTH [ft]		C(p)			
DATE		NOZZLE ID [inch]		FILTER BOX SETTING			
OPERATOR(S)		%H_2O (Assumed)		PROBE HTR SETTING			
AMBIENT TEMP [°F]		FILTER ID		DUCT X-SECTION	circ ?	(rect ?)	other:
BAR. PRESS. [" Hg]		K FACTOR		DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft^2

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
		63													
-90.0		70													
-54.0		77													
-18.0		84													
leak check															
-90.0		91													
-54.0		98													
-18.0		105													
leak check															
-90.0		112													
-54.0		119													
-18.0		126													
		106													
		~~126~~													

Sample Train Pre Test _____ ft^3 @ _____ in. Hg
Leak Checks: Post Test _____ ft^3 @ _____ in. Hg

Pitot Tube PreTest _____ @ _____ in. H_2O
Leak Checks: Post Test _____ @ _____ in. H_2O

CONSOL ENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	[redacted]
PLANT	Plant 2
LOCATION	~~Unit 1 Stack~~ Unit 2
DATE	2/10/23
OPERATOR(S)	[illegible], [illegible]
AMBIENT TEMP [°F]	
BAR. PRESS. [" Hg]	29.96

METER BOX	3
PITOT TUBE DESC	[illegible]
PROBE LENGTH [ft]	10
NOZZLE ID [inch]	[illegible]
%H_2O (Assumed)	13
FILTER ID	3
K FACTOR	0.82

CAL. DATA: delta H	1.981	Comments:	Run 3
Y	1.014		332.7 ft.c
C(p)	0.906		
FILTER BOX SETTING	250		
PROBE HTR SETTING	250		
DUCT X-SECTION	circ ?	rect ?	other:
DUCT DIMENSIONS	120" ID	DUCT AREA	78.54 ft²

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft³]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]	
		0					13.50									
-114.7	14:12	10		.90	1.60	5.0	942.38	99	96	181	258	258	66	3.4	14.1	3.8
-102.5	14:23	20		2.70	2.20	5.5	949.63	103	97	181	260	258	6.1	3.8	14.2	3.8
-84.5	14:32	30	-2.40	2.30	.96	5.0	956.55	104	98	181	260	258	6.0	3.8	14.3	3.9
-35.5	14:43	40		3.10	2.30	6.0	964.77	105	98	181	261	258	5.8	3.8	14.2	3.8
-17.5	14:52	50		3.10	2.30	6.0	972.96	105	98	181	264	258	5.8	3.7	14.4	3.7
-5.3	15:00	60		3.10	2.30	6.0	981.11	105	99	181	262	258	5.7	3.7	14.4	3.7
leak chk	15:16															
							981.50									
-114.7	15:32	70		2.90	2.05	6.0	989.16	105	99	181	259	258	5.3	3.7	14.2	3.7
-102.5	15:42	80		3.00	2.45	6.0	997.24	107	100	182	258	258	5.3	3.7	14.4	3.6
-84.5	15:52	90	-2.30	3.10	2.50	6.0	1005.36	107	101	182	261	259	5.7	3.9	14.2	3.9
-35.5	16:03	100		2.90	2.30	6.0	1013.31	107	101	182	264	258	6.0	3.8	14.3	3.9
-17.5	16:12	110		2.90	2.40	6.0	1021.34	107	101	182	264	259	6.0	6.1	14.0	6.1
-5.3	16:21	120		2.90	2.40	6.0	1029.43	107	101	182	263	259	6.2	5.0	12.2	7.9
	16:32	leak chk														
							10 min purge data not used									
				2.770	2.275											
		120	-3.03				93.54	102.1		181.4				6.02	14.08	

Sample Train Pre Test 20.01 ft³ @ 9 in. Hg
Leak Checks: Post Test 20.01 ft³ @ 10 in. Hg

Pitot Tube PreTest OK @ 9 in. H_2O
Leak Checks: Post Test OK @ 9 in. H_2O

CONSOLENERGY

NOTE: Purge for 10 minutes at end of sampling.

moisture 9%

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	1	METER BOX	N-2	CAL. DATA: delta H	1.982	Comments:	
PLANT	Plant 2	PITOT TUBE DESC	E-15	Y	0.993		
LOCATION	Unit 1 SCR Inlet	PROBE LENGTH [ft]	8'	C(p)	0.716		
DATE	5-22-03	NOZZLE ID [inch]	5/16B-0.312	FILTER BOX SETTING	225/A		
OPERATOR(S)	AWLS/RLS	%H_2O (Assumed)	9	PROBE HTR SETTING	250-3		
AMBIENT TEMP [°F]	70	FILTER ID	@ 9/13/1	DUCT X-SECTION	circ ? (rect ?)	other:	
BAR. PRESS. [" Hg]	30.01	K FACTOR	4.306	DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft²

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft³]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
	8:55	0					(907.61)								
-93.5	9:00	5		0.17	0.73	3	909.81	83	81	207	775		54	3.3	16.7
-76.5	9:05	10		0.15	0.65	5	912.05	84	81	771	258		50	3.5	16.5
-59.5		15	3.52	0.45	1.9	9	915.53	85	82	766	307		51	4.7	15.9
-42.5		20		0.38	2.5	14/16	919.59	87	82	744	315		52	4.6	15.3
-25.5		25		0.25	1.1	15	922.68	87	82	734	316		56	3.7	16.3
-8.5		30		0.14	0.60	11	924.89	86	82	722	322		57	3.5	16.5
leak check				Leak Ck	ok 10	@ <0.02	11:20		81	0:09					
				0.09			(925.52)								
-93.5		35		0.14	0.60	10	927.61	86	83	729	244		61	3.9	16.1
-76.5		40		0.17	0.73	13	929.88	86	83	782	247		55	3.3	16.7
-59.5	Clean ✓	45	3.57	0.48	2.1	18	932.44	87	83	767	280		50	2.6	17.9
-42.5	✓	50		0.61	2.6	9	935.14 (940.48)	87	85	753	259		54	2.6	17.4
-25.5		55		0.40	1.7	10	944.77	89	85	711	280		49	2.1	18.2
-8.5		60		0.18	0.78	5	947.31	89	86	625	290		54	2.6	17.4
leak check				Leak Ck	ok 10	@ <0.02									

Sample Train Leak Checks: Pre Test 0.02 ft³ @ 15 in. Hg; Post Test 0.02 ft³ @ 19 in. Hg

Pitot Tube Leak Checks: PreTest OK @ 5 in. H_2O; Post Test OK @ 5 in. H_2O

CONSOL ENERGY

NOTE: Purge for 10 minutes at end of sampling.

Changed to filter 15 from 9

Stopped testing to fix broken line. Came back on test 6 @ 1025 hrs

Hg 2 CVAF

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	4	METER BOX	N-2	CAL. DATA: delta H	1.982	Comments:	
PLANT	Plant 2	PITOT TUBE DESC	S-15	Y	0.993		
LOCATION	Unit 2 SCR Inlet	PROBE LENGTH [ft]	8'	C(p)	0.84		
DATE	5-22-03	NOZZLE ID [inch]	0.313 S/N "B"	FILTER BOX SETTING	~~3.25~~ HP		
OPERATOR(S)	AMS / BLS	%H_2O (Assumed)	7	PROBE HTR SETTING	~~250~~ 325		
AMBIENT TEMP [°F]	70	FILTER ID	9/13/15	DUCT X-SECTION	circ ? (rect ?)	other:	
BAR. PRESS. [" Hg]	30.01	K FACTOR	4.3066	DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft²

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
	1100	60					(948.47)								
-93.50		65		0.21	0.40	7	950.79	88	85	727	248		61	3.9	16.2
-76.50		70		0.17	0.73	7	953.13	89	85	778	240		57	3.5	16.5
-59.50		75		0.50	2.2	15	956.94	91	86	771	284		52	2.7	16.3
-42.50		80		0.57	~~2.5~~ 2.0	18	960.77	90	86	758	302		56	3.8	16.2
-25.50		85	3.151	0.54	2.0	18	964.49	90	86	734	302		59	4.6	15.5
-8.50		90													
leak check				0.25	1.31		49.08	85		727	276		59	3.5	16.5
				0.25	1.30		( )	85		353					
-93.50		95		0.27			3								
-76.50		100		0.52											
-59.50		105													
-42.50		110					Purge 10 minutes at end of test								
-25.50		115													
-8.50		120													
AVERAGE		120													

Sample Train Pre Test ~~5.225~~ ft^3 @ + in. Hg
Leak Checks: Post Test ____ ft^3 @ ____ in. Hg

Pitot Tube PreTest ~~3.0~~ @ + in. H_2O
Leak Checks: Post Test ____ @ ____ in. H_2O

CONSOL ENERGY

NOTE: Purge for 10 minutes at end of sampling.

Moisture ≈ 8%
past ISC's ≈ 95%

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID		METER BOX		CAL. DATA: delta H		Comments:	
PLANT	Plant 2	PITOT TUBE DESC		Y			
LOCATION	Unit 1 Air Heater Outlet	PROBE LENGTH [ft]		C(p)			
DATE		NOZZLE ID [inch]		FILTER BOX SETTING			
OPERATOR(S)		%H_2O (Assumed)		PROBE HTR SETTING			
AMBIENT TEMP [°F]		FILTER ID		DUCT X-SECTION	circ ?	(rect ?)	other:
BAR. PRESS. [" Hg]		K FACTOR		DUCT DIMENSIONS	32.67'x8.5'	DUCT AREA	277.67 ft²

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft³]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
		0													
1 -90.0		7													
-54.0		14													
-18.0		21													
leak check															
1 -90.0		28													
-54.0		35													
-18.0		42													
leak check															
1 -90.0		49													
-54.0		56													
-18.0		63													
leak check															

Sample Train Pre Test _____ ft³ @ _____ in. Hg
Leak Checks: Post Test _____ ft³ @ _____ in. Hg

Pitot Tube PreTest _____ @ _____ in. H_2O
Leak Checks: Post Test _____ @ _____ in. H_2O

CONSOL ENERGY.

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	
PLANT	Plant 2
LOCATION	Unit 1 Air Heater Outlet
DATE	
OPERATOR(S)	
AMBIENT TEMP [°F]	
BAR. PRESS. [" Hg]	

METER BOX	
PITOT TUBE DESC	
PROBE LENGTH [ft]	
NOZZLE ID [inch]	
%H_2O (Assumed)	
FILTER ID	
K FACTOR	

CAL. DATA: delta H	
Y	
C(p)	
FILTER BOX SETTING	
PROBE HTR SETTING	

Comments:

DUCT X-SECTION: circ ? | rect ? | other:

DUCT DIMENSIONS: 32.67'x8.5' DUCT AREA: 277.67 ft^2

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft^3]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]
		63													
-90.0		70													
-54.0		77													
-18.0		84													
leak check															
-90.0		91													
-54.0		98													
-18.0		105													
leak check															
-90.0		112													
-54.0		119													
-18.0		126													
		126													

Sample Train Leak Checks: Pre Test _____ ft^3 @ _____ in. Hg; Post Test _____ ft^3 @ _____ in. Hg

Pitot Tube Leak Checks: PreTest _____ @ _____ in. H_2O; Post Test _____ @ _____ in. H_2O

CONSOLENERGY

NOTE: Purge for 10 minutes at end of sampling.

ONTARIO HYDRO Hg SAMPLING AND SPECIATION FIELD DATA SHEET

TEST ID	[redacted]
PLANT	Plant 2
LOCATION	Unit 2 Stack
DATE	[illegible]
OPERATOR(S)	[illegible]
AMBIENT TEMP [°F]	
BAR. PRESS. [" Hg]	30.01

METER BOX	3
PITOT TUBE DESC	S-12A
PROBE LENGTH [ft]	10
NOZZLE ID [inch]	0.182
%H_2O (Assumed)	17
FILTER ID	4
K FACTOR	0.825

CAL. DATA: delta H	1.917	Comments:	[illegible]
Y	1.014		
C(p)	0.812		
FILTER BOX SETTING	350		
PROBE HTR SETTING	230		
DUCT X-SECTION	circ ?	rect ?	other:
DUCT DIMENSIONS	120" ID	DUCT AREA	78.54 ft²

TRAVERSE POINT [port-inch]	CLOCK TIME (24-hr)	SAMPLE TIME [minute]	STATIC PRES [" H_2O]	PITOT HEAD [" H_2O]	METER DIFF PRESSURE [" H_2O]	METER VACUUM [" Hg]	METER READING [ft³]	METER TEMP [oF] inlet	METER TEMP [oF] outlet	STACK TEMP [°F]	PROBE TEMP [°F]	FILTER BOX [°F]	LAST IMP TEMP [°F]	METER EXHAUST O_2 [% vol]	METER EXHAUST CO_2 [% vol]	O_2 CEM
		0					36.3									
-114.7	08:50	10		2.00	1.65	5.0	43.10	89	84	181	255	261	55	5.4	14.7	5.3
-102.5	09:00	20		2.30	1.90	5.0	50.14	93	86	181	254	258	61	5.3	14.8	5.3
-84.5	09:10	30	-2.428	2.10	1.75	5.0	57.02	95	88	182	261	259	60	5.5	14.6	5.6
-35.5	09:20	40		2.70	2.20	6.0	64.69	96	89	183	259	260	58	5.1	15.0	5.2
-17.5	09:30	50		2.60	2.10	5.75	72.23	98	90	183	265	259	56	5.2	14.9	5.3
-5.3	09:40	60		2.60	2.10	5.75	79.79	98	91	183	263	259	55	5.2	14.9	5.3
leak chk	09:52	ok		<0.01 @	21" Hg											
						0	80.30									
-114.7	10:40	70		2.40	2.00	5.0	87.63	96	92	183	252	257	52	5.3	14.8	5.3
-102.5	10:50	80		2.60	2.10	5.0	94.87	98	93	183	254	259	55	5.2	14.9	5.2
-84.5	11:00	90		2.70	2.20	6.0	102.52	99	93	183	252	259	57	5.1	14.9	5.2
-35.5	11:10	100		2.40	2.00	5.5	109.99	100	94	183	255	260	54	5.2	14.9	5.2
-17.5	11:20	110	-2.882	2.50	2.10	5.5	117.21	100	94	183	264	259	52	5.2	14.9	5.3
-5.3	11:30	120		2.50	2.10	5.5	124.60	100	94	183	260	259	52	5.3	14.8	5.3
leak test	11:42	ok														
								10	min	purge	after	test				
		120	-2.66	2.445	2.02		87.79	93.8		182.6				5.25	14.34	

Sample Train Pre Test <0.01 ft³ @ 10 in. Hg
Leak Checks: Post Test <0.01 ft³ @ 9 in. Hg

Pitot Tube PreTest OK @ 10 in. H_2O
Leak Checks: Post Test OK @ 7 in. H_2O

CONSOLENERGY

NOTE: Purge for 10 minutes at end of sampling.

Plant 2
Axial Flow Check

Location	SCR Inlet	Duct Ht, "	32.6667 ft	Barometric	30.09
Date	[illegible]	Duct ID,"	8.5 ft	Static	
Time		Duct Area	277.67 ft^2	Dry Bulb	
Tube I.D.	[illegible]	% O_2	4	Wet Bulb	
C-Factor	0.775	% CO_2	[illegible]	% H_20	
Operator(s)	[illegible]	% N_2		W.M.Wt	

PORT/ POINT	DISTANCE [" From Wall]	TEMP [°F]	DELTA P [" H_2O]	VELOCITY [Ft/Sec]	Null Angle
A - 1	93.5	800	0.0778		
A - 2	76.5	788	0.1401		
A - 3	59.50	790	0.6234		
A - 4	42.5	791	0.1113		
A - 5	25.5	797	0.7543		
A - 6	8.50	725	1.166		
B - 1	93.5	787	0.1264		~0
B - 2	76.5	778	0.1671		~0
B - 3	59.50	765	0.5771		~0
B - 4	42.5	748	0.6180		~0
B - 5	25.5	733	0.5212		~0
B - 6	8.50	711	0.1116		~0 -0.4
C-1	93.5	790	0.1397		~0
C-2	76.5	787	0.1313		~0
C-3	59.50	782	0.5385		~0
C-4	42.5	757	0.6369		~0
C-5	25.5	733	0.6351		~0
C-6	8.50	718	0.1782		~0
D-1	93.5	814	0.1487		~0
D-2	76.5	810	0.1621		~0
D-3	59.50	800	0.4780		~0
D-4	42.5	779	0.6511		~0
D-5	25.5	750	0.4214		~0
D-6	8.50	724	0.0836		~0
Average		1,63	0.3947		1.523
Maximum					
Minimum					
SDEV					

K factor = .252

Nozzle Size = 0.25

Actual Nozzle = 0.25

DATA SUMMARY	
Velocity, [fps]	
acfm	
scfm	
dscfm	
Ex Air Free cfm	
Est. MM Btu/hr Heat Input	
Est. Firing Rate, lb/hr	

Plant 2
Axial Flow Check

Location	Air Htr Out	Duct Ht, "	18.5 ft	Barometric	
Date		Duct ID,"	9 ft	Static	
Time		Duct Area	166.50 ft^2	Dry Bulb	
Tube I.D.		% O_2		Wet Bulb	
C-Factor		% CO_2		% H_20	
Operator(s)		% N_2		W.M.Wt	

PORT/ POINT	DISTANCE [" From Wall]	TEMP [°F]	DELTA P [" H_2O]	VELOCITY [Ft/Sec]	Null Angle
A - 1	90.0				
A - 2	54.0				
A - 3	18.0				
B-1	90.0				
B-2	54.0				
B-3	18.0				
C-1	90.0				
C-2	54.0				
C-3	18.0				
D-1	90.0				
D-2	54.0				
D-3	18.0				
E-1	90.0				
E-2	54.0				
E-3	18.0				
F-1	90.0				
F-2	54.0				
F-3	18.0				
Average					
Maximum					
Minimum					
SDEV					

DATA SUMMARY	
Velocity, [fps]	
acfm	
scfm	
dscfm	
Ex Air Free cfm	
Est. MM Btu/hr Heat Input	
Est. Firing Rate, lb/hr	

