Contract No. DE-FC22-90PC90548

Parametric and Optimization Tests Environmental Monitoring Report

LIFAC Sorbent Injection Desulfurization Demonstration Project

Presented By

LIFAC North America

A Joint Venture Between

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Presented To

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April 1, 1994

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Subject: LIFAC Sorbent Injection Desulfurization Demonstration Project
Agreement No. DE-FC22-90PC90548
ICF Kaiser Engineers Project No. 91001-002
Parametric and Optimization Tests Environmental Monitoring Report

Dear Mr. Evans:

Please find enclosed the Parametric and Optimization Tests Environmental Monitoring Report which summarizes testing performed during September and December of 1993 at Richmond Power and Light Whitewater Valley Generating Station Unit No. 2. As required by the Environmental Monitoring Plan (EMP), gaseous emissions and liquid and solid process samples were measured for their respective parameters. Gaseous emissions included the measurement of particulate matter (PM), nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), carbon dioxide (CO_2), and oxygen (O_2). Analyses of solid and aqueous samples included the determination of alkalinity, pH, sulfate content, and any detectable quantities of metals, organic compounds, and volatile organic compounds (VOC).

If we can be of any further assistance, please call me.

Very truly yours,

ICF KAISER ENGINEERS, INC.

Kathleen D. Conner

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Environmental Manager

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1.0 INTRODUCTION

In 1988, the Department of Energy (DOE) was provided with federal funding to cost-share the design, construction, and operation of the Clean Coal Technology (CCT) projects. The intention of these projects is to demonstrate the feasibility and effectiveness of technologies capable of retrofitting or repowering existing coal-burning power plants so as to reduce air emissions of sulfur dioxide (SO_2) and oxides of nitrogen (NO_x). Under Round III of the CCT project, the Limestone Injection into the Furnace with Activation of Unreacted Calcium (LIFAC) project of LIFAC-North America (LIFAC NA) was chosen from among 48 other proposals to demonstrate its innovative technology to reduce SO_2 emissions. LIFAC NA is a joint venture between ICF Kaiser Engineers, Inc. (ICF Kaiser), located in Pittsburgh Pennsylvania, and Tampella Power based in Marietta, Georgia. The Richmond Power and Light (RP&L) Whitewater Valley Generating Station Unit #2 is the host for the LIFAC demonstration project.

LIFAC NA, on behalf of RP&L, sought and received from Indiana Department of Environmental Management (IDEM) a variance to operate Unit #2 for the testing performed during the different project stages. The variance requires specific compliance tests to be conducted at milestones identified in the variance request. In addition to the compliance testing, the project also requires supplemental monitoring to be performed. As defined by the Environmental Monitoring Plan (EMP) for the LIFAC project, the supplemental monitoring is performed to identify and characterize potential environmental and health impacts of the project, both on-site and off-site. This monitoring may include, yet is not limited to, measurement of processes, feedstocks, operating conditions, discharges, and ambient environmental conditions. This supplemental monitoring focused on the measurement of coal feedstocks, boiler and generator operating conditions, gaseous and particulate discharges, and solid and aqueous process by-products. Measurement of coal feedstocks included coal analysis and feed rate to boiler. Boiler and generator operating conditions were recorded on operator log sheets. Measured discharges included total particulate matter, nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), carbon dioxide (CO_2), and oxygen (O_2). Determinations of alkalinity, pH, sulfate content, and any quantities of specified metals, organic compounds, and volatile organic compounds (VOC) present in the process liquid and solid by-products were made. Tables 1-1 and 1-2 provide a summary of the required compliance and supplemental monitoring required under the EMP.

Compliance and supplemental monitoring in accordance with the EMP, was conducted on September 23 and 24, 1993 during LIFAC's parametric tests. As per the Test Plan, parametric testing is designed to evaluate the different possible combinations of LIFAC process parameters and their effectiveness. This set of tests will determine the optimum combination and settings of process parameters which will then be used throughout the remaining demonstration tests. Process parameters include sulfur content of coal, limestone quality, limestone calcium to sulfur ratio, injection ports combinations, injection nozzle angles, booster air, reactor outlet temperature, and ash recycling ratio.

The second round of environmental monitoring, including compliance and supplemental monitoring, was conducted on December 7 and 8, 1993, during optimization testing in accordance with the Test Plan. As defined in the Test Plan optimization testing will be performed to determine the reliability and capability of the LIFAC process over short, continuous operation periods. This set of tests will be performed continuously 24 hours a day to simulate actual operating conditions, as apposed to the short 8- to 12-hour parametric tests performed previously. The baseline coal and limestone along with the optimum parametric setting will be used during this phase of testing.