Plant 2
Axial Flow Check

Unit 2

Location	Stack	Duct Ht, "	ft	Barometric	30.09
Date	5/19/03	Duct ID,"	10 ft	Static	-1.680, -2.234
Time	6:24 pm - 6:44 pm	Duct Area	78.54 ft^2	Dry Bulb	
Tube I.D.	S-19A	% O_2	5.6 - 5.5	Wet Bulb	-1.957
C-Factor	0.788	% CO_2		% H_2O	
Operator(s)	KC, MC	% N_2		W.M.Wt	

PORT/ POINT	DISTANCE [" From Wall]	TEMP [°F]	DELTA P [" H_2O]	VELOCITY [Ft/Sec]	Null Angle
A - 1	114.7	172	2.353		± 2
A - 2	102.5	172	2.595		± 2
A - 3	84.5	172	2.360		± 2
A - 4	35.5	172	3.263		± 2
A - 5	17.5	172	2.867		± 2
A - 6	5.3	172	2.552		± 2
B-1	114.7	172	2.171		± 2
B-2	102.5	172	3.124		± 2
B-3	84.5	172	3.215		± 2
B-4	35.5	172	2.771		± 2
B-5	17.5	172	2.618		± 2
B-6	5.3	172	2.486		± 2
Average					
Maximum					
Minimum					
SDEV					

South

East

DATA SUMMARY	
Velocity, [fps]	
acfm	
scfm	
dscfm	
Ex Air Free cfm	
Est. MM Btu/hr Heat Input	
Est. Firing Rate, lb/hr	

[redacted]
moisture 12%
O_2 7%
CO_2 13%

PLANT 2 Hg SAMPLING PROGRAM - ONTARIO HYDRO SAMPLING TRAIN DATA

Location			SCR Inlet	AirHtr Out	Stack	SCR Inlet	AirHtr Out	Stack	SCR Inlet	AirHtr Out	Stack	SCR Inlet	AirHtr Out	Stack
Date			5/20/03	5/20/03	5/20/03	5/21/03	5/21/03	5/21/03	5/21/03	5/21/03	5/21/03	5/22/03	5/22/03	5/22/03
Start Time			13:30	13:30	13:31	9:15	9:15	9:15	14:15	14:16	14:15	8:55	8:47	8:40
Stop Time			15:30	16:04	15:38		11:47	11:14		16:29	16:10	11:25	11:42	11:30
Test Number			1	1	1	2	2	2	3	3	3	4	4	4
Sample Type			OH-Hg	OH-Hg	OH-Hg	OH-Hg	OH-Hg	OH-Hg	OH-Hg	OH-Hg	OH-Hg	OH-Hg	OH-Hg	OH-Hg
Y factor of dry gas meter	-		0.993	0.978	1.014	0.993	0.978	1.014	0.993	0.978	1.014	0.993	0.978	1.014
Gas Volume	-	ft^3	33.09	81.99	91.09	62.43	80.11	92.54	57.97	66.14	93.54	50.39	78.59	87.79
Delta H of dry gas meter	-	" H_20	0.55	1.56	2.18	1.18	1.49	2.33	1.19	1.39	2.28	1.40	1.40	2.02
Meter Temperature	-	°F	80.3	86.2	103.3	79.1	71.9	100.1	79.6	76.6	102.1	85.5	73.4	93.8
C Factor of pitot tube	-		0.816	0.815	0.813	0.816	0.815	0.813	0.816	0.815	0.813	0.816	0.815	0.813
Nozzle Diameter	-	inches	0.251	0.250	0.182	0.313	0.250	0.182	0.312	0.250	0.182	0.313	0.250	0.182
A n (area of nozzle)	-	ft^2	0.00034	0.00034	0.00018	0.00053	0.00034	0.00018	0.00053	0.00034	0.00018	0.00053	0.00034	0.00018
Area of Stack (Single of Dual	-	ft^2	277.7	166.5	78.5	277.7	166.5	78.5	277.7	166.5	78.5	277.7	166.5	78.5
H_2O Weight	-	gm	61.1	129.1	302.7	137.8	141.1	308.3	122.4	123.5	332.7	120.1	155.8	310.1
Sample Time	-	minutes	90	126	120	115	126	120	105	108	120	86	126	120
Barometric Pressure	-	" Hg	30.09	30.08	30.08	29.96	29.96	29.96	29.90	29.90	29.90	30.01	30.01	30.01
Static Pressure	-	" H_20	-3.15	-13.10	-3.16	-3.46	-13.05	-2.85	-3.37	-13.00	-3.03	-3.28	-12.70	-2.67
% Oxygen	-		4.1	5.3	5.9	3.8	5.2	6.0	4.4	5.8	6.0	3.5	4.3	5.3
% Carbon Dioxide	-		12.6	14.9	14.2	16.2	11.7	14.1	15.7	11.4	14.1	16.5	14.6	14.3
% N_2 + CO	-		83.3	79.9	79.9	80.0	83.1	79.9	79.9	82.8	79.9	80.0	81.1	80.4
Stack Temp (Dry Bulb)	-	°F	758	358	182	757	344	182	764	343	181	753	352	183
Stack Temp (Wet Bulb)	-	°F												
"S" sample (rms vel head)	-	" H_20	0.336	0.665	2.645	0.304	0.629	2.811	0.288	0.585	2.770	0.312	0.596	2.445
Dust Wt.	-	gm	7.8264	6.6961	0.0003	7.8264	6.6961	0.0003	7.8264	6.6961	0.0003	11.5500	16.1809	0.0008
Sample Volume	-	DSCF	32.32	78.20	87.47	60.95	78.13	89.05	56.43	63.80	89.50	48.72	76.55	85.51
Sample Volume	-	dscm	0.915	2.215	2.477	1.726	2.213	2.522	1.598	1.807	2.535	1.380	2.168	2.422
ABS ST PRES	-	" Hg	29.86	29.12	29.85	29.71	29.00	29.75	29.65	28.94	29.68	29.77	29.08	29.81
ABS ST TEMP	-	°R	1218	818	642	1217	804	642	1224	803	641	1213	812	643
H_2O - % by Vol	-	vapor	8.2	7.2	14.0	9.6	7.8	14.0	9.3	8.4	14.9	10.4	8.7	14.6
Water Volume	-	std ft^3	2.88	6.08	14.26	6.49	6.65	14.52	5.77	5.82	15.67	5.66	7.34	14.61
Dry Molecular Weight	-	lb/lb-mole	30.18	30.59	30.51	30.75	30.08	30.49	30.69	30.06	30.49	30.78	30.51	30.50
Wet Molecular Weight	-	lb/lb-mole	29.18	29.68	28.76	29.52	29.14	28.74	29.51	29.05	28.63	29.45	29.42	28.68
% EXCESS AIR	-		22.6	33.5	38.6	22.1	31.2	39.6	26.3	36.0	39.9	20.1	25.0	32.9
Dry Mole Frac.	-		0.918	0.928	0.860	0.904	0.922	0.860	0.907	0.916	0.851	0.896	0.913	0.854
Wet Mole Frac.	-		0.082	0.072	0.140	0.096	0.078	0.140	0.093	0.084	0.149	0.104	0.087	0.146
Gas Velocity, Direct	-	ft/sec	47.81	55.28	97.79	45.30	53.89	100.95	44.27	52.07	100.50	45.84	52.40	94.21
ACFM	-		796489	552238	460825	754739	538383	475705	737504	520134	473603	763703	523452	443973
DSCFM	-		316392	321860	324893	293935	315951	334630	286185	303356	329087	296274	301949	310475
DSCFM (rounded)			316400	321900	324900	293900	316000	334600	286200	303400	329100	296300	301900	310500
DSCMM			8960	9115	9201	8324	8948	9477	8105	8591	9320	8390	8551	8793
Excess Air Free DSCFM	-		254930	240394	233643	240211	237190	238724	226072	219316	234297	246234	240115	232485
CALCULATED FIRING RATE:														
Dry	-	lb/min	1888	1781	1731	1782	1760	1771	1673	1623	1733	1823	1777	1721
Wet	-	lb/min	1929	1819	1768	1821	1798	1810	1710	1659	1773	1859	1813	1756
Dry	-	lb/hr	113304	106844	103843	106932	105587	106270	100352	97354	104003	109355	106637	103249
Wet	-	lb/hr	115717	109119	106054	109265	107890	108588	102620	99554	106354	111564	108791	105334
CALCULATED FIRING RATE:														
Dry	-	tons/hr	56.7	53.4	51.9	53.5	52.8	53.1	50.2	48.7	52.0	54.7	53.3	51.6
Wet	-	tons/hr	57.9	54.6	53.0	54.6	53.9	54.3	51.3	49.8	53.2	55.8	54.4	52.7
HEAT INPUT:														
MM Btu/hr	-		1589	1498	1456	1500	1481	1490	1403	1361	1454	1528	1490	1443
PARTICULATE LOADING:														
Grains/DSCF	-		3.7361	1.3213	0.0001	1.9814	1.3225	0.0001	2.1400	1.6195	0.0001	3.6576	3.2617	0.0001
lb/hr	-		10136	3647	0.15	4993.1	3583	0.15	5251	4213.2	0.15	9293	8443.3	0.38
lb/MM Btu	-		6.38	2.43	0.00	3.33	2.42	0.00	3.74	3.10	0.00	6.08	5.66	0.00
Ash Production		lb/hr	7977	7522	7311	7720	7623	7673	7446	7224	7717	7808	7614	7372
Bagouse Ash			10136	3647	0.15	4993	3583	0.15	5251	4213	0.15	9293	8443	0.38
Bottom Ash			-2159	3875	7310	2727	4040	7673	2195	3010	7717	-1485	-829	7372
Percent Fly Ash			127.1%	48.5%	0.0%	64.7%	47.0%	0.0%	70.5%	58.3%	0.0%	119.0%	110.9%	0.0%
% ISOKINETIC	-		92	94	98	94	96	97	98	95	99	100	98	100

ppm Hg in Coal	0.115	0.115	0.115	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105
µg Hg/dscm	10.99	10.19	9.81	10.19	9.37	8.90	9.83	8.99	8.86	10.34	9.90	9.32

Date	5/20/03	5/20/03	5/20/03	5/21/03	5/21/03	5/21/03	5/21/03	5/21/03	5/21/03	5/22/03	5/22/03	5/22/03
COAL DATA:												
% Carbon	77.89	77.89	77.89	77.81	77.81	77.81	77.91	77.91	77.91	77.84	77.84	77.84
% Hydrogen	4.86	4.86	4.86	4.83	4.83	4.83	4.85	4.85	4.85	4.87	4.87	4.87
% Nitrogen	1.51	1.51	1.51	1.52	1.52	1.52	1.52	1.52	1.52	1.55	1.55	1.55
% Sulfur	1.87	1.87	1.87	1.85	1.85	1.85	1.86	1.86	1.86	1.96	1.96	1.96
% Oxygen	6.83	6.83	6.83	6.77	6.77	6.77	6.44	6.44	6.44	6.64	6.64	6.64
% Ash	7.04	7.04	7.04	7.22	7.22	7.22	7.42	7.42	7.42	7.14	7.14	7.14
% Volatile Matter	38.11	38.11	38.11	37.80	37.80	37.80	37.98	37.98	37.98	37.92	37.92	37.92
Btu/lb	14025	14025	14025	14025	14025	14025	13981	13981	13981	13977	13977	13977
CARBON CONVERSION	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%	99.00%
CALCULATED FEED	93998	112697	108933	112461	87400	111286	105847	81592	109225	115199	104298	105045
F-Factor	9625	9625	9625	9610	9610	9610	9668	9668	9668	9666	9666	9666
Moisture	2.09%	2.09%	2.09%	2.14%	2.14%	2.14%	2.21%	2.21%	2.21%	1.98%	1.98%	1.98%

% Water Vapor Calculation:													
Barometric Pressure, In Hg		30.09	30.08	30.08	29.96	29.96	29.96	29.9	29.9	29.9	30.01	30.01	30.01
DUCT Static Pressure, in H2O		-3.154	-13.1	-3.155	-3.4566667	-13.05	-2.85	-3.369	-13	-3.03	-3.276	-12.7	-2.665
DRY Bulb Temp		758	358	182.4	756.5	343.7	181.7	763.5	342.6	181.4	753.3	351.7	182.6
WET Bulb Temp		0	0	0	0	0	0	0	0	0	0	0	0
Press, ATMS		14.66	14.30	14.66	14.59	14.24	14.61	14.56	14.21	14.57	14.62	14.28	14.64
Intermediate result		11.77	11.40	11.76	11.69	11.34	11.71	11.67	11.32	11.68	11.72	11.38	11.74
Intermediate result		758.00	358.00	182.40	756.50	343.70	181.70	763.50	342.60	181.40	753.30	351.70	182.60
Intermediate result		-7.80	-7.80	-7.80	-7.80	-7.80	-7.80	-7.80	-7.80	-7.80	-7.80	-7.80	-7.80
Intermediate result		6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08
Intermediate result		2819.76	1331.76	678.53	2814.18	1278.56	675.92	2840.22	1274.47	674.81	2802.28	1308.32	679.27
Intermediate result		6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.08
Intermediate result		2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89
Intermediate result		-360.1	1206.4	1782.1	-338.8	1272.4	1794.8	-359.3	1282.7	1803.5	-333.5	1234.3	1784.9
Intermediate result		6365	9660	10994	6393	9788	11010	6342	9803	11020	6412	9715	10996
Percent Water Vapor		-5.66	12.49	16.21	-5.30	13.00	16.30	-5.66	13.09	16.37	-5.20	12.71	16.23
	% CO_2	12.6000	14.8500	14.2200	16.2100	11.7200	14.0900	15.6900	11.4100	14.0800	16.4800	14.6400	14.3400
	ppm	126000	148500	142200	162100	117200	140900	156900	114100	140800	164800	146400	143400
	lb/dscf	1.38E-02	1.60E-02	1.54E-02	1.74E-02	1.29E-02	1.52E-02	1.69E-02	1.25E-02	1.52E-02	1.77E-02	1.58E-02	1.55E-02
	lb/hr	261556	309395	299822	306835	243715	306144	289730	228011	300863	314106	286845	288987
	lb/hr Carbon	71334	84381	81770	83682	66468	83494	79017	62185	82054	85665	78230	78815
	lb/hr Coal	91582	108333	104981	107547	85423	107305	101421	79816	105319	110053	100502	101252
ppm Hg in Coal		0.115	0.115	0.115	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105
Gas Phase Hg Conc., ug/m^3		10.99	10.19	9.81	10.19	9.37	8.90	9.83	8.99	8.86	10.34	9.90	9.32
Gas Phase Hg Conc., ug/m^3		8.88	10.33	9.92	10.25	7.58	8.99	9.93	7.37	8.97	10.41	9.33	9.14

Impinger Components Wts & Volumes	SCR Inl-1	AH Out-1	Stack-1	SCR Inl-2	AH Out-2	Stack-2	SCR Inl-3	AH Out-3	Stack-3	SCR Inl-4	AH Out-4	Stack-4
Filter Wt., g	7.8264	6.6961	0.3278	7.8264	6.6961	0.3375	7.8264	6.6961	0.3303	11.5500	16.1809	0.3297
ppb Hg	<5.000	212	<5.0	11	66	<5.0	17	300	<5.0	6	289	7.00
total ug	0.04	1.42	5.00E-03	0.09	0.44	5.00E-03	0.13	2.01	5.00E-03	0.07	4.68	7.00E-03
ug/dscm	0.04	0.64	2.02E-03	0.05	0.20	1.98E-03	0.08	1.11	1.97E-03	0.05	2.16	2.89E-03
Probe Rinse volume, ml	66	84	56	96	80	120	62	108	120	137	92	111
Analytical Hg, ng/ml	3.5	2.3	4.0	2.8	2.3	2.0	3.5	1.3	2.3	1.6	1.5	1.9
ug/dscm	0.25	0.09	0.09	0.16	0.08	0.10	0.14	0.08	0.11	0.16	0.06	0.09
Heated Umbilical Line Rinse volume, ml	71	114	NA	103	109	NA	102	98	NA	83	96	NA
Analytical Hg, ng/ml	7.1	1.6		3.3	1.2		5.1	1.6		1.7	1.1	
ug/dscm	0.55	0.08		0.20	0.06		0.33	0.09		0.10	0.05	
KCl volume, ml	507	560	738	567	578	746	564	561	756	648	587	744
Analytical Hg, ng/ml	5.2	41.0	<1.0	1.5	34.8	<1.0	4.1	27.4	<1.0	6.7	31.6	<1.0
ug/dscm	2.88	10.37	<0.30	0.49	9.09	<0.30	1.45	8.51	<0.30	3.15	8.56	<0.31
Nitric/Peroxide volume, ml	175	177	178	175	178	179	176	177	181	140	179	181
Analytical Hg, ng/ml	2.0	1.2	<1.00	2.7	<1.0	<1.00	2.5	1.0	<1.00	24.0	<1.0	<1.00
ug/dscm	0.38	0.10	<0.07	0.27	<0.08	<0.07	0.28	0.10	<0.07	2.43	<0.08	<0.07
KMnO4 volume, ml	245	246	247	252	245	245	246	249	256	193	250	248
Analytical Hg, ng/ml	39.7	3.9	<1.0	87.0	<1.0	<1.0	66.5	<1.0	<1.0	65.3	<1.0	<1.0
ug/dscm	10.63	0.43	<0.10	12.70	<0.11	<0.10	10.24	<0.14	<0.10	9.13	<0.12	<0.10
KMnO4-Acid Rinse volume, ml	100	100	100	100	100	100	100	100	100	100	100	100
Analytical Hg, ng/ml	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ug/dscm	<0.11	<0.05	<0.04	<0.06	<0.05	<0.04	<0.06	<0.06	<0.04	<0.07	<0.05	<0.04
Particulate	0.04	0.64	2.02E-03	0.05	0.20	1.98E-03	0.08	1.11	1.97E-03	0.05	2.16	2.89E-03
Percent of Total	0.29	5.45	0.34	0.36	2.07	0.33	0.66	11.04	0.32	0.33	19.49	0.47
Oxidized Fraction	3.68	10.54	0.39	0.85	9.23	0.39	1.91	8.67	0.41	3.41	8.67	0.39
Percent of Total	24.81	89.66	64.48	6.07	95.49	65.08	15.19	86.07	65.57	22.57	78.31	64.05
Elemental Fraction	11.12	0.57	0.21	13.03	0.24	0.21	10.57	0.29	0.21	11.64	0.24	0.22
Percent of Total	74.90	4.89	35.19	93.57	2.44	34.59	84.15	2.89	34.12	77.10	2.20	35.48
Total ug/m^3	14.84	11.75	0.60	13.93	9.67	0.60	12.57	10.08	0.62	15.10	11.07	0.62
ppm Hg in Bottom Ash	0.02	0.02	0.02	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
ug/m^3	-0.04	0.06	0.12	-0.04	0.01	0.02	0.01	0.01	0.02	0.00	0.01	0.02
ppm Hg in Baghouse Ash	0.69	0.69	0.69	0.7	0.7	0.7	0.67	0.67	0.67	0.61	0.61	0.61
ug/m^3	-1.26	2.22	4.14	-1.37	2.39	4.28	1.37	2.38	4.19	-0.82	2.18	3.87
	13.55	14.03	4.87	12.52	12.07	4.90	13.94	12.47	4.83	14.28	13.26	4.50
	-2159	3875	7310	-2159	4040	7673	2195	4040	7717	-1485	4040	7372
Coal In ug/sec	1641.4	1547.8	1504.4	1414.4	1396.6	1405.6	1327.4	1287.7	1375.7	1446.4	1410.5	1365.7
Bottom Ash	-5.4	9.8	18.4	-0.8	1.5	2.9	0.8	1.5	2.9	-0.6	1.5	2.8
	-0.3%	0.6%	1.2%	-0.1%	0.1%	0.2%	0.1%	0.1%	0.2%	0.0%	0.1%	0.2%
Baghouse Ash	881.0	317.0	0.0	440.3	316.0	0.0	443.2	355.6	0.0	714.1	648.8	0.0
	53.7%	20.5%	0.0%	31.5%	22.5%	0.0%	32.2%	24.6%	0.0%	52.3%	#DIV/0!	0.0%
FGD Solid												

APPENDIX B

Plant 2 Process Data

[redacted] Generating Plant
Selected Process Data for May 20, 2003 (12:00 to 18:00)

1 h

Point ID	Description	Units	5/20/2003 12:00 5/20/2003 13:00	5/20/2003 13:00 5/20/2003 14:00	5/20/2003 14:00 5/20/2003 15:00	5/20/2003 15:00 5/20/2003 16:00	5/20/2003 16:00 5/20/2003 17:00	5/20/2003 17:00 5/20/2003 18:00	TEST PERIOD AVERAGE
MAJT02	GENERATOR WATT	MW	285.0121155	284.6630859	284.8414917	284.1486816	284.5657349	284.5403137	284.5510864
JL2ST18A	COAL FDR 2A1 RATE TPH	TONS PER HR	13.53194523	13.81976604	13.56320763	13.95877552	14.10605335	14.23916531	13.78058306
JL2ST18B	COAL FDR 2A2 RATE TPH	TONS PER HR	13.80245781	13.57326603	14.12667847	14.05644417	14.14178467	13.39662457	13.91879622
JL2ST56A	COAL FDR 2B1 RATE TPH	TONS PER HR	16.91896057	16.77245712	15.87625694	15.32052326	14.85062695	15.91179276	15.98974578
JL2ST56B	COAL FDR 2B2 RATE TPH	TONS PER HR	16.70841217	16.06086159	16.15438843	16.00525093	16.28355789	15.50442982	16.07350032
AE1FI01C	BLR 1 FW FLOW XMTR	KPPH	1252.951416	1248.865356	1249.546509	1251.822754	1256.804688	1258.410278	1250.078206
AE1FT02	BLR 1 SPRHTR/DSPRHTR SPRAY	KPPH	17.21237183	12.00606441	5.02955246	1.960704923	0.847187877	3.125095367	6.332107266
AE2FI01C	BLR 2 FW FLOW XMTR	KPPH	1253.676636	1253.39563	1258.675903	1258.897705	1257.324097	1253.97522	1256.989746
AE2FT02	BLR 2 SPRHTR/DSPRHTR SPRAY	KPPH	4.790603161	5.751005173	5.557218552	5.333421707	5.109624863	4.885827541	5.547215144
AB1FI01C	BLR 1 MAIN STEAM FLOW	KPPH	1277.372192	1271.675171	1269.07312	1271.501587	1272.80188	1275.899048	1270.749959
AB1PT01	BLR 1 MAIN STEAM PRESS	PSIG	1891.130615	1891.556885	1894.098755	1894.613159	1894.984375	1895.355591	1893.422933
AB1TE01	BLR 1 MAIN STEAM TEMP	DEGF	1007.06665	1005.714233	1005.762024	1006.347595	1004.738525	1003.734985	1005.941284
AB2FI01C	BLR 2 MAIN STEAM FLOW	KPPH	1282.240967	1283.251099	1289.50415	1287.826416	1288.620728	1283.088013	1286.860555
AB2PT01	BLR 2 MAIN STEAM PRESS	PSIG	1885.846069	1885.561646	1885.012329	1886.975708	1886.845947	1886.493652	1885.849894
AB2TE01	BLR 2 MAIN STEAM TEMP	DEGF	989.0239868	988.755127	987.9347534	987.6572876	985.6018066	985.131897	988.1157227
JP2AT08A	SCR FLUE GAS INLET OXYGEN	PCT	2.801468372	2.860774517	2.873255253	2.814286232	2.774495363	2.792716503	2.849438667
JP2AT08B	SCR FLUE GAS INLET OXYGEN	PCT	4.924291611	4.977404594	4.925389767	4.923716545	4.992543697	5.010920525	4.942170302
BA2TE11A	AIR HEATER AIR INLET TEMP	DEGF	78.49239349	80.63630676	82.08584595	83.16149139	84.12371826	82.59571838	81.9612147
BA2TE11B	AIR HEATER AIR INLET TEMP	DEGF	78.34314728	80.40149689	81.84553528	82.9726944	83.99030304	82.46591949	81.73990885
BA2TE11C	AIR HEATER AIR INLET TEMP	DEGF	82.39981079	84.20037842	84.43888092	84.5680542	84.69723511	84.81426239	84.40243785
JP2TE12A	AIR HEATER FLUE GAS OUT TE	DEGF	320.0716248	321.2647095	322.4577942	323.6508789	324.4978027	322.9161987	322.4577942
JP2TE12B	AIR HEATER FLUE GAS OUT TE	DEGF	342.6317444	343.4883728	344.3449707	345.2015991	345.7056885	344.2762146	344.3449809
JP2TE12C	AIR HEATER FLUE GAS OUT TE	DEGF	384.1207275	384.5223999	384.9241028	385.3258057	385.7275085	386.1292114	384.9241028
JP2TE07A	SCR FLUE GAS OUT (A/H IN)	DEGF	773.1456909	773.7532959	774.7285156	775.7037354	776.6789551	777.6541748	774.7285156
JP2TT1F	SDA OUTLET TEMP	DEGF	160.6013947	160.6207581	160.6029816	160.1038971	159.4570007	158.8101044	160.4425456
JP2TY11	SCR INLET TEMPERATURE AVER	DEGF	737.0835571	734.1639404	731.833252	731.1980591	730.6690674	730.1400757	732.3984172
JP2TI1H	BAGHOUSE 2 OUTLET TEMP	DEGF	162.0324249	162.169754	162.3070831	162.4444122	162.5817566	162.7040863	162.3070831
JP2TE82A	FLUE GAS EXIT TEMP	DEGF	173.1171417	172.9836273	172.8500977	172.7159271	172.407486	171.9630585	172.849884
JP2TE82B	FLUE GAS EXIT TEMP	DEGF	172.9745789	172.78479	172.5950012	172.4052124	172.1468048	171.7390594	172.5950012
JP2TE82C	FLUE GAS EXIT TEMP	DEGF	172.7843628	172.5974426	172.4105225	172.223587	171.990097	171.6138153	172.4105174
JP2FI4B	AMMONIA MASS FLOW	PPH	445.9773865	448.4068298	450.8362732	453.2657166	455.6951599	458.1229553	450.8362732
RE2AY02	SOX MONITOR CEMS OUTPUT	PPM	In calibration	75.49460602	84.42284393	77.36946869	80.95968628	88.27359772	79.09563955
RE2AY03	NOX MONITOR CEMS OUTPUT	PPM	In calibration	75.57772827	75.24662018	74.71805573	74.60462952	74.47187042	75.18080139
RE2AY04	CO MONITOR CEMS OUTPUT	PPM	In calibration	10.25102043	10.67256165	10.20773506	12.57730007	13.09584045	10.37710571

Notes:

1. **All data shown are for Boiler #2 unless otherwise identified as BLR1 in description.**
2. **All data shown are hourly averages for the 1 hour period.**
3. **CEMS was in calibration during 12:00 to 13:00 hour. Emissions data are not available for this period.**

[redacted] Generating Plant
Selected Process Data for May 21, 2003 (08:00 to 13:00)

1 h

Point ID	Description	Units	5/21/2003 8:00 5/21/2003 9:00	5/21/2003 9:00 5/21/2003 10:00	5/21/2003 10:00 5/21/2003 11:00	5/21/2003 11:00 5/21/2003 12:00	5/21/2003 12:00 5/21/2003 13:00	TEST PERIOD AVERAGE
MAJT02	GENERATOR WATT	MW	284.3995972	284.7961426	285.4602051	284.7624207	285.5088196	285.0062561
JL2ST18A	COAL FDR 2A1 RATE TPH	TONS PER HR	14.72817326	14.1769886	14.40433884	14.86493587	14.59652615	14.48208777
JL2ST18B	COAL FDR 2A2 RATE TPH	TONS PER HR	15.18020248	14.93904018	14.69505978	15.16630268	15.01325893	14.93346755
JL2ST56A	COAL FDR 2B1 RATE TPH	TONS PER HR	16.97879982	17.54987717	17.15631676	16.66308784	16.77394485	17.12309392
JL2ST56B	COAL FDR 2B2 RATE TPH	TONS PER HR	16.47397804	16.74970627	17.11352348	16.68526649	16.24526405	16.84949875
AE1FI01C	BLR 1 FW FLOW XMTR	KPPH	1237.195923	1234.671875	1241.796265	1247.555298	1255.943848	1241.341146
AE1FT02	BLR 1 SPRHTR/DSPRHTR SPRAY	KPPH	16.17988396	18.12521553	13.04185486	10.60330963	10.9552021	13.92346001
AE2FI01C	BLR 2 FW FLOW XMTR	KPPH	1275.49292	1271.587158	1272.005493	1261.576416	1259.144897	1268.389689
AE2FT02	BLR 2 SPRHTR/DSPRHTR SPRAY	KPPH	7.142319202	6.82349062	6.811731339	6.811731339	6.811731339	6.815651099
AB1FI01C	BLR 1 MAIN STEAM FLOW	KPPH	1264.545532	1263.325073	1268.208496	1270.965454	1280.766724	1267.499674
AB1PT01	BLR 1 MAIN STEAM PRESS	PSIG	1904.574463	1906.524536	1908.218872	1904.258911	1898.499756	1906.334106
AB1TE01	BLR 1 MAIN STEAM TEMP	DEGF	1004.482178	1004.416809	1004.277832	1003.961121	1004.260071	1004.218587
AB2FI01C	BLR 2 MAIN STEAM FLOW	KPPH	1308.522095	1306.366089	1306.035278	1292.984009	1286.170532	1301.795125
AB2PT01	BLR 2 MAIN STEAM PRESS	PSIG	1891.707886	1890.851563	1893.932617	1887.621094	1891.883545	1890.801758
AB2TE01	BLR 2 MAIN STEAM TEMP	DEGF	979.8396606	983.2817383	984.7243042	985.5716553	989.2167358	984.5258993
JP2AT08A	SCR FLUE GAS INLET OXYGEN	PCT	2.799674273	2.77575922	2.671258688	2.679772377	2.601457357	2.708930095
JP2AT08B	SCR FLUE GAS INLET OXYGEN	PCT	4.978339672	5.003475666	4.978423119	4.918628693	4.920167923	4.966842492
BA2TE11A	AIR HEATER AIR INLET TEMP	DEGF	63.06214905	63.26940536	63.58330917	63.8617897	64.03282166	63.57150141
BA2TE11B	AIR HEATER AIR INLET TEMP	DEGF	62.96653748	63.35348129	63.78694534	64.01430511	64.09487152	63.71824392
BA2TE11C	AIR HEATER AIR INLET TEMP	DEGF	67.12864685	67.41213226	67.69561768	67.97909546	68.29303741	67.69561513
JP2TE12A	AIR HEATER FLUE GAS OUT TE	DEGF	307.7579651	304.9303284	305.5072327	306.0935364	306.6798401	305.5103658
JP2TE12B	AIR HEATER FLUE GAS OUT TE	DEGF	328.8440857	326.594696	327.0681152	327.5415649	328.0149841	327.0681254
JP2TE12C	AIR HEATER FLUE GAS OUT TE	DEGF	373.3012695	370.3759155	371.0624084	371.7644653	372.4665222	371.0675964
JP2TE07A	SCR FLUE GAS OUT (A/H IN)	DEGF	778.2839966	775.9523926	776.6934814	777.5612793	778.4290161	776.7357178
JP2TT1F	SDA OUTLET TEMP	DEGF	159.9730072	159.9505463	160.1608124	160.3710785	160.5813446	160.1608124
JP2TY11	SCR INLET TEMPERATURE AVER	DEGF	729.0422363	724.9144287	723.4503784	721.9863892	720.5223389	723.4503988
JP2TI1H	BAGHOUSE 2 OUTLET TEMP	DEGF	161.3289032	161.5784607	161.5890808	161.4975128	161.4059601	161.5550181
JP2TE82A	FLUE GAS EXIT TEMP	DEGF	173.1149902	172.9776459	172.8403168	172.7029877	172.5656586	172.8403168
JP2TE82B	FLUE GAS EXIT TEMP	DEGF	172.2342224	172.1628113	172.079834	171.9968567	171.9138947	172.079834
JP2TE82C	FLUE GAS EXIT TEMP	DEGF	172.0739746	171.9686127	171.8370056	171.7053986	171.5737915	171.8370056
JP2FI4B	AMMONIA MASS FLOW	PPH	444.7895203	440.6798401	436.5691528	432.4584656	428.3477783	436.5691528
RE2AY02	SOX MONITOR CEMS OUTPUT	PPM	96.6966095	51.6559906	69.3670578	58.56201935	71.30745697	59.86168925
RE2AY03	NOX MONITOR CEMS OUTPUT	PPM	28.32099724	57.02217484	74.83648682	72.07045746	74.81124878	67.97637304
RE2AY04	CO MONITOR CEMS OUTPUT	PPM	2.388440847	2.140814781	13.59666443	14.78662968	17.17652512	10.17470296

Notes:

1. **All data shown are for Boiler #2 unless otherwise identified as BLR1 in description.**
2. **All data shown are hourly averages for the 1 hour period.**

[redacted] Generating Plant
Selected Process Data for May 21, 2003 (13:00 to 18:00)

1 h

Point ID	Description	Units	5/21/2003 13:00 5/21/2003 14:00	5/21/2003 14:00 5/21/2003 15:00	5/21/2003 15:00 5/21/2003 16:00	5/21/2003 16:00 5/21/2003 17:00	5/21/2003 17:00 5/21/2003 18:00	TEST PERIOD AVERAGE
MAJT02	GENERATOR WATT	MW	285.773407	285.4936829	284.7680054	274.6034241	285.6673889	281.6217041
JL2ST18A	COAL FDR 2A1 RATE TPH	TONS PER HR	13.89982986	13.81330395	14.54034519	12.72418022	14.15902424	13.69260979
JL2ST18B	COAL FDR 2A2 RATE TPH	TONS PER HR	13.75826168	14.67096233	14.58789825	12.78282166	14.83383656	14.01389408
JL2ST56A	COAL FDR 2B1 RATE TPH	TONS PER HR	17.20214653	16.82278061	16.36519623	15.90760994	15.52451992	16.36519559
JL2ST56B	COAL FDR 2B2 RATE TPH	TONS PER HR	16.75222588	16.95851707	17.51232529	16.30038071	16.37096214	16.92374102
AE1FI01C	BLR 1 FW FLOW XMTR	KPPH	1258.272705	1260.067505	1254.762817	1253.165283	1264.637573	1255.998535
AE1FT02	BLR 1 SPRHTR/DSPRHTR SPRAY	KPPH	9.219270706	9.902366638	24.03045273	29.36478043	14.43607616	21.09919993
AE2FI01C	BLR 2 FW FLOW XMTR	KPPH	1253.103149	1248.0625	1246.32605	1175.754761	1252.096924	1223.381104
AE2FT02	BLR 2 SPRHTR/DSPRHTR SPRAY	KPPH	6.811731339	6.811731339	6.811731339	6.811731339	6.482751369	6.811731339
AB1FI01C	BLR 1 MAIN STEAM FLOW	KPPH	1279.264893	1280.696167	1285.356201	1288.541992	1289.144043	1284.864787
AB1PT01	BLR 1 MAIN STEAM PRESS	PSIG	1903.116577	1907.81897	1903.48584	1872.598999	1908.525513	1894.634603
AB1TE01	BLR 1 MAIN STEAM TEMP	DEGF	1004.949036	1007.712891	1004.57959	1004.081665	1004.363892	1005.458049
AB2FI01C	BLR 2 MAIN STEAM FLOW	KPPH	1283.554077	1277.703491	1276.89502	1206.363281	1279.778564	1253.653931
AB2PT01	BLR 2 MAIN STEAM PRESS	PSIG	1893.181396	1892.018921	1889.642578	1865.323608	1897.878662	1882.328369
AB2TE01	BLR 2 MAIN STEAM TEMP	DEGF	995.2527466	997.1950073	996.8883057	970.9140015	997.401123	988.3324382
JP2AT08A	SCR FLUE GAS INLET OXYGEN	PCT	2.592372179	2.521198988	2.567058802	3.904717684	2.385539293	2.997658491
JP2AT08B	SCR FLUE GAS INLET OXYGEN	PCT	4.932720661	4.861488819	4.950539112	6.076348305	4.554429531	5.296125412
BA2TE11A	AIR HEATER AIR INLET TEMP	DEGF	64.1964798	64.36013031	64.52378845	64.68501282	64.81788635	64.52297719
BA2TE11B	AIR HEATER AIR INLET TEMP	DEGF	64.17543793	64.25600433	64.33657074	64.4196701	64.55618286	64.33741506
BA2TE11C	AIR HEATER AIR INLET TEMP	DEGF	68.77768707	69.28887177	69.80005646	70.24050903	70.28453064	69.77647909
JP2TE12A	AIR HEATER FLUE GAS OUT TE	DEGF	306.9040527	305.6992798	304.3482056	304.2337646	307.2785645	304.7604167
JP2TE12B	AIR HEATER FLUE GAS OUT TE	DEGF	328.1913452	327.3336792	326.3875427	325.7320251	327.2762146	326.4844157
JP2TE12C	AIR HEATER FLUE GAS OUT TE	DEGF	372.3834839	370.4679565	368.4772034	367.5139465	370.2139587	368.8197021
JP2TE07A	SCR FLUE GAS OUT (A/H IN)	DEGF	778.4284058	777.2918701	775.7329712	771.4174194	772.1715088	774.8140869
JP2TT1F	SDA OUTLET TEMP	DEGF	160.7916107	161.0018768	161.2121429	161.3231964	160.9902649	161.1790721
JP2TY11	SCR INLET TEMPERATURE AVER	DEGF	719.0583496	717.5942993	716.1303101	717.3790283	726.8265991	717.0345459
JP2TI1H	BAGHOUSE 2 OUTLET TEMP	DEGF	161.3144073	161.2228546	161.1313019	161.0397339	160.9455719	161.1312968
JP2TE82A	FLUE GAS EXIT TEMP	DEGF	172.4283142	172.2909851	172.1537933	172.0558777	171.9885864	172.1668854
JP2TE82B	FLUE GAS EXIT TEMP	DEGF	171.8309174	171.7479401	171.664978	171.6130829	171.6288757	171.6753337
JP2TE82C	FLUE GAS EXIT TEMP	DEGF	171.4421692	171.3105621	171.1789551	171.0943604	171.1539154	171.1946259
JP2FI4B	AMMONIA MASS FLOW	PPH	424.2370605	420.1263733	416.0155029	419.8620605	429.2852783	418.6679789
RE2AY02	SOX MONITOR CEMS OUTPUT	PPM	77.22389984	76.02581787	70.39402008	81.31669617	71.88053894	75.91217804
RE2AY03	NOX MONITOR CEMS OUTPUT	PPM	74.39357758	74.52046204	75.23608398	72.33103943	64.49617767	74.02919515
RE2AY04	CO MONITOR CEMS OUTPUT	PPM	14.95053005	17.20219994	17.54199219	9.18006897	21.51213455	14.64142036