TABLE 1-1

COMPLIANCE MONITORING
EMP

Parameter	Sample	Sample Frequency and Duration	Limit[1]	Sample Location (see Figure 2-1)
GASEOUS EMISSIONS				
SO_2[2]	Calculation	Daily	6.0 lb/MBtu	9 - Breeching-duct downstream of the I.D. fan*
Total Suspended Particulates (TSP)	EPA Method 5[3]	2/year	0.22 lb/MBtu	9 - Breeching-duct downstream of the I.D. fan*
Opacity	CEM[4]	Continuous	40%	9 - Breeching-duct downstream of the I.D. fan*
AQUEOUS EFFLUENT (RP&L's NPDES Discharge Permit Requirements)				
Flow	Instantaneous	3 × Weekly	Report	6 - Weir at ponds system outfall
Total Suspended Solids (TSS)	Grab	2 × Weekly	70 mg/l	6 - Weir at ponds system outfall
Oil and Grease	Grab	2 × Weekly	15 mg/l	6 - Weir at ponds system outfall
Total Residual Oxidants (Chlorine)	Grab	2 × Weekly	0.02 mg/l	6 - Weir at ponds system outfall
Temperature	Instantaneous	2 × Weekly	Report	6 - Weir at ponds system outfall
Ammonia (NH_3)	Grab	2 × Monthly	1.8 mg/l (summer) 2.6 (winter)	6 - Weir at ponds system outfall
Copper	Grab	2 × Monthly	0.05 mg/l	6 - Weir at ponds system outfall
Lead	Grab	2 × Monthly	0.02 mg/l	6 - Weir at ponds system outfall
Zinc	Grab	2 × Monthly	0.46 mg/l	6 - Weir at ponds system outfall
Aluminum	Grab	2 × Monthly	0.40 mg/l	6 - Weir at ponds system outfall
Iron	Grab	2 × Monthly	Report	6 - Weir at ponds system outfall
Total Polychlorinated Biphenols (PCBs)	Grab	2 × Monthly	Report	6 - Weir at ponds system outfall

[1] Limits for air emissions are based on the LIFAC Variance to the draft boiler Operating Permits. Limits for water discharges are daily limits.
[2] Complete coal analysis is performed as part of the Test Program.
[3] 40 CFR Part 60.
[4] Continuous Emissions Monitor.

* Emissions tests can be conducted at the 250' level on the stack when Unit #1 is not in operation.

TABLE 1-2

SUPPLEMENTAL MONITORING
EMP

Parameter	Sample	Sample Frequency and Duration	Range	Sample Location (see Figure 2-1)
GASEOUS EMISSIONS				
NO_x	EPA Method 7 D&E[1]	Continuous or 3/condition	0-1 lb/MBtu	9 - Breeching-duct* downstream of the I.D. fan
SO_2[2]	EPA Method, 6, 6C or 8	Continuous or 3/condition	--	9 - Breeching-duct* downstream of the I.D. fan
TSP	EPA Methods 1-5	Continuous or 3/condition	0-1 lb/MBtu	9 - Breeching-duct* downstream of the I.D. fan
PM_{10}	EPA Method 201A	Continuous or 3/condition	0-1 lb/MBtu	9 - Breeching-duct* downstream of the I.D. fan
CO_2	EPA Method 3	Continuous of 3/condition	0-500 lb/MBtu	9 - Breeching-duct* downstream of the I.D. fan
CO	EPA Method 10	Continuous or 3/condition	0-500 ppmv	9 - Breeching-duct* downstream of the I.D. fan
AQUEOUS EFFLUENT				
Alkalinity	EPA Method 310.2	1/Condition	mg $CaCO_3$	6 - Weir at ponds system outfall
SOLID WASTE AND BY-PRODUCT				
TCLP	EPA Method 1311 TCLP Metals, Methods 8240 and 8270 for Organics	1/Condition	Various per parameter	3 - Economizer Hopper 4 - LIFAC Ash 5 - ESP Hoppers 10 - Bottom Ash
Sulfates	ASTM Extraction[3] EPA Method 9035	1/Condition	0-1,000 mg/l	3 - Economizer Hopper 4 - LIFAC Ash 5 - ESP Hoppers 10 - Bottom Ash
Alkalinity	ASTM Extraction Method EPA Method 310.2	1/Condition	mg $CaCO_3$	3 - Economizer Hopper 4 - LIFAC Ash 5 - ESP Hoppers 10 - Bottom Ash
Organics	EPA Method 8240	1/Condition	0-1,000 mg/l	3 - Economizer Hopper 4 - LIFAC Ash 5 - ESP Hoppers 10 - Bottom Ash
pH	EPA Method 9045	1/Condition	0-14 H^+	3 - Economizer Hopper 4 - LIFAC Ash 5 - ESP Hoppers 10 - Bottom Ash

[1] 40 CFR Part 60 Appendix A.
[2] SO_2 monitoring will be performed as part of process monitoring.
[3] Annual book of ASTM standards.

* Emissions tests can be conducted at the 250' level on the stack when Unit #1 is not in operation.

2.0 TECHNOLOGY DESCRIPTION

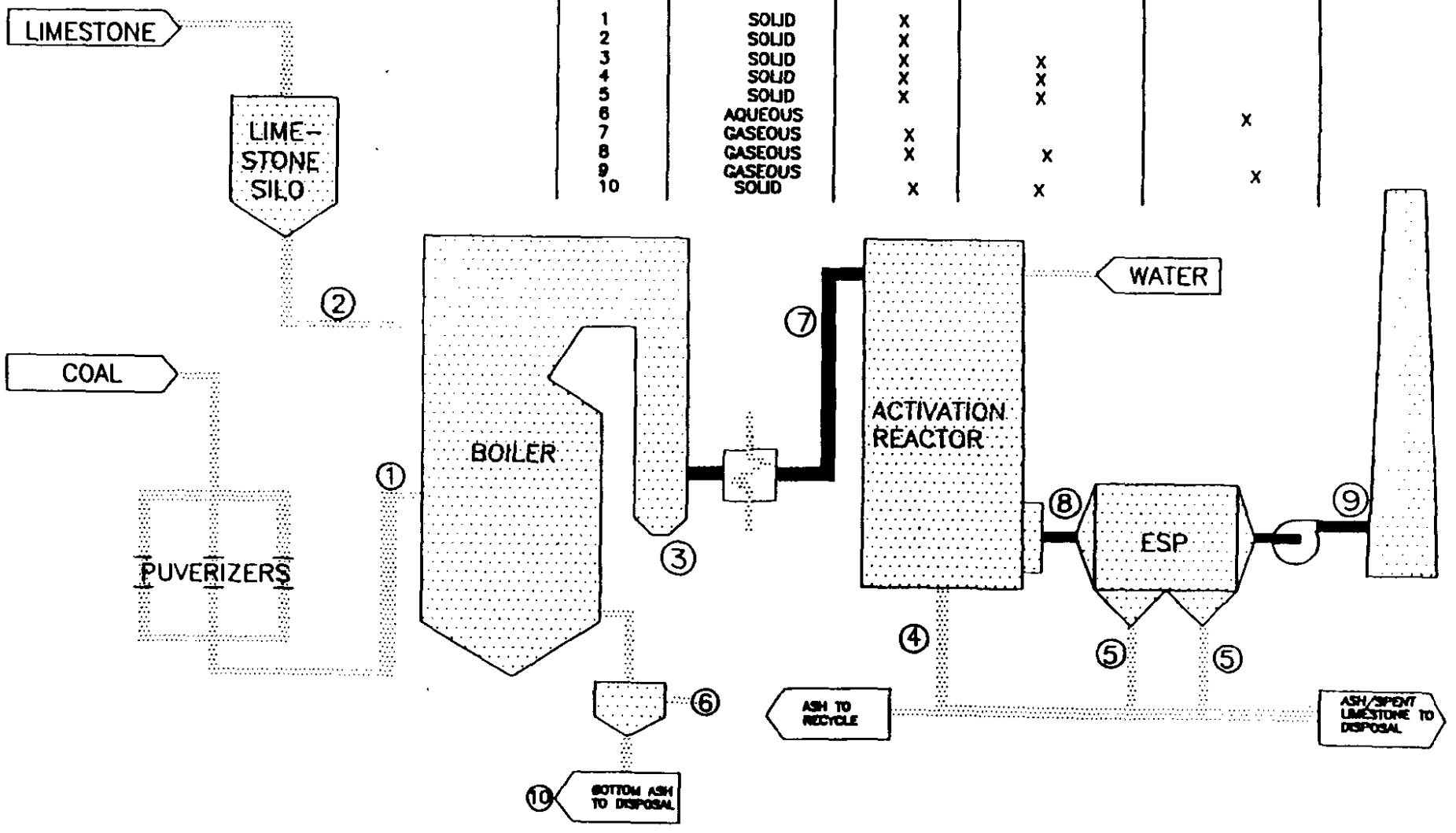
The LIFAC project involves the installation and testing of the LIFAC system on Unit No. 2, a 60 MW tangentially-fired, coal-burning boiler. A schematic of the system is included as Figure 2-1. LIFAC is a retrofit flue gas desulfurization technology capable of reducing SO_2 emissions in the range of 75 to 85 percent. The system utilizes limestone injection and a unique activation reactor with a humidification process for effective SO_2 removal. Various types of limestone will be used throughout the demonstration project. The pulverized limestone is pneumatically injected into the upper regions of the furnace. Here, the calcium carbonate ($CaCO_3$) in the limestone breaks down to form calcium oxide (CaO) and carbon dioxide (CO_2). A portion of the sulfur dioxide (SO_2) and sulfur trioxide (SO_3) present in the flue gas chemically reacts with the limestone constituents to form calcium compounds calcium sulphite ($CaSO_3$) and calcium sulphate ($CaSO_4$). Subsequently, the flue gas, carrying along with it the calcium compounds and unreacted CaO, then continues to a unique piece of equipment known as the activation reactor, a cylindrically-shaped vertical tower located between the Unit 2 air preheater and the ESP. Further removal of the SO_2 is achieved by the humidification of the flue gas as it enters and passes through the activation reactor. The addition of the water mists in the reactor causes the remaining untreated CaO to form calcium hydroxide (CaOH). The calcium hydroxide then reacts with additional sulfur dioxide, nearly completing the removal process. The purpose of initiating reductions of SO_2 emissions is to minimize generation of acid rain, as SO_2 is a precursor to its occurrence.