Notes:

1. **All data shown are for Boiler #2 unless otherwise identified as BLR1 in description.**
2. **All data shown are hourly averages for the 1 hour period.**
3. **Boiler #2 load was reduced by approximately 10-15% for about 30 minutes during hour 16:00/17:00 due to elevated temperatures on 2 burners.**

[redacted] Generating Plant
Selected Process Data for May 22, 2003 (8:00 to 13:00)

1 h

Point ID	Description	Units	5/22/2003 8:00 5/22/2003 9:00	5/22/2003 9:00 5/22/2003 10:00	5/22/2003 10:00 5/22/2003 11:00	5/22/2003 11:00 5/22/2003 12:00	5/22/2003 12:00 5/22/2003 13:00	TEST PERIOD AVERAGE
MAJT02	GENERATOR WATT	MW	286.2198181	285.2159424	285.6192017	284.7683411	285.3544617	285.2011617
JL2ST18A	COAL FDR 2A1 RATE TPH	TONS PER HR	14.01988411	14.88260937	14.64012718	14.35592461	14.34133053	14.62622039
JL2ST18B	COAL FDR 2A2 RATE TPH	TONS PER HR	14.10613441	15.32871819	15.03775215	14.14886665	14.4559145	14.83844566
JL2ST56A	COAL FDR 2B1 RATE TPH	TONS PER HR	16.3122921	16.25909042	16.20588875	16.12085342	15.92359829	16.19527753
JL2ST56B	COAL FDR 2B2 RATE TPH	TONS PER HR	16.14792633	16.99380112	16.5614624	16.85622406	17.337677	16.80382919
AE1FI01C	BLR 1 FW FLOW XMTR	KPPH	1241.074097	1232.168457	1241.483276	1244.120117	1249.095703	1239.257284
AE1FT02	BLR 1 SPRHTR/DSPRHTR SPRAY	KPPH	13.57119656	13.13760471	10.5570507	9.446086884	5.585210323	11.0469141
AE2FI01C	BLR 2 FW FLOW XMTR	KPPH	1264.619141	1264.708618	1263.099976	1261.102783	1261.963623	1262.970459
AE2FT02	BLR 2 SPRHTR/DSPRHTR SPRAY	KPPH	7.729885578	6.009119987	7.501080513	6.514704227	5.847346306	6.674968243
AB1FI01C	BLR 1 MAIN STEAM FLOW	KPPH	1261.385864	1255.599731	1261.522705	1259.817383	1266.508057	1258.97994
AB1PT01	BLR 1 MAIN STEAM PRESS	PSIG	1897.490112	1896.044189	1894.673584	1893.302979	1891.932373	1894.673584
AB1TE01	BLR 1 MAIN STEAM TEMP	DEGF	1001.252136	1000.98999	1000.110229	1000.602722	1000.761963	1000.567647
AB2FI01C	BLR 2 MAIN STEAM FLOW	KPPH	1293.5625	1295.214111	1292.733032	1290.608887	1290.440796	1292.85201
AB2PT01	BLR 2 MAIN STEAM PRESS	PSIG	1890.812256	1888.952515	1889.498779	1884.80896	1888.013428	1887.753418
AB2TE01	BLR 2 MAIN STEAM TEMP	DEGF	1003.402649	1003.315125	1003.289917	1004.633057	1002.27832	1003.746033
JP2AT08A	SCR FLUE GAS INLET OXYGEN	PCT	2.141755342	2.080692291	1.977871537	1.986598492	2.05417943	2.015054107
JP2AT08B	SCR FLUE GAS INLET OXYGEN	PCT	4.52131319	4.147316456	4.074446201	4.074785233	4.179182053	4.098849297
BA2TE11A	AIR HEATER AIR INLET TEMP	DEGF	63.5476265	63.79959869	64.17955017	64.55950928	64.93946075	64.17955271
BA2TE11B	AIR HEATER AIR INLET TEMP	DEGF	63.57303619	63.74193573	64.05838776	64.37483978	64.69129944	64.05838776
BA2TE11C	AIR HEATER AIR INLET TEMP	DEGF	68.75083923	69.05079651	69.40709686	69.76340485	70.1197052	69.40709941
JP2TE12A	AIR HEATER FLUE GAS OUT TE	DEGF	309.561615	310.325531	311.089447	311.853363	312.6172791	311.089447
JP2TE12B	AIR HEATER FLUE GAS OUT TE	DEGF	333.226593	333.5819397	333.9372864	334.2926331	334.6479797	333.9372864
JP2TE12C	AIR HEATER FLUE GAS OUT TE	DEGF	375.4468079	375.7901306	376.1334839	376.4768066	376.8201294	376.1334737
JP2TE07A	SCR FLUE GAS OUT (A/H IN)	DEGF	780.8719482	780.4209595	780.4656982	780.510437	780.5552368	780.4656982
JP2TT1F	SDA OUTLET TEMP	DEGF	160.4690399	160.2746277	160.0802155	159.8858185	159.6914063	160.0802205
JP2TY11	SCR INLET TEMPERATURE AVER	DEGF	743.0995483	739.1196899	735.598938	734.1752319	733.010498	736.2979533
JP2TI1H	BAGHOUSE 2 OUTLET TEMP	DEGF	161.532608	161.8331757	162.0581818	162.256546	162.4549103	162.0493011
JP2TE82A	FLUE GAS EXIT TEMP	DEGF	173.0420532	173.0210724	173.0000916	172.9791107	172.9581146	173.0000916
JP2TE82B	FLUE GAS EXIT TEMP	DEGF	172.9150696	172.8482208	172.7766876	172.7051544	172.6336365	172.7766876
JP2TE82C	FLUE GAS EXIT TEMP	DEGF	172.7777557	172.7108765	172.6393585	172.5678253	172.4962921	172.6393534
JP2FI4B	AMMONIA MASS FLOW	PPH	467.1712341	451.8599548	448.6338501	445.4077759	443.8244629	448.6338603
RE2AY02	SOX MONITOR CEMS OUTPUT	PPM	75.31489563	74.01787567	73.13191986	71.84762573	74.22486115	72.99914042
RE2AY03	NOX MONITOR CEMS OUTPUT	PPM	67.0375824	73.31904602	72.96198273	73.91446686	77.44639587	73.39849854
RE2AY04	CO MONITOR CEMS OUTPUT	PPM	34.88733292	40.1811409	51.3319931	32.1812439	40.1966095	41.2314593

Notes:

1. **All data shown are for Boiler #2 unless otherwise identified as BLR1 in description.**
2. **All data shown are hourly averages for the 1 hour period.**

APPENDIX C

Flue Gas Mercury Data

- Summary of Ontario-Hydro Impinger Analyses Data Sheets
- Recovery Data Sheets

Particulate and Filter Samples

ID No.	Location	Test No.	Fraction	Hg (ng/filter)	Hg (ng/mg or ppm)	Comments
31509	SCR Inlet	1	Loose particulate in thimble		< 0.005	
31510	Air Heater Outlet	1	Loose particulate in thimble		0.211	
31511	Stack	1	3" Disc Filter	< 5		Digested whole filter because particlate < 0.5g
31512	SCR Inlet	2	Loose particulate in thimble		0.011	
31513	Air Heater Outlet	2	Loose particulate in thimble		0.066	
31514	Stack	2	3" Disc Filter	< 5		Digested whole filter because particlate < 0.5g
31515	SCR Inlet	3	Loose particulate in thimble		0.016	
31516	Air Heater Outlet	3	Loose particulate in thimble		0.300	
31517	Stack	3	3" Disc Filter	< 5		Digested whole filter because particlate < 0.5g
31518	SCR Inlet	4	Loose particulate in thimble		0.006	
31519	Air Heater Outlet	4	Loose particulate in thimble		0.289	
31520	Stack	4	3" Disc Filter	7		Digested whole filter because particlate < 0.5g
31521	Blank	NA	Thimble		< 0.005	Digested 1 g thimble
31522	Blank	NA	3" Disc Filter	< 5		Digested whole filter

QA/QC

Duplicates

					Hg (ng/mg or ppm)	
31512 dup	SCR Inlet	2	Loose particulate in thimble		0.009	good within 20%
31519dup	Air Heater Outlet	4	Loose particulate in thimble		0.293	good within 20%

Spikes (Spike concentration = 5 ppb or ng/ml)

31512 spike	SCR Inlet	2	Loose particulate in thimble		spike recovery 102%	good
31519 spike	Air Heater Outlet	4	Loose particulate in thimble		spike recovery 100%	good

Ash Reference Standard (True concentration = 141 ppb or ng/g)

					Hg (ng/g or ppb)	
NIST 1633b					149	106%

Continuing Calibration Verification (NIST 1641D = 8 ppb or ng/ml)

					Hg (ng/ml or ppb)	
1	NIST 1641D				8.0	good 101%
2	NIST 1641D				8.1	good 101%
3	NIST 1641D				8.1	good 101%

Heated Line and Probe Rinse Samples

ID No.	Location	Test No.	Fraction	Solution	Hg (ng/ml or ppb)	Comments
31430	SCR Inlet	1	Heated Line Rinse	HNO3/HCL	7.1	
31436	Air Heater Outlet	1	Heated Line Rinse	HNO3/HCL	1.6	
31447	SCR Inlet	2	Heated Line Rinse	HNO3/HCL	3.3	
31453	Air Heater Outlet	2	Heated Line Rinse	HNO3/HCL	1.2	
31464	SCR Inlet	3	Heated Line Rinse	HNO3/HCL	5.1	
31470	Air Heater Outlet	3	Heated Line Rinse	HNO3/HCL	1.6	
31481	SCR Inlet	4	Heated Line Rinse	HNO3/HCL	1.7	
31487	Air Heater Outlet	4	Heated Line Rinse	HNO3/HCL	1.1	
31429	SCR Inlet	1	Probe Rinse	HNO3/HCL	3.5	Solution filtered
31435	Air Heater Outlet	1	Probe Rinse	HNO3/HCL	2.3	
31441	Stack	1	Probe Rinse	HNO3/HCL	4.0	
31446	SCR Inlet	2	Probe Rinse	HNO3/HCL	2.8	
31452	Air Heater Outlet	2	Probe Rinse	HNO3/HCL	2.3	
31458	Stack	2	Probe Rinse	HNO3/HCL	2.0	
31463	SCR Inlet	3	Probe Rinse	HNO3/HCL	3.5	
31469	Air Heater Outlet	3	Probe Rinse	HNO3/HCL	1.3	
31475	Stack	3	Probe Rinse	HNO3/HCL	2.3	
31480	SCR Inlet	4	Probe Rinse	HNO3/HCL	1.6	
31486	Air Heater Outlet	4	Probe Rinse	HNO3/HCL	1.5	
31492	Stack	4	Probe Rinse	HNO3/HCL	1.9	
31497	Solution Blanks	NA	20-May-03	HNO3/HCL	1.2	

QA/QC

Duplicates and Spikes (Spike concentration = 2 ppb)

31429dup	SCR Inlet	1	Probe Rinse	HNO3/HCL	3.7	good within 20%
31429spike	SCR Inlet	1	Probe Rinse	HNO3/HCL	spike recovery 93%	good
31453dup	Air Heater Outlet	2	Heated Line Rinse	HNO3/HCL	1.3	good within 20%
31453spike	Air Heater Outlet	2	Heated Line Rinse	HNO3/HCL	spike recovery 93%	good
31492dup	Stack	4	Probe Rinse	HNO3/HCL	1.9	good within 20%
31492spike	Stack	4	Probe Rinse	HNO3/HCL	spike reovery 87%	good

Continuing Calibration Verification (NIST 1641D = 8 ppb)

1	NIST 1641D	8.1	good 101%
2	NIST 1641D	8.0	good 100%
3	NIST 1641D	7.9	good 99%
4	NIST 1641D	8.0	good 100%

KCL Impinger Samples

ID No.	Location	Test No.	Fraction	Solution	Hg (ng/ml or ppb)	Comments
31431	SCR Inlet	1	Impingers 1-3	KCl	~~41.3~~ 5.2	
31437	Air Heater Outlet	1	Impingers 1-3	KCl	41.0	
31442	Stack	1	Impingers 1-3	KCl	< 1.0	
31448	SCR Inlet	2	Impingers 1-3	KCl	1.5	Solution filtered
31454	Air Heater Outlet	2	Impingers 1-3	KCl	34.8	
31459	Stack	2	Impingers 1-3	KCl	< 1.0	
31465	SCR Inlet	3	Impingers 1-3	KCl	4.1	Solution filtered
31471	Air Heater Outlet	3	Impingers 1-3	KCl	27.4	Solution filtered
31476	Stack	3	Impingers 1-3	KCl	< 1.0	
31482	SCR Inlet	4	Impingers 1-3	KCl	6.7	
31488	Air Heater Outlet	4	Impingers 1-3	KCl	31.6	
31493	Stack	4	Impingers 1-3	KCl	< 1.0	
31498	Solution Blanks	NA	20-May-2003	KCl/HNO3/HCL	< 1.0	
31501	Solution Blanks	NA	21-May-2003	KCl/HNO3/HCL	< 1.0	
31503	Solution Blanks	NA	22-May-2003	KCl/HNO3/HCL	< 1.0	
31505	Solution Blanks	NA	Lab Impingers	KCl/HNO3/HCL	< 1.0	

QA/QC

Duplicates and Spikes (Spike concentration = 10 ppb)

31431dup	SCR Inlet	1	Impingers 1-3	KCl	41	good within 20%
31431spike	SCR Inlet	1	Impingers 1-3	KCl	spike recovery 94%	good
31459 dup	Stack	2	Impingers 1-3	KCl	< 1.0	good within 20%
31459 spike	Stack	2	Impingers 1-3	KCl	spike recovery 94%	good
31488 dup	Air Heater Outlet	4	Impingers 1-3	KCl	30.8	good within 20%
31488 spike	Air Heater Outlet	4	Impingers 1-3	KCl	spike reovery 93%	good

Continuing Calibration Verification (NIST 1641D = 8 ppb)

1	NIST 1641D	8.1	good 101%
2	NIST 1641D	8.0	good 100%
3	NIST 1641D	8.1	good 101%
4	NIST 1641D	8.0	good 100%

HNO3/H2O2 IMPINGER SAMPLES

ID No.	Location	Test No.	Fraction	Solution	Hg (ng/ml or ppb)	Comments
31432	SCR Inlet	1	Impinger 4	HNO3/H2O2	2.0	
31438	Air Heater Outlet	1	Impinger 4	HNO3/H2O2	1.2	
31443	Stack	1	Impinger 4	HNO3/H2O2	< 1.0	
31449	SCR Inlet	2	Impinger 4	HNO3/H2O2	2.7	
31455	Air Heater Outlet	2	Impinger 4	HNO3/H2O2	< 1.0	
31460	Stack	2	Impinger 4	HNO3/H2O2	< 1.0	
31466	SCR Inlet	3	Impinger 4	HNO3/H2O2	2.5	
31472	Air Heater Outlet	3	Impinger 4	HNO3/H2O2	1.0	
31477	Stack	3	Impinger 4	HNO3/H2O2	< 1.0	
31483	SCR Inlet	4	Impinger 4	HNO3/H2O2	24.0	
31489	Air Heater Outlet	4	Impinger 4	HNO3/H2O2	< 1.0	
31494	Stack	4	Impinger 4	HNO3/H2O2	< 1.0	
31499	Solution Blanks	NA	20-May-03	(HNO3/H2O2)/HNO3/HCl	< 1.0	
31506	Solution Blanks	NA	Lab Impingers	HNO3/H2O2	< 1.0	