In addition to the boiler bottom ash and fly ash normally produced by coal combustion, there are other "new" by-products associated with the LIFAC system. The addition of limestone to the process and the subsequent reactions create a dry, powdery material referred to as LIFAC solid waste and by-product. Approximately 75 percent of the solid waste and by-product is collected by the ESP (and the ESP hoppers). The remainder of the waste exits as a slag through hoppers at the bottom of the activation reactor. A small fraction of LIFAC solid waste and by-product may collect in the air preheater ash hopper. Wastes captured by the process vessels and equipment will be collected using a new, dry mechanical exhauster system and transported to an off-site, permitted landfill. The carbon dioxide leaves with the flue gas in the stack emissions.

There will be no change to the amount of coal fired at the plant. Different varieties of coal will be tested ranging from a high sulfur to a low sulfur bituminous coal. When the LIFAC system is fully operational, the additional electrical energy requirements for LIFAC equipment and the introduction of limestone into the boiler is expected to reduce the net output of Unit 2 from 60 MW to 59.5 MW.

FIGURE 2-1
WHITEWATER VALLEY UNIT 2
SCHEMATIC WITH LIFAC SYSTEM INSTALLED

LOCATION	MEDIA	MONITORING PURPOSE: TEST PROGRAM	MONITORING PURPOSE: EMP SUPPLEMENTAL	MONITORING PURPOSE: EMP COMPLIANCE
1	SOLID	X		
2	SOLID	X		
3	SOLID	X	X	
4	SOLID	X	X	
5	SOLID	X	X	
6	AQUEOUS			X
7	GASEOUS	X		
8	GASEOUS	X	X	
9	GASEOUS			X
10	SOLID	X	X	



3.0 LIFAC TEST PARAMETERS

Parametric Testing

The first round of environmental monitoring was conducted during parametric tests for LIFAC on September 23 and 24, 1993. Monitoring included compliance and supplemental emissions testing being conducted for each day. Since Unit 1 was off-line during the sampling event, emissions were monitoring at the 250-foot level of the stack and not at the duct breeching as done during the baseline testing. Sootblowing was performed during one of the three PM tests for each of the two days.

Under supplemental monitoring ash samples were collected at the economizer hoppers, LIFAC bottom hoppers, ESP inlet and outlet hoppers, and boiler bottom ash disposal bin. Monitoring of the plant's feedwater was also conducted since its incoming quality is believed to be impacting compliance with effluent criteria in accordance with RP&L's NPDES Permit. Feedwater for the plant is either pumped from the river, or during dry seasons, is pumped from the local sanitary treatment plant's effluent discharge. Feedwater during the September tests was coming from the treatment plant effluent.

The boiler bottom ash discharge water was also sampled since it is believed that immediate impacts will not be seen at the pond outfall as a result of LIFAC operations due to the long residence time through the pond system. The team plans to utilize RP&L's pond discharge monitoring analyses as required under their NPDES permit to identify any long-term trends after LIFAC has been running.