QA/QC

Duplicates and Spikes (Spike concentration = 2 ppb)

031443 dup	Stack	1	Impinger 4	HNO3/H2O2	< 1.0	good within 20%
031443 spike	Stack	1	Impinger 4	HNO3/H2O2	spike recovery 92%	good
031472 dup	Air Heater Outlet	3	Impinger 4	HNO3/H2O2	< 1.0	good within 20%
031472 spike	Air Heater Outlet	3	Impinger 4	HNO3/H2O2	spike recovery 88%	good
031483 dup	SCR Inlet	4	Impinger 4	HNO3/H2O2	23.4	good within 20%
031483 spike	SCR Inlet	4	Impinger 4	HNO3/H2O2	spike reovery 96%	good

Continuing Calibration Verification (NIST 1641D = 8 ppb)

1	NIST 1641D	7.9	good 99%
2	NIST 1641D	7.8	good 98%
3	NIST 1641D	7.7	good 96%
4	NIST 1641D	7.7	good 96%
5	NIST 1641D	7.7	good 96%

KMnO4 Impinger Samples

ID No.	Location	Test No.	Fraction	Solution	Hg (ng/ml or ppb)	Comments
31433	SCR Inlet	1	Impingers 5 & 6	KMnO4	39.7	
31439	Air Heater Outlet	1	Impingers 5 & 6	KMnO4	3.9	
31444	Stack	1	Impingers 5 & 6	KMnO4	< 1.0	
31450	SCR Inlet	2	Impingers 5 & 6	KMnO4	87.0	
31456	Air Heater Outlet	2	Impingers 5 & 6	KMnO4	< 1.0	
31461	Stack	2	Impingers 5 & 6	KMnO4	< 1.0	
31467	SCR Inlet	3	Impingers 5 & 6	KMnO4	66.5	
31473	Air Heater Outlet	3	Impingers 5 & 6	KMnO4	< 1.0	
31478	Stack	3	Impingers 5 & 6	KMnO4	< 1.0	
31484	SCR Inlet	4	Impingers 5 & 6	KMnO4	65.3	
31490	Air Heater Outlet	4	Impingers 5 & 6	KMnO4	< 1.0	
31495	Stack	4	Impingers 5 & 6	KMnO4	< 1.0	
31500	Solution Blanks	NA	20-May-2003	KMnO4/HNO3	< 1.0	
31502	Solution Blanks	NA	21-May-2003	KMnO4/HNO3	< 1.0	
31504	Solution Blanks	NA	22-May-2003	KMnO4/HNO3	< 1.0	
31507	Solution Blanks	NA	Lab Impingers	KMnO4	< 1.0	

QA/QC

Duplicates and Spikes (Spike concentration = 10 ppb)

31433dup	SCR Inlet	1	Impingers 5 & 6	KMnO4	40.3	good within 20%
31433spike	SCR Inlet	1	Impingers 5 & 6	KMnO4	spike recovery 101%	good
31478dup	Stack	3	Impingers 5 & 6	KMnO4	< 1.0	good within 20%
31478spike	Stack	3	Impingers 5 & 6	KMnO4	spike recovery 96%	good
31484dup	SCR Inlet	4	Impingers 5 & 6	KMnO4	63.0	good within 20%
31484spike	SCR Inlet	4	Impingers 5 & 6	KMnO4	spike recovery 95%	good

Continuing Calibration Verification (NIST 1641D = 8 ppb)

1	NIST 1641D	8.1	good 101%
2	NIST 1641D	7.8	good 98%
3	NIST 1641D	8.0	good 100%
4	NIST 1641D	8.0	good 100%

Final Rinse Samples

ID No.	Location	Test No.	Fraction	Solution	Hg (ng/ml or ppb)	Comments
31434	SCR Inlet	1	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	Solution filtered
31440	Air Heater Outlet	1	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	
31445	Stack	1	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	
31451	SCR Inlet	2	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	
31457	Air Heater Outlet	2	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	
31462	Stack	2	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	
31468	SCR Inlet	3	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	
31474	Air Heater Outlet	3	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	
31479	Stack	3	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	
31485	SCR Inlet	4	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	
31491	Air Heater Outlet	4	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	
31496	Stack	4	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	Solution filtered
31508	Lab Impingers	NA	Solution Blank	HNO3/HCL	< 1.0	

QA/QC

Duplicates and Spikes (Spike concentration = 2 ppb)

31440dup	Air Heater Outlet	1	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	good within 20%
31440spike	Air Heater Outlet	1	Imp 5 & 6 Final Rinse	HNO3/HCL	spike recovery 94%	good
31491 dup	Air Heater Outlet	4	Imp 5 & 6 Final Rinse	HNO3/HCL	< 1.0	good within 20%
31491spike	Air Heater Outlet	4	Imp 5 & 6 Final Rinse	HNO3/HCL	spike recovery 90%	good

Continuing Calibration Verification (NIST 1641D = 8 ppb)

1	NIST 1641D	8.4	good 106%
2	NIST 1641D	8.4	good 106%
3	NIST 1641D	8.7	good 109%
4	NIST 1641D	8.7	good 109%

CONSOL ENERGY INC.
RESEARCH & DEVELOPMENT
ANALYTICAL LABORATORY
4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION [redacted] *THIMBLE*

SAMPLE NUMBER TEST 1 INLET

DATE LOGGED 05/27/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER **031509**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	86.76

ULTIMATE	(Dry)%
Carbon	11.90
Ash	86.76

MAJOR ASH ELEM	(Dry)%
SiO2	44.08
Al2O3	21.50
TiO2	0.96
Fe2O3	15.67
CaO	2.20
MgO	0.77
Na2O	0.66
K2O	1.78
P2O5	0.34
SO3	1.16
UND	10.88

MISC. (As Det.)

Hg	<0.005	ppm

AS DETERMINED MOISTURE: 0.56 %

DISTRIBUTION:
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DESCRIPTION [redacted] *THIMBLE*

SAMPLE NUMBER T-1 OUTLET

DATE LOGGED 05/27/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER **031510**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	86.85

MISC. (As Det.)

Hg	0.212 ppm

ULTIMATE	(Dry)%
Carbon	11.46
Ash	86.85

MAJOR ASH ELEM	(Dry)%
SiO2	44.17
Al2O3	21.57
TiO2	0.97
Fe2O3	15.20
CaO	2.12
MgO	0.78
Na2O	0.68
K2O	1.82
P2O5	0.33
SO3	1.55
UND	10.81

AS DETERMINED MOISTURE: 0.68 %

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DESCRIPTION Plant No. 2 ⌜ *FILTER*

SAMPLE NUMBER T-1 STACK

DATE LOGGED 05/27/03
DATE COMPLETED 07/03/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031511

ANALYSIS REPORT

MISC. (As Det.)

Hg	<5	ng/fil

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DESCRIPTION Plant No. 2 *THIMBLE*

SAMPLE NUMBER T-2 INLET

DATE LOGGED 05/27/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031512

ANALYSIS REPORT

PROXIMATE (Dry)%	
Ash	87.19

ULTIMATE (Dry)%	
Carbon	11.08
Ash	87.19

MAJOR ASH ELEM (Dry)%	
SiO2	44.60
Al2O3	21.47
TiO2	0.95
Fe2O3	15.23
CaO	2.10
MgO	0.78
Na2O	0.68
K2O	1.90
P2O5	0.31
SO3	1.12
UND	10.86

MISC. (As Det.)

Hg	0.011 ppm

AS DETERMINED MOISTURE: 0.50 %

DISTRIBUTION:
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ANALYTICAL LABORATORY
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DESCRIPTION Plant No. 2 *THIMBLE*

SAMPLE NUMBER T-2 OUTLET

DATE LOGGED 05/27/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031513

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	87.38

MISC. (As Det.)

Hg	0.066 ppm

ULTIMATE	(Dry)%
Carbon	13.55
Ash	87.38

MAJOR ASH ELEM	(Dry)%
SiO2	45.26
Al2O3	21.98
TiO2	0.99
Fe2O3	14.37
CaO	2.07
MgO	0.79
Na2O	0.69
K2O	1.92
P2O5	0.31
SO3	1.16
UND	10.46

AS DETERMINED MOISTURE: 0.55 %

DISTRIBUTION:
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J. WITHUM

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ANALYTICAL LABORATORY
4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION PLANT NO. 2 *FILTER*

SAMPLE NUMBER T-2 STACK

DATE LOGGED 05/27/03
DATE COMPLETED 07/03/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031514

ANALYSIS REPORT

MISC. (As Det.)

Hg	<5	ng/fil

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CONSOL ENERGY INC.
RESEARCH & DEVELOPMENT
ANALYTICAL LABORATORY
4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION PLANT NO. 2 *THIMBLE*

SAMPLE NUMBER T-3 INLET

DATE LOGGED 05/27/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031515

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	85.64

MISC. (As Det.)

Hg	0.017 ppm

ULTIMATE	(Dry)%
Carbon	13.35
Ash	85.64

MAJOR ASH ELEM	(Dry)%
SiO2	43.66
Al2O3	21.04
TiO2	0.94
Fe2O3	15.19
CaO	2.06
MgO	0.76
Na2O	0.65
K2O	1.82
P2O5	0.29
SO3	1.27
UND	12.32

AS DETERMINED MOISTURE: 0.59 %

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DESCRIPTION PLANT NO. 2 *THIMBLE*

SAMPLE NUMBER T-3 OUTLET

DATE LOGGED 05/27/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031516

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	85.60

ULTIMATE	(Dry)%
Carbon	12.42
Ash	85.60

MAJOR ASH ELEM	(Dry)%
SiO2	43.60
Al2O3	21.22
TiO2	0.95
Fe2O3	14.81
CaO	2.02
MgO	0.77
Na2O	0.69
K2O	1.88
P2O5	0.29
SO3	1.61
UND	12.16

MISC. (As Det.)

Hg	0.300 ppm

AS DETERMINED MOISTURE: 0.67 %

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DESCRIPTION PLANT NO. 2 *FILTER*

SAMPLE NUMBER T-3 STACK

DATE LOGGED 05/27/03
DATE COMPLETED 07/03/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031517

ANALYSIS REPORT

MISC. (As Det.)

Hg	<5	ng/fil

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DESCRIPTION PLANT NO. 2 *THIMBLE*

SAMPLE NUMBER T-4 INLET

DATE LOGGED 05/27/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031518

ANALYSIS REPORT

PROXIMATE (Dry)%		ULTIMATE (Dry)%		MAJOR ASH ELEM (Dry)%	
Ash	82.64	Carbon	16.67	SiO2	42.18
		Ash	82.64	Al2O3	20.33
MISC. (As Det.)				TiO2	0.91
				Fe2O3	14.63
Hg	0.006 ppm			CaO	2.01
				MgO	0.74
				Na2O	0.65
				K2O	1.78
				P2O5	0.30
				SO3	0.63
				UND	15.84

AS DETERMINED MOISTURE: 0.52 %

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DESCRIPTION PLANT NO. 2 *THIMBLE*

SAMPLE NUMBER T-4 OUTLET

DATE LOGGED 05/27/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031519

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	84.97

ULTIMATE	(Dry)%
Carbon	13.41
Ash	84.97

MAJOR ASH ELEM	(Dry)%
SiO2	43.46
Al2O3	21.06
TiO2	0.96
Fe2O3	14.13
CaO	2.01
MgO	0.78
Na2O	0.68
K2O	1.85
P2O5	0.30
SO3	1.49
UND	13.28

MISC. (As Det.)

Hg	0.289 ppm

AS DETERMINED MOISTURE: 0.67 %

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DESCRIPTION PLANT NO. 2 *FILTER*

SAMPLE NUMBER T-4 STACK

DATE LOGGED 05/27/03
DATE COMPLETED 07/03/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031520

ANALYSIS REPORT

MISC. (As Det.)

Hg	7 ng/fil

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DESCRIPTION PLANT NO. 2 *THIMBLE*

SAMPLE NUMBER BLANK

DATE LOGGED 05/27/03
DATE COMPLETED 07/02/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031521

ANALYSIS REPORT

MISC. (As Det.)

Hg	<0.005	ppm

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DESCRIPTION PLANT NO. 2 *FILTER*

SAMPLE NUMBER BLANK

DATE LOGGED 05/27/03
DATE COMPLETED 07/03/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031522

ANALYSIS REPORT

MISC. (As Det.)

Hg	<5	ng/fil

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 1 INLET
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031429

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	3.5		

Note: All units mg/L unless specified

Sew

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-1 INLET
SAMPLE NUMBER HEATED LINE
ANALYTICAL NUMBER 031430

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	7.1		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 - T-1 INLET
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031431

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	41.3		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 1 INLET
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031432

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	2.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-1 INLET
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031433

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	39.7		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-1 INLET
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031434

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 1 OUTLET
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031435

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	2.3		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-1 OUTLET
SAMPLE NUMBER HEATED LINE
ANALYTICAL NUMBER 031436

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.6		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-1 OUTLET
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031437

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	41.0		

Note: All units mg/L unless specified

Sew

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 1 OUTLET
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031438

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.2		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-1 OUTLET
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031439

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	3.9		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-1 OUTLET
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031440

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 1 STACK
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031441

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	4.0		

Note: All units mg/L unless specified

Sew

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-1 STACK
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031442

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 - T-1 STACK
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031443

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 - TEST 1 STACK
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031444

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-1 STACK
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031445

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

Sell

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 2 INLET
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031446

		WATER ANALYSIS		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	2.8		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-2 INLET
SAMPLE NUMBER HEATED LINE
ANALYTICAL NUMBER 031447

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	3.3		

Note: All units mg/L unless specified

See

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-2 INLET
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031448

		WATER ANALYSIS		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	1.5		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 2 INLET
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031449

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	2.7		

Note: All units mg/L unless specified

SW

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-2 INLET
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031450

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	87.0		

Note: All units mg/L unless specified

Sew

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-2 INLET
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031451

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 2 OUTLET
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031452

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	2.3		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-2 OUTLET
SAMPLE NUMBER HEATED LINE
ANALYTICAL NUMBER 031453

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.2		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-2 OUTLET
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031454

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	34.8		

Note: All units mg/L unless specified

See

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 2 OUTLET
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031455

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-2 OUTLET
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031456

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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SOUTH PARK, PENNSYLVANIA 15129

TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 - TEST 2 OUTLET
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031457

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 2 STACK
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031458

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	2.0		

Note: All units mg/L unless specified

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SOUTH PARK, PENNSYLVANIA 15129

TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-2 STACK
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031459

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-2 STACK
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031460

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 2 STACK
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031461

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

See

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-2 STACK
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031462

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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RESEARCH & DEVELOPMENT
ANALYTICAL LABORATORY
SOUTH PARK, PENNSYLVANIA 15129

TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 3 INLET
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031463

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	3.5		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-3 INLET
SAMPLE NUMBER HEATED LINE
ANALYTICAL NUMBER 031464

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	5.1		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-3 INLET
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031465

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	4.1		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 3 INLET
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031466

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	2.5		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-3 INLET
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031467

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	66.5		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-3 INLET
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031468

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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TO: J. WITHUM/J. LOCKE

PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 - TEST 3 OUTLET
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031469

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.3		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 T-3 OUTLET
SAMPLE NUMBER HEATED LINE
ANALYTICAL NUMBER 031470

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.6		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 T-3 OUTLET
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031471

		WATER ANALYSIS		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	27.4		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 3 OUTLET
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031472

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-3 OUTLET
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031473

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-3 OUTLET
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031474

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 3 STACK
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031475

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	2.3		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-3 STACK
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031476

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 T-3 STACK
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031477

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 3 STACK
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031478

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 T-3 STACK
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031479

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

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DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 4 INLET
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031480

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.6		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 TEST 4 INLET
SAMPLE NUMBER HEATED LINE
ANALYTICAL NUMBER 031481

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.7		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 T-4 INLET
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031482

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	6.7		

Note: All units mg/L unless specified

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DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 TEST 4 INLET
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031483

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	24.0		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 T-4 INLET
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031484

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	65.3		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 T-4 INLET
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031485

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 [illegible] TEST 4 PROBE
SAMPLE NUMBER OUTLET
ANALYTICAL NUMBER 031486

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.5		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 T-4 HEATED LINE
SAMPLE NUMBER OUTLET
ANALYTICAL NUMBER 031487

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.1		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 T-4 IMP 1-2-3
SAMPLE NUMBER OUTLET
ANALYTICAL NUMBER 031488

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	31.6		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 - TEST 4 OUTLET
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031489

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

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DESCRIPTION PLANT NO. 2 T-4 OUTLET
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031490

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 T-4 OUTLET
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031491

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 TEST 4 STACK
SAMPLE NUMBER PROBE
ANALYTICAL NUMBER 031492

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.9		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 T-4 STACK
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031493

		WATER ANALYSIS		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 T-4 STACK
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031494

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 Γ TEST 4 STACK
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031495

ANALYSIS	UNITS	-------- WATER ANALYSIS --------- VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 Γ T-4 STACK
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031496

ANALYSIS	UNITS	-------- WATER ANALYSIS --------- VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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PROJECT NUMBER 1621-87 -

DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 BLANK 5-20
SAMPLE NUMBER HCL/HNO3
ANALYTICAL NUMBER 031497

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	1.2		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 - BLANK 5-20
SAMPLE NUMBER IMP 1-2-3 KCL
ANALYTICAL NUMBER 031498

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 BLANK 5-20
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031499

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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PLANT NO. 2

DESCRIPTION [illegible] BLANK 5-20
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031500

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 BLANK 5-21
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031501

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 - BLANK 5-21
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031502

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
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DESCRIPTION PLANT NO. 2 BLANK 5-22
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031503

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 BLANK 5-22
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031504

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DATE LOGGED 05/27/03
DATE COMPLETED 06/18/03

DESCRIPTION PLANT NO. 2 IMP BLANK LAB
SAMPLE NUMBER IMP 1-2-3
ANALYTICAL NUMBER 031505

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 IMP BLANK LAB
SAMPLE NUMBER IMP 4
ANALYTICAL NUMBER 031506

		-------- WATER ANALYSIS ---------		
ANALYSIS	UNITS	VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