LIFAC test parameters during the September 23 and 24, 1993 environmental monitoring are summarized in Table 3-1:

TABLE 3-1

PARAMETRIC TESTING
TEST PARAMETERS

	September 23, 1993	September 24, 1993
Boiler Load (MW)	60	60
Coal Quality - % S - SO_2 lb/MMBtu	2.23 4.09	2.18 3.87
Limestone Quality	85% - 200 Coarse	85% - 325 Fine
Ca/S Molar Ratio	1.8	2.0
Reactor Outlet Temperature (°F) (approach to saturation)	6	4
% Bypass (1)	30-35%	30-35%
Recycling (2)	No	Yes

(1) % Bypass is the amount of flue gas that is bypassed around the reactor.
(2) Recycle is when spent sorbent from the inlet ESP hoppers is recycled through LIFAC to improve sorbent utilization and increase SO_2 reduction.

Optimization Testing

On December 7 and 8, 1993, environmental monitoring was conducted during optimization testing for LIFAC. Compliance and supplemental tests were conducted each day including emissions testing. Since Units 1 and 2 were both in operation, emissions monitoring was conducted at the test portals located in the duct breeching located downstream of the I.D. fan. Sootblowing was performed during one of the three PM tests for each of the two days.

Ash samples were collected at the economizer hoppers, LIFAC bottom hoppers, ESP inlet and outlet hoppers and the boiler bottom ash disposal bin. The sampling team also continued to monitor the feedwater to the plant which, at this time, was coming from the river, as well as the boiler bottom ash discharge water.

LIFAC test parameters during the December 7 and 8, 1993 environmental monitoring are summarized in Table 3-2:

TABLE 3-2

OPTIMIZATION TESTING
TEST PARAMETERS

	December 7, 1993	**December 8, 1993**
Boiler Load (MW)	63.3	58.5
Coal Quality - % S - SO_2 lb/MMBtu	2.24 3.93	2.14 3.75
Limestone Quality	85% - 325 Fine	85% - 325 Fine
Ca/S Molar Ratio	2.0	2.0
Reactor Outlet Temperature (°F) (approach to saturation)	8	7-8
% Bypass	40%	40-42%
Recycling	Yes	No

4.0 METHODOLOGIES

The majority of the compliance and supplemental monitoring centered around the testing of particulate matter and gaseous parameters. The test programs utilized methodologies promulgated in 40 CFR 60, Appendix A, for the particulate matter and duct gas determinations necessary for the test program. EPA Methods 1, 2, 3A, and 4 were used for the determination of the sampling points locations, gas velocities and volumetric flow rates, gas molecular weight on a dry basis, and percent moisture content, respectively. Particulate matter was determined using EPA Method 5. Gas concentrations of NO_x, SO_2, and CO were determined utilizing EPA Methods 7E, 6C, and 10, respectively. PM_{10} was determined using EPA Method 201A. Also, verification tests for absence of cyclonic flow was performed each of the December test days at the breech sampling location, in accordance with EPA Method 1, Section 2.4.

Analyses of the solid and aqueous LIFAC by-products followed EPA methods and ASTM extraction methods. The specific EPA methods which were referenced are sited in the footnotes on the actual analytical results provided by Antech Ltd. attached in Appendix B. Total alkalinity of both the aqueous and solid samples were determined by EPA Method 310.2. Before the alkalinity of the solid samples could be measured, they were extracted using ASTM extraction methods. The remaining analyses of the solid wastes were performed using the following EPA Methods: pH, 9045; sulfate, 9038 (using ASTM extraction method); metals, Toxicity Characteristics Leaching Procedures (TCLP) 1311, 6010, 7470, and 7740; organic materials, TCLP 8260 and 8270; and VOC, TCLP 8260.

5.0 RESULTS

A summary of results for compliance and supplemental monitoring for particulate matter testing for LIFAC's baseline, parametric and optimization testing are presented in Tables 5-1 and 5-2. Table 5-1, Summary of Particulate Matter Test Data, includes pertinent process conditions such as power generation in units of megawatts (MW), coal feed rates (lb/hr) and firing rates (MBtu/hr). It also includes correction to the particulate matter loading to account for sootblowing which IDEM required to be done during one of the three PM tests conducted on September 23 and 24, and December 7 and 8, 1993. Table 5-2 provides a summary of gaseous emissions as required under supplemental monitoring. This table clearly indicates a reduction in SO_2. Under baseline conditions SO_2 was at 1972 ppmv. There was an average reduction of approximately 41% for the September tests (average at 1152 ppmv) and approximately 55% reduction for December tests (average at 885.05 ppmv). Detailed particulate matter test data and actual gaseous emission results are provided in Appendix A. For backup calculations, refer to the Baseline Monitoring Report[1] (for baseline information) and see Appendix A for tests conducted in September and December 1993. Coal data for the different testing events is summarized in Table 5-3, with actual analysis provided in Appendix F.

The particulate matter mass loadings summarized in Table 5-1 are expressed in grains per dry standard cubic feet (gr/dscf), pounds per hour (lb/hr), and mass per heat input, expressed as pounds per million Btu (lb/MBtu). Mass emission per heat input was calculated using two different methods. The first method was based on actual process parameters such as coal feed rate to the boiler and coal heating value. The second method utilized EPA Method 19, also known as the F factor method. The following equation, extracted from the method, calculates a theoretical mass emission per heat input based on the F_d, which is the ratio of the gas volume of the products of combustion to the heat contents of the fuel (dependent on the type of coal), measured pollutant concentration, and the measured percent oxygen, with all variables being on a dry basis.

$$E = F_d * C_d * [20.9/(20.9 - \%O_{2d})]$$

where
- E = Emission rate (lb/MBtu)
- F_d = Oxygen-based F factor (dscf/MBtu), dry basis (9780 dscf/MBtu for bituminous coal)
- C_d = Pollutant concentration (lb/dscf)
- $\%O_{2d}$ = Percent oxygen (%), dry basis

Detailed calculations using the F factor method can be found in the Baseline Monitoring Report[1] (for baseline information) and Appendix A for the parametric and optimization testing. Stack gas conditions have been presented in the tables. Flow rates have been expressed in two different formats: actual cubic feet per minute (acfm) and dry standard cubic feet per minute (dscfm). Other stack gas parameters such as temperature and percent moisture have also been included. Percent isokinetics have been calculated for each test run. The percent isokinetic value represents a ratio of the gas velocity through the sampling probe nozzle to the gas velocity in the stack. An isokinetic value is acceptable if it falls within the range of 90 to 110 percent. All isokinetic values are within the acceptable limits. After review of the calibration data, all particulate matter sampling equipment was operated in accordance with EPA Methods 2 through 5. Particulate matter emission calculations, analytical data, field data sheets, and equipment calibrations can be found in the Baseline Monitoring Report[1] (for baseline information) and Appendices A, G, and H for the September and December testing.

TABLE 5-1
SUMMARY OF
ENVIRONMENTAL MONITORING
PARTICULATE MATTER TEST DATA

	UNITS	Baseline		Parametric		Optimization	
		9-2-92	12-18-92	9-23-93	9-24-93	12-7-93	12-8-93
Process Conditions		Duct Breeching		Stack 250' Level		Duct Breeching	
Power Generation	MW	65.1	65.8	62.3	60.6	63.3	58.5
Coal Feed Rate	lb/hr	61220	59677	58860	54360	56800	53400
Heat Input	MBtu/hr	691.1	672.3	665.0	614.2	644.9	609.6
Particulate Matter Loadings							
Concentration	gr/dscf	0.0135	0.0912	0.0425	0.0672	0.1335	0.1109
Mass Flow Rate	lb/hr	17.28	120.30	55.36	84.83	193.10	155.60
Mass Emission/Heat Input (1)	lb/MBtu	0.025	0.180	0.085	0.131	0.295	0.250
Mass Emission/Heat Input (2)	lb/MBtu	0.024	0.174	0.074	0.140	0.257	0.209
Mass Emission/Heat Input (2*)	lb/MBtu	–	–	0.072	0.128	0.253	0.206
Duct Conditions							
Average Flow Rate	acfm	247167	265939	236622	229237	264200	257800
Dry Standard Flow Rate	dscfm	149267	155968	152089	147086	168900	163600
Temperature	deg F	338	342	225	225	250	254
Percent Moisture	%	9.9	8.6	13.2	14.0	12.5	12.5
Percent O2	%	4.4	5.7	4.1	6.8	5.7	5.4
Percent CO2	%	14.8	14.2	14.0	13.0	13.3	13.8
Isokinetics	%	102.8	108.1	105.7	104.7	102.7	101.7
Opacity	%	–	–	12.6	12.1	19.7	15.7

(1) Based on measured coal feed rates and heating values.
(2) Based on EPA Method 19 (F factor method).
(2*) Corrected for sootblowing.