EW

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DESCRIPTION PLANT NO. 2 Γ IMP BLANK LAB
SAMPLE NUMBER IMP 5-6
ANALYTICAL NUMBER 031507

ANALYSIS	UNITS	-------- WATER ANALYSIS --------- VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

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DESCRIPTION PLANT NO. 2 IMP BLANK LAB
SAMPLE NUMBER FINAL 5-6
ANALYTICAL NUMBER 031508

ANALYSIS	UNITS	WATER ANALYSIS VALUE	VALUE	DUP AVG
Hg	ng/ml	<1.0		

Note: All units mg/L unless specified

SCR/FGD MERCURY SAMPLING PROGRAM - PLANT 2

Ontario Hydro Hg Sampling Train Recovery Data

Date: May 20 2003 Test ID: 1

SCR Inlet:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids	31509						
1	Probe & Filter Rinse	31429		66		66		
2	Heated Line Rinse	31430		71		71		
3	KCl Impingers	31431	300	150	57	507		
4	HNO_3/H_2O_2 Impinger	31432	100	75	0	175		
5	$KMnO_4$ Impingers	31433	200	50	-5	245		
6	$KMnO_4$ Acid Rinse	31434		100		100		
7	Silica Gel					12.19	NA	NA

Total Particulate Wt. 7.8264 grams Condensate Total 61.1 mL

Air Heater Outlet:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids	31510						
1	Probe & Filter Rinse	31435		84		84	2.3	
2	Heated Line Rinse	31436		114		114		
3	KCl Impingers	31437	300	150	110	560		
4	HNO_3/H_2O_2 Impinger	31438	100	75	2	177		
5	$KMnO_4$ Impingers	31439	200	50	-4	246		
6	$KMnO_4$ Acid Rinse	31440		100		100		
7	Silica Gel						NA	NA

Total Particulate Wt. 6.7470 grams Condensate Total 129.8 mL

Stack:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids	31511						
1	Probe & Filter Rinse	31441		56		56		
2	KCl Impingers	31442	300	150	288	738		
3	HNO_3/H_2O_2 Impinger	31443	100	75	3	178		
4	$KMnO_4$ Impingers	31444	200	50	-3	247		
5	$KMnO_4$ Acid Rinse	31445		100		100		
6	Silica Gel						NA	NA

Total Particulate Wt. 0.0003 grams Condensate Total 302.7 mL

Recovered By: Jim Bedillion Date: May 20, 2003

SCR/FGD MERCURY SAMPLING PROGRAM - PLANT 2

Ontario Hydro Hg Sampling Train Recovery Data

Date: May 21, 2003 Test ID: 2

SCR Inlet:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids	31512						
1	Probe & Filter Rinse	31446		96		96	28	
2	Heated Line Rinse	31447		103		103		
3	KCl Impingers	31448	300	150	117	567		
4	HNO_3/H_2O_2 Impinger	31449	100	75	0	175		
5	$KMnO_4$ Impingers	31450	200	50	2	252		
6	$KMnO_4$ Acid Rinse	31451		100		100		
7	Silica Gel						NA	NA

Total Particulate Wt. 12.7386 grams Condensate Total 137.8 mL

Air Heater Outlet:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids	31513						
1	Probe & Filter Rinse	31452		80		80		
2	Heated Line Rinse	31453		109		109		
3	KCl Impingers	31454	300	150	128	578		
4	HNO_3/H_2O_2 Impinger	31455	100	75	3	178		
5	$KMnO_4$ Impingers	31456	200	50	-5	245		
6	$KMnO_4$ Acid Rinse	31457		100		100		
7	Silica Gel						NA	NA

Total Particulate Wt. 6.3973 grams Condensate Total 141.1 mL

Stack:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids	31514						
1	Probe & Filter Rinse	31458		120		120	2.0	
2	KCl Impingers	31459	300	150	296	746		
3	HNO_3/H_2O_2 Impinger	31460	100	75	4	179		
4	$KMnO_4$ Impingers	31461	200	50	-5	245		
5	$KMnO_4$ Acid Rinse	31462		100		100		
6	Silica Gel						NA	NA

Total Particulate Wt. 0.0008 grams Condensate Total 308.3 mL

Recovered By: J. Bedillion Date: May 21 2003

SCR/FGD MERCURY SAMPLING PROGRAM - PLANT 2

Ontario Hydro Hg Sampling Train Recovery Data

Date: May 21, 2003 Test ID: 3

SCR Inlet:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids							
1	Probe & Filter Rinse	31463		62		62	[illegible]	[illegible]
2	Heated Line Rinse	31464		102		102	[illegible]	[illegible]
3	KCl Impingers	31465	300	150	114	564	[illegible]	[illegible]
4	HNO_3/H_2O_2 Impinger	31466	100	75	1	176	[illegible]	[illegible]
5	$KMnO_4$ Impingers	31467	200	50	-4	246	[illegible]	[illegible]
6	$KMnO_4$ Acid Rinse	31468		100		100	[illegible]	[illegible]
7	Silica Gel						NA	NA

Total Particulate Wt. 12.3875 grams Condensate Total 122.4 mL

Air Heater Outlet:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids							
1	Probe & Filter Rinse	31469		108		108	[illegible]	[illegible]
2	Heated Line Rinse	31470		98		98	[illegible]	[illegible]
3	KCl Impingers	31471	300	150	111	561	[illegible]	[illegible]
4	HNO_3/H_2O_2 Impinger	31472	100	75	2	177	[illegible]	[illegible]
5	$KMnO_4$ Impingers	31473	200	50	-1	249	[illegible]	[illegible]
6	$KMnO_4$ Acid Rinse	31474		100		100	[illegible]	[illegible]
7	Silica Gel						NA	NA

Total Particulate Wt. 7.3981 grams Condensate Total 123.5 mL

Stack:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids							
1	Probe & Filter Rinse	31475		120		120	[illegible]	[illegible]
2	KCl Impingers	31476	300	150	306	756	[illegible]	[illegible]
3	HNO_3/H_2O_2 Impinger	31477	100	75	6	181	[illegible]	[illegible]
4	$KMnO_4$ Impingers	31478	200	50	6	256	[illegible]	[illegible]
5	$KMnO_4$ Acid Rinse	31479		100		100	[illegible]	[illegible]
6	Silica Gel						NA	NA

Total Particulate Wt. 0.0007 grams Condensate Total 332.7 mL

Recovered By: [signature] Date: May 21, 2003

SCR/FGD MERCURY SAMPLING PROGRAM - PLANT 2

Ontario Hydro Hg Sampling Train Recovery Data

Date: May 22 2003 Test ID: 4

SCR Inlet:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids							
1	Probe & Filter Rinse	31480		137		137		
2	Heated Line Rinse	31481		83		83		
3	KCl Impingers	31482	300	150	198	648		
4	HNO_3/H_2O_2 Impinger	31483	100	75	-35	140		
5	$KMnO_4$ Impingers	31484	200	50	-57	193		
6	$KMnO_4$ Acid Rinse	31485		100		100		
7	Silica Gel						NA	NA

Total Particulate Wt. 11.5500 grams Condensate Total 120.1 mL

Air Heater Outlet:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids							
1	Probe & Filter Rinse	31486		92		92		
2	Heated Line Rinse	31487		96		96		
3	KCl Impingers	31488	300	150	137	587		
4	HNO_3/H_2O_2 Impinger	31489	100	75	4	179		
5	$KMnO_4$ Impingers	31490	200	50	0	250		
6	$KMnO_4$ Acid Rinse	31491		100		100		
7	Silica Gel						NA	NA

Total Particulate Wt. 16.1809 grams Condensate Total 155.8 mL

Stack:

Bottle #	Description	Analytical No.	Initial Vol mL	Rinse Vol mL	Gain mL	Final Vol mL	ppb Hg	Total ug of Hg
S	Filter/Solids							
1	Probe & Filter Rinse	31492		111		111		
2	KCl Impingers	31493	300	150	294	744		
3	HNO_3/H_2O_2 Impinger	31494	100	75	6	181		
4	$KMnO_4$ Impingers	31495	200	50	-2	248		
5	$KMnO_4$ Acid Rinse	31496		100		100		
6	Silica Gel						NA	NA

Total Particulate Wt. 0.0008 grams Condensate Total 310.0 mL

Recovered By: Jim Beckelhimer Date: May 23 2003

APPENDIX D

Process Material Data

- Coal Analysis Data Sheets
- Ash Analysis Data Sheets

CONSOL ENERGY INC.
RESEARCH & DEVELOPMENT
ANALYTICAL LABORATORY
4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *COAL PLANT 02*

SAMPLE NUMBER *COAL-T1-1*

DATE LOGGED *06/03/03*
DATE COMPLETED *06/18/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031640**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	7.03
Volatile Matter	37.90
Fixed Carbon	55.07
Sulfur, Total	1.86
BTU/lb	14026
MAF BTU/lb	15087

ULTIMATE	(Dry)%
Carbon	77.95
Hydrogen	4.90
Nitrogen	1.51
Chlorine	0.104
Sulfur, Total	1.86
Ash	7.03
Oxygen (DIFF)	6.65

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	47.99
Al2O3	23.67
TiO2	1.02
Fe2O3	17.43
CaO	2.30
MgO	0.80
Na2O	0.66
K2O	1.89
P2O5	0.34
SO3	1.90
UND	2.00

SULFUR FORMS	(Dry)%
Pyritic Sulfur	0.81
Sulfate	0.03
Organic	1.02
Sulfur, Total	1.86

MISC. (As Det.)

Hg 0.11 ppm

AS-DETERMINED MOISTURE: 2.10 %

DISTRIBUTION:
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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *COAL PLANT 02*

SAMPLE NUMBER *COAL-T1-2*

DATE LOGGED *06/03/03*
DATE COMPLETED *06/18/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031641**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	7.05
Volatile Matter	38.32
Fixed Carbon	54.63
Sulfur, Total	1.87
BTU/lb	14023
MAF BTU/lb	15087

ULTIMATE	(Dry)%
Carbon	77.83
Hydrogen	4.82
Nitrogen	1.52
Chlorine	0.087
Sulfur, Total	1.87
Ash	7.05
Oxygen (DIFF)	6.82

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	47.88
Al2O3	23.72
TiO2	1.03
Fe2O3	18.51
CaO	2.04
MgO	0.77
Na2O	0.59
K2O	1.79
P2O5	0.34
SO3	1.67
UND	1.66

SULFUR FORMS	(Dry)%
Pyritic Sulfur	0.85
Sulfate	0.01
Organic	1.01
Sulfur, Total	1.87

MISC. (As Det.)

Hg 0.12 ppm

AS DETERMINED MOISTURE: 2.07 %

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DESCRIPTION *COAL PLANT 02*

SAMPLE NUMBER *COAL-T2-1*

DATE LOGGED *06/03/03*
DATE COMPLETED *06/18/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031642**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	7.05
Volatile Matter	38.09
Fixed Carbon	54.86
Sulfur, Total	1.87
BTU/lb	14052
MAF BTU/lb	15118

ULTIMATE	(Dry)%
Carbon	77.92
Hydrogen	4.88
Nitrogen	1.53
Chlorine	0.096
Sulfur, Total	1.87
Ash	7.05
Oxygen (DIFF)	6.65

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	48.68
Al2O3	24.12
TiO2	1.03
Fe2O3	17.86
CaO	1.90
MgO	0.78
Na2O	0.60
K2O	1.91
P2O5	0.32
SO3	1.60
UND	1.20

SULFUR FORMS	(Dry)%
Pyritic Sulfur	0.85
Sulfate	0.01
Organic	1.01
Sulfur, Total	1.87

MISC. (As Det.)

Hg 0.11 ppm

AS-DETERMINED MOISTURE: 2.10 %

DISTRIBUTION:
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DESCRIPTION *COAL PLANT 02*

SAMPLE NUMBER *COAL-T2-2*

DATE LOGGED *06/03/03*
DATE COMPLETED *06/18/03*
PROJECT NUMBER *1621-87*
ANALYTICAL NUMBER **031643**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	7.38
Volatile Matter	37.50
Fixed Carbon	55.12
Sulfur, Total	1.84
BTU/lb	13998
MAF BTU/lb	15113

ULTIMATE	(Dry)%
Carbon	77.69
Hydrogen	4.78
Nitrogen	1.51
Chlorine	0.096
Sulfur, Total	1.84
Ash	7.38
Oxygen (DIFF)	6.70

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	48.57
Al2O3	24.08
TiO2	1.03
Fe2O3	17.06
CaO	1.96
MgO	0.80
Na2O	0.61
K2O	1.94
P2O5	0.35
SO3	1.64
UND	1.96

SULFUR FORMS	(Dry)%
Pyritic Sulfur	0.86
Sulfate	0.01
Organic	0.97
Sulfur, Total	1.84

MISC. (As Det.)

Hg 0.10 ppm

AS DETERMINED MOISTURE: 2.17 %

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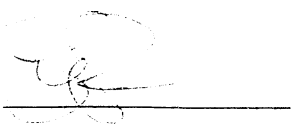
Approved for transmittal 

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DESCRIPTION *COAL PLANT 02*

SAMPLE NUMBER *COAL-T3-1*

DATE LOGGED *06/03/03*
DATE COMPLETED *06/18/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031644**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	7.40
Volatile Matter	37.88
Fixed Carbon	54.72
Sulfur, Total	1.87
BTU/lb	14017
MAF BTU/lb	15137

ULTIMATE	(Dry)%
Carbon	78.02
Hydrogen	4.86
Nitrogen	1.53
Chlorine	0.097
Sulfur, Total	1.87
Ash	7.40
Oxygen (DIFF)	6.22

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	47.74
Al2O3	23.74
TiO2	1.01
Fe2O3	18.25
CaO	2.13
MgO	0.77
Na2O	0.63
K2O	1.94
P2O5	0.34
SO3	1.84
UND	1.61

SULFUR FORMS	(Dry)%
Pyritic Sulfur	0.88
Sulfate	0.01
Organic	0.98
Sulfur, Total	1.87

MISC. (As Det.)

Hg 0.11 ppm

AS DETERMINED MOISTURE: 2.20 %

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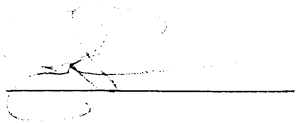
Approved for transmittal 

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *COAL PLANT 02*

SAMPLE NUMBER *COAL-T3-2*

DATE LOGGED *06/03/03*
DATE COMPLETED *06/18/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031645**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	7.44
Volatile Matter	38.08
Fixed Carbon	54.48
Sulfur, Total	1.85
BTU/lb	13944
MAF BTU/lb	15065

ULTIMATE	(Dry)%
Carbon	77.79
Hydrogen	4.83
Nitrogen	1.51
Chlorine	0.107
Sulfur, Total	1.85
Ash	7.44
Oxygen (DIFF)	6.47

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	47.92
Al2O3	23.52
TiO2	1.02
Fe2O3	18.24
CaO	2.31
MgO	0.81
Na2O	0.67
K2O	2.04
P2O5	0.33
SO3	2.00
UND	1.14

SULFUR FORMS	(Dry)%
Pyritic Sulfur	0.93
Sulfate	0.02
Organic	0.90
Sulfur, Total	1.85

MISC. (As Det.)

Hg 0.10 ppm

AS DETERMINED MOISTURE: 2.22 %

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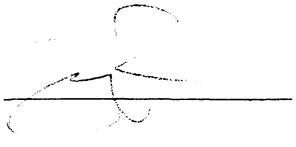
Approved for transmittal 

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *COAL PLANT 02*

SAMPLE NUMBER *COAL T4-1*

DATE LOGGED *06/03/03*
DATE COMPLETED *06/18/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031626**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	7.06
Volatile Matter	37.97
Fixed Carbon	54.97
Sulfur, Total	1.92
BTU/lb	13970
MAF BTU/lb	15031

ULTIMATE	(Dry)%
Carbon	77.94
Hydrogen	4.84
Nitrogen	1.52
Chlorine	0.099
Sulfur, Total	1.92
Ash	7.06
Oxygen (DIFF)	6.62

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	48.05
Al2O3	23.89
TiO2	1.02
Fe2O3	18.46
CaO	2.11
MgO	0.77
Na2O	0.57
K2O	1.79
P2O5	0.33
SO3	1.68
UND	1.33

SULFUR FORMS	(Dry)%
Pyritic Sulfur	0.86
Sulfate	0.01
Organic	1.05
Sulfur, Total	1.92

MISC. (As Det.)

Hg	0.10 ppm

AS DETERMINED MOISTURE: 1.99 %

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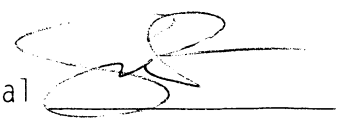
Approved for transmittal 

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *COAL PLANT 02*

SAMPLE NUMBER *COAL T4-2*

DATE LOGGED *06/03/03*
DATE COMPLETED *06/18/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031627**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	7.21
Volatile Matter	37.87
Fixed Carbon	54.92
Sulfur, Total	1.99
BTU/lb	13983
MAF BTU/lb	15070

ULTIMATE	(Dry)%
Carbon	77.74
Hydrogen	4.89
Nitrogen	1.57
Chlorine	0.114
Sulfur, Total	1.99
Ash	7.21
Oxygen (DIFF)	6.49

MAJOR ASH ELEM	%
Ignited at 750 C	
SiO2	47.42
Al2O3	23.55
TiO2	1.00
Fe2O3	19.77
CaO	1.98
MgO	0.75
Na2O	0.59
K2O	1.83
P2O5	0.34
SO3	1.71
UND	1.06

SULFUR FORMS	(Dry)%
Pyritic Sulfur	0.87
Sulfate	0.01
Organic	1.11
Sulfur, Total	1.99

MISC. (As Det.)