TABLE 5-2
SUMMARY OF
ENVIRONMENTAL MONITORING
GASEOUS EMISSIONS

PARAMETERS	LIMITS	BASELINE (9-2-92) DUCT BREECHING	BASELINE (12-18-92) DUCT BREECHING	PARAMETRIC (9-23-93) STACK 250' LEVEL	PARAMETRIC (9-24-93) STACK 250' LEVEL	OPTIMIZATION (12-7-93) DUCT BREECHING	OPTIMIZATION (12-8-93) DUCT BREECHING
TSP (lb/M btu)	0.22-0.40*	0.024	0.174	0.074	0.140	0.253	0.206
OPACITY	40%	–	–	8-25%	10-18%	19-21%	14-18%
SO2 lb / Mbtu (ppmv)	6.0	(1972)	–	(1411.8)	(891.9)	(844.3)	(925.8)
NOx lb / Mbtu (ppmv)	0-1 (0-588)	(375.6)	–	(379.0)	(352.7)	(337.2)	(350.3)
PM-10 lb/M btu (%)	0-1 (100%)	–	–	(77.1 >)	(51.1 >)	(55.27 >)	(50.66 >)
				(22.9 <)	(48.9 <)	(44.73 <)	(49.34 <)
CO2 lb/M btu (%)	0-500 (0-50)	(14.8)	–	(14.36)	(13.95)	(13.35)	(13.83)
CO (ppmv)	0-500	19.9	–	66.57	216.23	4.1	6.5

* Per IDEM Variance

TABLE 5-3
SUMMARY OF
ENVIRONMENTAL MONITORING
COAL DATA

	PARAMETERS	Baseline 9-2-92	Baseline 9-22-93	Parametric 9-23-93	Parametric 9-24-93	Optimization 12-7-93	Optimization 12-8-93
ultimate analysis	Btu/lb. (Rec'd)	11355	11307	11250	11253	11390	11417
	Btu/lb. (Dry)	13084	12893	12967	12983	13016	13094
proximate analysis	Moisture % (Rec'd)	13.22	12.30	13.24	13.33	12.49	12.81
	Ash (Rec'd)	9.00	10.53	9.98	9.86	9.79	9.53
	Ash (Dry)	10.37	12.00	11.50	11.37	11.19	10.93
ultimate	Sulfur % (Rec'd)	2.46	2.25	2.20	2.18	2.24	2.14
	Sulfur % (Dry)	2.83	2.57	2.54	2.51	2.56	2.45

Based on analysis conducted by Standard Laboratories, original laboratory results attached in Appendix F.

Also verification tests for absence of cyclonic flow was performed each test day during the baseline and December, 1993 tests at the breeching sampling location, in accordance with EPA Method 1, Section 2.4. (This test was not required during the September 23 and 24, 1993 test since testing was conducted at the 250' level of the stack). The location is acceptable if the average angle of rotation, as measured by the pilot tube, is less than 20 degrees. The average angle of rotation for the Baseline and December test days was less than 20 degrees, thus the sampling location was deemed acceptable.

Table 5-1 also summarizes the opacity measurements taken during the three PM test runs for each day. The opacity readings were read directly from RP&L's opacity recorder. The opacities are averaged over six minute periods and are represented by the stepped blocks on the recorder chart. Copies of the opacity charts can be found in Appendix C for the parametric tests and Appendix D for the optimization test, while averages for each individual test can be found in the Baseline Monitoring Report[1] and Appendix A for the parametric and optimization testing. The high spikes on the chart are due to the periodic cleaning (rapping cycles) of the ESP collector plates. The action of rapping the collector plates produces a sudden spike on the opacity recorder which represents that instantaneous reading at that time. These rapping spikes are subsequently incorporated into the six minute averages. As shown on Table 5-2, the averaged opacity readings for all tests are below the variance limit of 40%.

PM_{10} was determined employing EPA Method 201A. PM_{10} results for the September 23 and 24 and December 7 and 8 testing are provided in Table 5-2. There are no baseline PM_{10} results due to sampling equipment access difficulties with the test ports, which were too small for the PM_{10} test probe heads. This problem was corrected for the parametric and optimization testing.

Analyses of the aqueous effluent and solid waste were conducted by Antech Ltd. in accordance with the EMP. The aqueous effluent sample was collected from the Boiler Bottom Ash Bin (sample location 6A) and from the plants incoming feed water. Based on the review of RP&L's monthly monitoring data, the plant has had several exceedance of their 0.40 mg/l aluminum limit. They believed that the feedwater from the treatment plant (source during the September tests) could possibly be coming into the plant at an elevated level of aluminum, therefore impacting their discharge. However, based on our September analysis this does not appear to be entirely true, although the aluminum level of the feedwater on September 22, 1993 was at 0.63 mg/l. It should also be noted that the analysis for the Boiler Bottom Ash Bin aqueous sample with LIFAC in operation also illustrated elevated aluminum levels (greater than 0.40 mg/l) on all test days but one.