Hg 0.11 ppm

AS DETERMINED MOISTURE: 1.97 %

DISTRIBUTION:
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DESCRIPTION *BOTTOM ASH PLANT 02*

SAMPLE NUMBER BM ASH-T1

DATE LOGGED 06/03/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031628

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.74
Total Sulfur	0.09

MISC. (As Det.)	
Hg	0.02 ppm

MAJOR ASH ELEM	(Dry)%
SiO2	43.98
Al2O3	20.39
TiO2	0.91
Fe2O3	21.31
CaO	2.37
MgO	0.73
Na2O	0.51
K2O	1.56
P2O5	0.25
SO3	0.23
UND	7.76

AS DETERMINED MOISTURE: 0.42 %

DISTRIBUTION:
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DESCRIPTION *BOTTOM ASH PLANT 02*

SAMPLE NUMBER BM ASH-T2

DATE LOGGED 06/03/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER **031629**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	94.35
Total Sulfur	0.08

MISC. (As Det.)	
Hg	0.003 ppm

MAJOR ASH ELEM	(Dry)%
SiO2	46.44
Al2O3	21.36
TiO2	0.97
Fe2O3	21.20
CaO	2.54
MgO	0.78
Na2O	0.55
K2O	1.73
P2O5	0.25
SO3	0.19
UND	3.99

AS DETERMINED MOISTURE: 0.25 %

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DESCRIPTION *BOTTOM ASH PLANT 02*

SAMPLE NUMBER BM ASH-T3

DATE LOGGED *06/03/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031630**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	85.70
Sulfur, Total	0.10

MISC. (As Det.)

Hg	0.003 ppm

MAJOR ASH ELEM	(Dry)%
SiO2	42.13
Al2O3	19.31
TiO2	0.87
Fe2O3	18.91
CaO	2.17
MgO	0.69
Na2O	0.50
K2O	1.57
P2O5	0.22
SO3	0.26
UND	13.37

AS DETERMINED MOISTURE: 0.69 %

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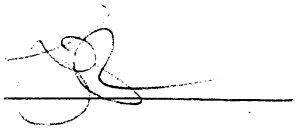
Approved for transmittal 

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DESCRIPTION *BOTTOM ASH PLANT 02*

SAMPLE NUMBER BM ASH-T4

DATE LOGGED 06/03/03
DATE COMPLETED 07/02/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031631

ANALYSIS REPORT

PROXIMATE (Dry)%	
Ash	89.69
Sulfur, Total	0.10

MISC. (As Det.)	
Hg	0.003 ppm

MAJOR ASH ELEM (Dry)%	
SiO2	44.17
Al2O3	20.28
TiO2	0.90
Fe2O3	20.23
CaO	2.36
MgO	0.73
Na2O	0.55
K2O	1.69
P2O5	0.24
SO3	0.26
UND	8.59

AS DETERMINED MOISTURE: 0.44 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T1-W-9-1

DATE LOGGED *06/04/03*
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER **031649**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	91.88
Sulfur, Total	9.91

MISC. (As Det.)

MERCURY	0.76 ppm
SO3 as S	10.3 %
Inorg.C	0.89 %

ULTIMATE	(Dry)%
Carbon	5.30
Chlorine	0.691
Sulfur, Total	9.91
Ash	91.88

MAJOR ASH ELEM	(Dry)%
SiO2	20.60
Al2O3	9.73
TiO2	0.44
Fe2O3	6.71
CaO	26.95
MgO	0.68
Na2O	0.29
K2O	0.82
P2O5	0.14
SO3	23.92
UND	9.72

AS DETERMINED MOISTURE: 0.85 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T1-2-7-1

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031650**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	91.83
Sulfur, Total	9.70

MISC. (As Det.)

MERCURY	0.70 ppm
So3 as S	10.1 %
Inorg.C	0.86 %

ULTIMATE	(Dry)%
Carbon	5.21
Chlorine	0.695
Sulfur, Total	9.70
Ash	91.83

MAJOR ASH ELEM	(Dry)%
SiO2	20.34
Al2O3	9.60
TiO2	0.43
Fe2O3	6.88
CaO	27.58
MgO	0.68
Na2O	0.29
K2O	0.82
P2O5	0.14
SO3	23.87
UND	9.37

AS DETERMINED MOISTURE: 0.75 %

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DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T1-2-5-1

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031651

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.73
Sulfur, Total	9.71

MISC. (As Det.)

MERCURY	0.72 ppm
SO3 as S	9.80 %
Inorg. C	0.88 %

ULTIMATE	(Dry)%
Carbon	6.42
Chlorine	0.658
Sulfur, Total	9.71
Ash	90.73

MAJOR ASH ELEM	(Dry)%
SiO2	20.75
Al2O3	9.85
TiO2	0.45
Fe2O3	7.10
CaO	26.37
MgO	0.64
Na2O	0.28
K2O	0.83
P2O5	0.13
SO3	22.87
UND	10.73

AS DETERMINED MOISTURE: 1.23 %

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DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T1-2-3-1

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031652

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.02
Sulfur, Total	9.06

MISC. (As Det.)

MERCURY	0.60 ppm
SO3 as S	9.28 %
Inorg. C	0.93 %

ULTIMATE	(Dry)%
Carbon	7.47
Chlorine	0.544
Sulfur, Total	9.06
Ash	89.02

MAJOR ASH ELEM	(Dry)%
SiO2	19.47
Al2O3	9.02
TiO2	0.40
Fe2O3	7.59
CaO	27.71
MgO	0.67
Na2O	0.26
K2O	0.77
P2O5	0.12
SO3	21.41
UND	12.58

AS DETERMINED MOISTURE: 0.72 %

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DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T1-2-1-1

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031653

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.07
Sulfur, Total	8.92

MISC. (As Det.)

MERCURY	0.67 ppm
SO3 as S	8.32 %
Inorg. C	0.91 %

ULTIMATE	(Dry)%
Carbon	6.79
Chlorine	0.676
Sulfur, Total	8.92
Ash	90.07

MAJOR ASH ELEM	(Dry)%
SiO2	20.16
Al2O3	9.48
TiO2	0.42
Fe2O3	7.28
CaO	26.82
MgO	0.66
Na2O	0.28
K2O	0.81
P2O5	0.13
SO3	22.60
UND	11.36

AS DETERMINED MOISTURE: 0.86 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T1-2-9-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031654**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.88
Sulfur, Total	9.47

MISC. (As Det.)

MERCURY	0.70 ppm
SO3 as S	9.84 %
Inorg. C	0.93 %

ULTIMATE	(Dry)%
Carbon	5.96
Chlorine	0.686
Sulfur, Total	9.47
Ash	90.88

MAJOR ASH ELEM	(Dry)%
SiO2	20.06
Al2O3	9.49
TiO2	0.43
Fe2O3	6.83
CaO	27.16
MgO	0.67
Na2O	0.28
K2O	0.80
P2O5	0.14
SO3	22.97
UND	11.17

AS DETERMINED MOISTURE: 0.91 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T1-2-7-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031655**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	91.73
Sulfur, Total	9.63

MISC. (As Det.)

MERCURY	0.68 ppm
SO3 as S	9.84 %
Inorg. C	0.86 %

ULTIMATE	(Dry)%
Carbon	5.41
Chlorine	0.726
Sulfur, Total	9.63
Ash	91.73

MAJOR ASH ELEM	(Dry)%
SiO2	20.16
Al2O3	9.51
TiO2	0.43
Fe2O3	6.80
CaO	27.42
MgO	0.67
Na2O	0.29
K2O	0.82
P2O5	0.13
SO3	23.37
UND	10.40

AS DETERMINED MOISTURE: 0.77 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T1-2-5-2

DATE LOGGED *06/04/03*
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER **031656**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.77
Sulfur, Total	9.49

MISC. (As Det.)

MERCURY	0.68 ppm
SO3 as S	9.96 %
Inorg. C	0.95 %

ULTIMATE	(Dry)%
Carbon	6.13
Chlorine	0.627
Sulfur, Total	9.49
Ash	90.77

MAJOR ASH ELEM	(Dry)%
SiO2	20.32
Al203	9.56
TiO2	0.43
Fe203	7.10
CaO	26.83
MgO	0.66
Na20	0.28
K20	0.81
P205	0.13
SO3	22.50
UND	11.38

AS DETERMINED MOISTURE: 1.13 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T1-2-3-2

DATE LOGGED *06/04/03*
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER **031657**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	92.11
Sulfur, Total	10.27

MISC. (As Det.)

SO3 as S	10.5 %
Inorg. C	0.79 %
MERCURY	0.70 ppm

ULTIMATE	(Dry)%
Carbon	4.86
Chlorine	0.738
Sulfur, Total	10.27
Ash	92.11

MAJOR ASH ELEM	(Dry)%
SiO2	19.58
Al2O3	9.35
TiO2	0.42
Fe2O3	6.17
CaO	28.04
MgO	0.67
Na2O	0.30
K2O	0.82
P2O5	0.13
SO3	23.91
UND	10.61

AS DETERMINED MOISTURE: 1.14 %

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DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T1-2-1-2

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031658

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	92.05
Sulfur, Total	10.21

MISC. (As Det.)

MERCURY	0.72 ppm
SO3 as S	10.5 %
Inorg. C	0.82 %

ULTIMATE	(Dry)%
Carbon	5.06
Chlorine	0.768
Sulfur, Total	10.21
Ash	92.05

MAJOR ASH ELEM	(Dry)%
SiO2	19.84
Al2O3	9.41
TiO2	0.43
Fe2O3	6.32
CaO	27.69
MgO	0.67
Na2O	0.29
K2O	0.82
P2O5	0.14
SO3	23.65
UND	10.74

AS DETERMINED MOISTURE: 1.08 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T2-2-9-1

DATE LOGGED *06/04/03*
DATE COMPLETED *07/11/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031659**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	88.73
Sulfur, Total	9.93

MISC. (As Det.)

MERCURY	0.71 ppm
SO3 as S	10.1 %
Inorg. C	0.89 %

ULTIMATE	(Dry)%
Carbon	6.96
Chlorine	0.633
Sulfur, Total	9.93
Ash	88.73

MAJOR ASH ELEM	(Dry)%
SiO2	17.13
Al2O3	8.24
TiO2	0.36
Fe2O3	5.10
CaO	30.51
MgO	0.66
Na2O	0.26
K2O	0.69
P2O5	0.11
SO3	22.44
UND	14.50

AS DETERMINED MOISTURE: 0.45 %

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DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T2-2-7-1

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031660

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	91.71
Sulfur, Total	9.74

MISC. (As Det.)

MERCURY	0.71 ppm
SO3 as S	10.0 %
Inorg. C	0.78 %

ULTIMATE	(Dry)%
Carbon	5.41
Chlorine	0.678
Sulfur, Total	9.74
Ash	91.71

MAJOR ASH ELEM	(Dry)%
SiO2	20.31
Al2O3	9.70
TiO2	0.44
Fe2O3	6.72
CaO	27.22
MgO	0.67
Na2O	0.29
K2O	0.81
P2O5	0.14
SO3	23.84
UND	9.86

AS DETERMINED MOISTURE: 1.15 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T2-2-5-1

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031661**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.34
Sulfur, Total	9.23

MISC. (As Det.)

MERCURY	0.69 ppm
SO3 as S	5.87 %
Inorg. C	1.10 %

ULTIMATE	(Dry)%
Carbon	6.61
Chlorine	0.614
Sulfur, Total	9.23
Ash	89.34

MAJOR ASH ELEM	(Dry)%
SiO2	18.62
Al2O3	8.88
TiO2	0.40
Fe2O3	5.74
CaO	29.74
MgO	0.66
Na2O	0.27
K2O	0.75
P2O5	0.11
SO3	23.59
UND	11.24

AS DETERMINED MOISTURE: 3.91 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T2-2-3-1

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031662**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	87.59
Sulfur, Total	9.58

MISC. (As Det.)

MERCURY	0.72 ppm
SO3 as S	9.78 %
Inorg. C	1.04 %

ULTIMATE	(Dry)%
Carbon	8.04
Chlorine	0.696
Sulfur, Total	9.58
Ash	87.59

MAJOR ASH ELEM	(Dry)%
SiO2	17.01
Al2O3	8.11
TiO2	0.35
Fe2O3	4.95
CaO	30.58
MgO	0.66
Na2O	0.23
K2O	0.69
P2O5	0.10
SO3	22.75
UND	14.57

AS DETERMINED MOISTURE: 0.89 %

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DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T2-2-1-1

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031663

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	92.40
Sulfur, Total	10.27

MISC. (As Det.)

MERCURY	0.70 ppm
SO3 as S	10.4 %
Inorg. C	1.07 %

ULTIMATE	(Dry)%
Carbon	5.19
Chlorine	0.763
Sulfur, Total	10.27
Ash	92.40

MAJOR ASH ELEM	(Dry)%
SiO2	20.99
Al2O3	10.12
TiO2	0.46
Fe2O3	6.53
CaO	25.99
MgO	0.66
Na2O	0.32
K2O	0.85
P2O5	0.14
SO3	25.09
UND	8.85

AS DETERMINED MOISTURE: 1.65 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T2-2-9-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031664**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.03
Sulfur, Total	9.07

MISC. (As Det.)

MERCURY	0.71 ppm
SO3 as S	8.99 %
Inorg. C	1.02 %

ULTIMATE	(Dry)%
Carbon	6.15
Chlorine	0.644
Sulfur, Total	9.07
Ash	90.03

MAJOR ASH ELEM	(Dry)%
SiO2	18.03
Al2O3	8.60
TiO2	0.38
Fe2O3	5.70
CaO	30.32
MgO	0.66
Na2O	0.25
K2O	0.73
P2O5	0.12
SO3	22.61
UND	12.60

AS DETERMINED MOISTURE: 0.55 %

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RESEARCH & DEVELOPMENT
ANALYTICAL LABORATORY
4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T2-2-7-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031665**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.71
Sulfur, Total	9.97

MISC. (As Det.)

MERCURY	0.68 ppm
SO3 as S	9.95 %
Inorg. C	1.19 %

ULTIMATE	(Dry)%
Carbon	5.87
Chlorine	0.671
Sulfur, Total	9.97
Ash	90.71

MAJOR ASH ELEM	(Dry)%
SiO2	19.88
Al2O3	9.51
TiO2	0.43
Fe2O3	6.53
CaO	27.10
MgO	0.65
Na2O	0.28
K2O	0.80
P2O5	0.13
SO3	23.33
UND	11.36

AS DETERMINED MOISTURE: 1.68 %

DISTRIBUTION:
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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T2-2-5-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031666**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	88.73
Sulfur, Total	9.36

MISC. (As Det.)

MERCURY	0.68 ppm
SO3 as S	9.49 %
Inorg. C	0.97 %

ULTIMATE	(Dry)%
Carbon	6.52
Chlorine	0.575
Sulfur, Total	9.36
Ash	88.73

MAJOR ASH ELEM	(Dry)%
SiO2	17.21
Al2O3	8.17
TiO2	0.35
Fe2O3	5.28
CaO	31.54
MgO	0.67
Na2O	0.24
K2O	0.70
P2O5	0.10
SO3	22.35
UND	13.39

AS DETERMINED MOISTURE: 0.94 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T2-2-3-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031667**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	87.91
Sulfur, Total	9.84

MISC. (As Det.)

MERCURY	0.68 ppm
SO3 as S	9.44 %
Inorg. C	0.91 %

ULTIMATE	(Dry)%
Carbon	7.36
Chlorine	0.645
Sulfur, Total	9.84
Ash	87.91

MAJOR ASH ELEM	(Dry)%
SiO2	16.93
Al2O3	8.05
TiO2	0.35
Fe2O3	5.17
CaO	31.14
MgO	0.66
Na2O	0.23
K2O	0.67
P2O5	0.11
SO3	22.41
UND	14.28

AS DETERMINED MOISTURE: 0.73 %

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T2-2-1-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031668**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	91.77
Sulfur, Total	10.68

MISC. (As Det.)

MERCURY	0.73 ppm
SO3 as S	10.4 %
Inorg. C	1.13 %

ULTIMATE	(Dry)%
Carbon	5.30
Chlorine	0.770
Sulfur, Total	10.68
Ash	91.77

MAJOR ASH ELEM	(Dry)%
SiO2	20.06
Al2O3	9.75
TiO2	0.44
Fe2O3	6.34
CaO	26.66
MgO	0.65
Na2O	0.30
K2O	0.83
P2O5	0.13
SO3	24.06
UND	10.78

AS DETERMINED MOISTURE: 2.60 %

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T3-2-9-1

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031669

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.17
Sulfur, Total	9.94

MISC. (As Det.)

MERCURY	0.73 %
SO3 as S	8.98 %
Inorg. C	0.89 %

ULTIMATE	(Dry)%
Carbon	6.73
Chlorine	0.633
Sulfur, Total	9.94
Ash	89.17

MAJOR ASH ELEM	(Dry)%
SiO2	18.53
Al2O3	8.88
TiO2	0.38
Fe2O3	5.25
CaO	29.57
MgO	0.66
Na2O	0.27
K2O	0.76
P2O5	0.12
SO3	22.69
UND	12.89

AS DETERMINED MOISTURE: 0.48 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T3-2-7-1

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031670**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.70
Sulfur, Total	9.82

MISC. (As Det.)

MERCURY	0.69 ppm
SO3 as S	9.84 %
Inorg. C	0.90 %

ULTIMATE	(Dry)%
Carbon	6.07
Chlorine	0.752
Sulfur, Total	9.82
Ash	90.70

MAJOR ASH ELEM	(Dry)%
SiO2	20.42
Al2O3	9.68
TiO2	0.43
Fe2O3	6.52
CaO	26.96
MgO	0.68
Na2O	0.29
K2O	0.84
P2O5	0.11
SO3	23.42
UND	10.65

AS DETERMINED MOISTURE: 1.54 %

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T3-2-5-1

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031671

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.11
Sulfur, Total	9.85

MISC. (As Det.)

MERCURY	0.70 ppm
SO3 as S	9.61 %
Inorg. C	0.96 %

ULTIMATE	(Dry)%
Carbon	6.59
Chlorine	0.655
Sulfur, Total	9.85
Ash	89.11

MAJOR ASH ELEM	(Dry)%
SiO2	17.66
Al2O3	8.32
TiO2	0.36
Fe2O3	5.62
CaO	31.07
MgO	0.69
Na2O	0.24
K2O	0.72
P2O5	0.09
SO3	22.69
UND	12.54

AS DETERMINED MOISTURE: 0.83 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T3-2-3-1

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031672**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.04
Sulfur, Total	9.63

MISC. (As Det.)

MERCURY	0.68 ppm
SO3 as S	9.68 %
Inorg. C	0.90 %

ULTIMATE	(Dry)%
Carbon	6.79
Chlorine	0.615
Sulfur, Total	9.63
Ash	89.04

MAJOR ASH ELEM	(Dry)%
SiO2	17.88
Al2O3	8.40
TiO2	0.36
Fe2O3	5.73
CaO	31.52
MgO	0.69
Na2O	0.24
K2O	0.75
P2O5	0.09
SO3	23.15
UND	11.19

AS DETERMINED MOISTURE: 0.82 %

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T3-2-1-1

DATE LOGGED *06/04/03*
DATE COMPLETED *07/11/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031673**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.75
Sulfur, Total	9.76

MISC. (As Det.)

MERCURY	0.65 ppm
SO3 as S	9.57 %
Inorg. C	1.01 %

ULTIMATE	(Dry)%
Carbon	5.86
Chlorine	0.775
Sulfur, Total	9.76
Ash	90.75

MAJOR ASH ELEM	(Dry)%
SiO2	20.40
Al2O3	9.86
TiO2	0.43
Fe2O3	6.53
CaO	29.54
MgO	0.71
Na2O	0.32
K2O	0.83
P2O5	0.13
SO3	25.06
UND	6.19

AS DETERMINED MOISTURE: 1.93 %

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T3-2-9-2

DATE LOGGED *06/04/03*
DATE COMPLETED *07/11/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031674**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.62
Sulfur, Total	10.34

MISC. (As Det.)

MERCURY	0.67 ppm
SO3 as S	8.38 %
Inorg. C	0.92 %

ULTIMATE	(Dry)%
Carbon	6.55
Chlorine	0.642
Sulfur, Total	10.34
Ash	89.62

MAJOR ASH ELEM	(Dry)%
SiO2	17.52
Al2O3	8.46
TiO2	0.36
Fe2O3	5.34
CaO	28.89
MgO	0.65
Na2O	0.26
K2O	0.73
P2O5	0.11
SO3	22.54
UND	15.14

AS DETERMINED MOISTURE: 0.37 %

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T3-2-7-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031675**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	91.06
Sulfur, Total	9.72

MISC. (As Det.)

MERCURY	0.67 ppm
SO3 as S	9.73 %
Inorg. C	0.89 %

ULTIMATE	(Dry)%
Carbon	6.23
Chlorine	0.696
Sulfur, Total	9.72
Ash	91.06

MAJOR ASH ELEM	(Dry)%
SiO2	20.72
Al2O3	9.81
TiO2	0.43
Fe2O3	6.88
CaO	27.04
MgO	0.69
Na2O	0.29
K2O	0.86
P2O5	0.12
SO3	23.38
UND	9.78

AS DETERMINED MOISTURE: 0.88 %

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T3-2-5-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031676**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	88.92
Sulfur, Total	9.59

MISC. (As Det.)

MERCURY	0.65 ppm
SO3 as S	9.85 %
Inorg. C	0.99 %

ULTIMATE	(Dry)%
Carbon	6.67
Chlorine	0.612
Sulfur, Total	9.59
Ash	88.92

MAJOR ASH ELEM	(Dry)%
SiO2	17.29
Al2O3	8.14
TiO2	0.35
Fe2O3	5.43
CaO	32.29
MgO	0.69
Na2O	0.24
K2O	0.71
P2O5	0.09
SO3	22.91
UND	11.86

AS DETERMINED MOISTURE: 0.36 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T3-2-3-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031677**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	88.72
Sulfur, Total	9.39

MISC. (As Det.)

MERCURY	0.66 ppm
SO3 as S	4.78 %
Inorg. C	0.95 %

ULTIMATE	(Dry)%
Carbon	6.82
Chlorine	0.572
Sulfur, Total	9.39
Ash	88.72

MAJOR ASH ELEM	(Dry)%
SiO2	17.57
Al2O3	8.22
TiO2	0.36
Fe2O3	5.64
CaO	31.89
MgO	0.69
Na2O	0.24
K2O	0.71
P2O5	0.10
SO3	22.63
UND	11.95

AS DETERMINED MOISTURE: 0.34 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T3-2-1-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031678**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	88.44
Sulfur, Total	9.12

MISC. (As Det.)

MERCURY	0.63 ppm
SO3 as S	9.34 %
Inorg. C	1.04 %

ULTIMATE	(Dry)%
Carbon	7.00
Chlorine	0.586
Sulfur, Total	9.12
Ash	88.44

MAJOR ASH ELEM	(Dry)%
SiO2	17.61
Al2O3	8.25
TiO2	0.37
Fe2O3	5.62
CaO	31.92
MgO	0.70
Na2O	0.24
K2O	0.73
P2O5	0.10
SO3	22.53
UND	11.93

AS DETERMINED MOISTURE: 1.00 %

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T4-2-9-1

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031679**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.86
Sulfur, Total	9.60

MISC. (As Det.)

MERCURY	0.66 ppm
SO3 as S	7.70 %
Inorg. C	0.86 %

ULTIMATE	(Dry)%
Carbon	6.14
Chlorine	0.665
Sulfur, Total	9.60
Ash	90.86

MAJOR ASH ELEM	(Dry)%
SiO2	21.49
Al2O3	10.29
TiO2	0.45
Fe2O3	6.96
CaO	26.12
MgO	0.70
Na2O	0.33
K2O	0.90
P2O5	0.12
SO3	22.68
UND	9.96

AS DETERMINED MOISTURE: 0.76 %

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DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T4-2-7-1

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031680

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.09
Sulfur, Total	9.65

MISC. (As Det.)

MERCURY	0.63 ppm
SO3 as S	9.62 %
Inorg. C	1.08 %

ULTIMATE	(Dry)%
Carbon	7.17
Chlorine	0.655
Sulfur, Total	9.65
Ash	89.09

MAJOR ASH ELEM	(Dry)%
SiO2	19.85
Al2O3	9.53
TiO2	0.41
Fe2O3	6.38
CaO	27.68
MgO	0.69
Na2O	0.31
K2O	0.84
P2O5	0.11
SO3	22.57
UND	11.63

AS DETERMINED MOISTURE: 0.78 %

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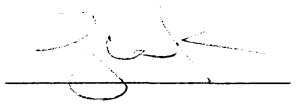
Approved for transmittal 

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T4-2-5-1

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031681

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	91.16
Sulfur, Total	10.18

MISC. (As Det.)

MERCURY	0.65 ppm
SO3 as S	10.1 %
Inorg. C	1.03 %

ULTIMATE	(Dry)%
Carbon	5.63
Chlorine	0.625
Sulfur, Total	10.18
Ash	91.16

MAJOR ASH ELEM	(Dry)%
SiO2	20.12
Al2O3	9.71
TiO2	0.43
Fe2O3	6.24
CaO	27.84
MgO	0.69
Na2O	0.31
K2O	0.86
P2O5	0.12
SO3	24.17
UND	9.51

AS DETERMINED MOISTURE: 0.74 %

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ANALYTICAL LABORATORY
4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T4-2-3-1

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031682**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.94
Sulfur, Total	9.57

MISC. (As Det.)

MERCURY	0.66 ppm
SO3 as S	9.15 %
Inorg. C	1.08 %

ULTIMATE	(Dry)%
Carbon	5.91
Chlorine	0.728
Sulfur, Total	9.57
Ash	90.94

MAJOR ASH ELEM	(Dry)%
SiO2	20.55
Al2O3	9.91
TiO2	0.44
Fe2O3	6.49
CaO	27.34
MgO	0.70
Na2O	0.32
K2O	0.88
P2O5	0.12
SO3	24.05
UND	9.20

AS DETERMINED MOISTURE: 1.09 %

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4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T4-2-1-1

DATE LOGGED *06/04/03*
DATE COMPLETED *07/11/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031683**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.97
Sulfur, Total	9.37

MISC. (As Det.)	
MERCURY	0.63 ppm
SO3 as S	9.42 %
Inorg. C	1.05 %

ULTIMATE	(Dry)%
Carbon	6.45
Chlorine	0.645
Sulfur, Total	9.37
Ash	89.97

MAJOR ASH ELEM	(Dry)%
SiO2	20.23
Al2O3	9.65
TiO2	0.42
Fe2O3	6.48
CaO	27.53
MgO	0.69
Na2O	0.31
K2O	0.83
P2O5	0.13
SO3	21.25
UND	12.48

AS DETERMINED MOISTURE: 0.82 %

DISTRIBUTION:
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ANALYTICAL LABORATORY
4000 BROWNSVILLE ROAD, SOUTH PARK, PA 15129

DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T4-2-9-2

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031684

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.32
Sulfur, Total	9.11

MISC. (As Det.)	
MERCURY	0.58 ppm
SO3 as S	7.51 %
Inorg. C	1.19 %

ULTIMATE	(Dry)%
Carbon	6.28
Chlorine	0.674
Sulfur, Total	9.11
Ash	89.32

MAJOR ASH ELEM	(Dry)%
SiO2	19.41
Al2O3	9.23
TiO2	0.40
Fe2O3	6.57
CaO	28.72
MgO	0.69
Na2O	0.29
K2O	0.82
P2O5	0.11
SO3	22.18
UND	11.58

AS DETERMINED MOISTURE: 0.64 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T4-2-7-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031685**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.60
Sulfur, Total	9.05

MISC. (As Det.)

MERCURY	0.62 ppm
SO3 as S	4.74 %
Inorg. C	1.05 %

ULTIMATE	(Dry)%
Carbon	6.86
Chlorine	0.646
Sulfur, Total	9.05
Ash	89.60

MAJOR ASH ELEM	(Dry)%
SiO2	19.89
Al2O3	9.53
TiO2	0.42
Fe2O3	6.38
CaO	27.58
MgO	0.68
Na2O	0.30
K2O	0.84
P2O5	0.11
SO3	22.97
UND	11.30

AS DETERMINED MOISTURE: 0.97 %

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DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T4-2-5-2

DATE LOGGED 06/04/03
DATE COMPLETED 06/27/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031686

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.32
Sulfur, Total	9.75

MISC. (As Det.)

MERCURY	0.63 ppm
SO3 as S	9.38 %
Inorg. C	0.97 %

ULTIMATE	(Dry)%
Carbon	6.25
Chlorine	0.626
Sulfur, Total	9.75
Ash	90.32

MAJOR ASH ELEM	(Dry)%
SiO2	19.25
Al2O3	9.23
TiO2	0.41
Fe2O3	5.86
CaO	28.77
MgO	0.69
Na2O	0.30
K2O	0.81
P2O5	0.11
SO3	23.87
UND	10.70

AS DETERMINED MOISTURE: 1.01 %

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DESCRIPTION BAGHOUSE HOPPER ASH PLANT 02

SAMPLE NUMBER BHA-T4-2-3-2

DATE LOGGED 06/04/03
DATE COMPLETED 07/03/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER 031687

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	90.52
Sulfur, Total	9.69

MISC. (As Det.)	
MERCURY	0.62 ppm
SO3 as S	7.56 %
Inorg. C	0.99 %

ULTIMATE	(Dry)%
Carbon	6.12
Chlorine	0.656
Sulfur, Total	9.69
Ash	90.52

MAJOR ASH ELEM	(Dry)%
SiO2	20.81
Al2O3	10.08
TiO2	0.43
Fe2O3	6.54
CaO	28.26
MgO	0.71
Na2O	0.34
K2O	0.92
P2O5	0.13
SO3	23.79
UND	7.99

AS DETERMINED MOISTURE: 0.96 %

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DESCRIPTION *BAGHOUSE HOPPER ASH PLANT 02*

SAMPLE NUMBER BHA-T4-2-1-2

DATE LOGGED *06/04/03*
DATE COMPLETED *06/27/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031688**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Ash	89.18
Sulfur, Total	9.52

MISC. (As Det.)

MERCURY	0.60 ppm
SO3 as S	9.59 %
Inorg. C	1.07 %

ULTIMATE	(Dry)%
Carbon	6.81
Chlorine	0.607
Sulfur, Total	9.52
Ash	89.18

MAJOR ASH ELEM	(Dry)%
SiO2	19.71
Al2O3	9.42
TiO2	0.41
Fe2O3	6.25
CaO	28.14
MgO	0.68
Na2O	0.29
K2O	0.82
P2O5	0.11
SO3	22.70
UND	11.47

AS DETERMINED MOISTURE: 1.16 %

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DESCRIPTION *PEBBLE LIME PLANT 02*

SAMPLE NUMBER *PEBBLE LIME-T1-1*

DATE LOGGED *06/03/03*
DATE COMPLETED *07/02/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031632**

ANALYSIS REPORT

PROXIMATE (Dry)%	
Total Sulfur	0.04

MISC. (As Det.)	
Hg	0.001 ppm

MAJOR ASH ELEM (Dry)%	
SiO2	1.45
Al2O3	0.45
TiO2	0.02
Fe2O3	0.20
CaO	92.92
MgO	1.20
Na2O	0.02
K2O	0.10
P2O5	0.01
SO3	0.11
UND	3.52

AS DETERMINED MOISTURE: <0.01 %

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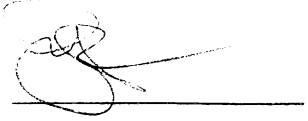
Approved for transmittal 

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DESCRIPTION PEBBLE LIME PLANT 02

SAMPLE NUMBER PEBBLE LIME-T-2

DATE LOGGED 06/03/03
DATE COMPLETED 07/02/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER **031633**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Total Sulfur	0.04

MISC. (As Det.)	
Hg	0.001 ppm

MAJOR ASH ELEM	(Dry)%
SiO2	1.33
Al2O3	0.44
TiO2	0.02
Fe2O3	0.16
CaO	93.54
MgO	1.19
Na2O	0.03
K2O	0.10
P2O5	0.01
SO3	0.10
UND	3.08

AS DETERMINED MOISTURE: <0.01 %

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DESCRIPTION *PEBBLE LIME PLANT 02*

SAMPLE NUMBER *PEBBLE LIME-T2-1*

DATE LOGGED *06/03/03*
DATE COMPLETED *07/02/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031634**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Total Sulfur	0.04

MISC. (As Det.)	
Hg	0.001 ppm

MAJOR ASH ELEM	(Dry)%
SiO2	1.28
Al2O3	0.43
TiO2	0.02
Fe2O3	0.17
CaO	90.96
MgO	1.15
Na2O	0.02
K2O	0.10
P2O5	0.03
SO3	0.09
UND	5.75

AS DETERMINED MOISTURE: <0.01 %

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DESCRIPTION *PEBBLE LIME PLANT 02*

SAMPLE NUMBER *PEBBLE LIME-T2-2*

DATE LOGGED *06/03/03*
DATE COMPLETED *07/02/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031635**

ANALYSIS REPORT

PROXIMATE (Dry)%	
Total Sulfur	0.04

MISC. (As Det.)	
Hg	0.001 ppm

MAJOR ASH ELEM (Dry)%	
SiO2	1.26
Al2O3	0.40
TiO2	0.02
Fe2O3	0.14
CaO	92.36
MgO	1.20
Na2O	0.02
K2O	0.09
P2O5	0.02
SO3	0.10
UND	4.39

AS DETERMINED MOISTURE: <0.01 %

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DESCRIPTION *PEBBLE LIME PLANT 02*

SAMPLE NUMBER *PEBBLE LIME-T3-1*

DATE LOGGED *06/03/03*
DATE COMPLETED *07/02/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031636**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Total Sulfur	0.04

MISC. (As Det.)	
Hg	0.003 ppm

MAJOR ASH ELEM	(Dry)%
SiO2	1.45
Al203	0.48
TiO2	0.02
Fe203	0.18
CaO	88.71
MgO	1.18
Na20	0.02
K20	0.10
P205	0.02
SO3	0.11
UND	7.73

AS DETERMINED MOISTURE: <0.01 %

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DESCRIPTION *PEBBLE LIME PLANT 02*

SAMPLE NUMBER *PEBBLE LIME-T3-2*

DATE LOGGED *06/03/03*
DATE COMPLETED *07/02/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031637**

ANALYSIS REPORT

PROXIMATE	(Dry)%
Total Sulfur	0.04

MISC. (As Det.)

Hg	ppm

MAJOR ASH ELEM	(Dry)%
SiO2	1.34
Al2O3	0.45
TiO2	0.02
Fe2O3	0.16
CaO	88.43
MgO	1.17
Na2O	0.02
K2O	0.11
P2O5	0.01
SO3	0.09
UND	8.20

AS DETERMINED MOISTURE: <0.01 %

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DESCRIPTION PEBBLE LIME PLANT 02

SAMPLE NUMBER PEBBLE LIME-T4-1

DATE LOGGED 06/03/03
DATE COMPLETED 07/02/03
PROJECT NUMBER 1621-87 -
ANALYTICAL NUMBER **031638**

ANALYSIS REPORT

PROXIMATE (Dry)%	
Total Sulfur	0.03

MISC. (As Det.)	
Hg	0.001 ppm

MAJOR ASH ELEM (Dry)%	
SiO2	1.24
Al2O3	0.42
TiO2	0.02
Fe2O3	0.14
CaO	89.66
MgO	1.17
Na2O	0.01
K2O	0.09
P2O5	0.01
SO3	0.08
UND	7.16

AS DETERMINED MOISTURE: <0.01 %

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DESCRIPTION *PEBBLE LIME PLANT 02*

SAMPLE NUMBER *PEBBLE LIME-T4-2*

DATE LOGGED *06/03/03*
DATE COMPLETED *07/02/03*
PROJECT NUMBER *1621-87 -*
ANALYTICAL NUMBER **031639**

ANALYSIS REPORT

PROXIMATE (Dry)%	
Total Sulfur	0.04

MISC. (As Det.)	
Hg	0.001 ppm

MAJOR ASH ELEM (Dry)%	
SiO2	1.22
Al2O3	0.41
TiO2	0.02
Fe2O3	0.15
CaO	89.68
MgO	1.14
Na2O	0.02
K2O	0.09
P2O5	0.02
SO3	0.11
UND	7.14

AS DETERMINED MOISTURE: <0.01 %

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