A summary of the aqueous samples are presented in Tables 5-9 and 5-10, with Antech's actual analytical results located in Appendix B.

Solid samples were collected from the following during the September 23 and 24, and December 7 and 8 testing:

Sample Location	Sample Location Description
3	Economizer Ash Hopper
4	Reactor Bottom Ash
5A	ESP Inlet Hopper
5B	ESP Outlet Hopper
6B	Boiler Bottom Ash Bin

A summary of the analytical results for the solid samples are presented in Tables 5-4 through 5-8. A table was developed for each type of ash sampled to make the comparison of baseline results to the parametric and optimization results easier. Antech's actual analytical results are located in Appendix B, along with a list of Regulatory Levels for TCLPs.

During parametric testing all metals in all five samples locations were below detectable limits except for chromium collected at sample location (5B) the ESP outlet hopper which was measured at 1.1 mg/l. Although this is below the regulatory level of 5.0 mg/l, we believe this could of been an error in the analysis, however at this time we have not been able to verify this. All metals under the optimization testing were below detectable limits. In regard to TCLP organic and VOC analyses during parametric testing all parameters for all five separate sample locations were below detectable limits with the exception of 900 μg/kg of methylene chloride and 40 μg/kg of toluene found in the ESP outlet hopper ash (sample location 5B, September 23, 1993) and 8.0 μg/kg of methylene chloride found in the boiler bottom ash (sample location 6B, September 23, 1993). There are no regulatory levels established for these constituents. Also, during optimization testing all TCLP parameters were below detectable levels except again for 13 μg/kg of methylene chloride in the boiler bottom ash (sample location 6B December 7, 1993). The source of methylene chloride is not known at this time. Results of the method blank runs for the TCLP analyses are also in Appendix B with the actual analytical results.

Also due to concerns for the potential of arsenic in the LIFAC ash since it was detected in Boiler Unit #2, ICF Kaiser Engineers conducted a standard industrial hygiene test and determined all levels of metals tested to be significantly below acceptable exposure limits.

TABLE 5-4
SUMMARY OF
ENVIRONMENTAL MONITORING
SOLID WASTE AND BY PRODUCT
ECONOMIZER ASH

SAMPLE LOCATION : ECONOMIZER HOPPER (3)

PARAMETERS	REGULATORY LIMIT (mg/l)* (if established)	UNITS	BASELINE (9-2-92)	BASELINE (9-22-93)	PARAMETRIC (9-23-93)	PARAMETRIC (9-24-93)	OPTIMIZATION (12-7-93)	OPTIMIZATION (12-8-93)
Alkalinity	–	mg/l CaCO3	87.0	417	2540	2760	2090	2130
pH	–	pH units	11.90	12.48	12.55	12.44	12.55	12.52
Sulfate	–	mg/l	100	170	1200	1200	1600	1700
Percent Carbon	–	%	–	5.6	4.5	4.4	6.5	5.3
Total Metals:								
Arsenic (Total)	5.0	mg/kg	–	35	–	26	47	35
TCLP Metals :								
Silver	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Barium	100.0	mg/l	<10	<10	<10	<10	<10	<10
Cadmium	1.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Mercury	0.2	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Selenium	1.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:								
Extraction Fluid	–		No.1	No.1	No.2	No.2	No.2	No.2
pH w/ Deionized Water	–	pH Units	11.05	10.70	11.75	11.75	12.69	12.71
pH after Addition of 1 Normal HCL	–	pH Units	1.55	3.21	11.17	11.40	11.95	11.78
pH of TCLP Extract	–	pH Units	5.15	5.33	12.31	12.37	12.30	12.59
Amount of Sample Extracted	–	g	100	100	100	100	100	100
TCLP Volatile Organic Analysis : (8260)								
Benzene	0.5	ug/l	<50	<50	<50	<50	<50	<50
2-Butanone	200.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000
Carbon Tetrachloride	0.5	ug/l	<50	<50	<50	<50	<50	<50
Chlorobenzene	100.0	ug/l	<1000	<1000	<1000	<1000	<1000	<1000
Chloroform	6.0	ug/l	<500	<500	<500	<500	<500	<500
1,2-Dichloroethane	0.5	ug/l	<50	<50	<50	<50	<50	<50
1,1-Dichloroethene	0.7	ug/l	<50	<50	<50	<50	<50	<50
Tetrachloroethene	0.7	ug/l	<50	<50	<50	<50	<50	<50
Trichloroethene	0.5	ug/l	<50	<50	<50	<50	<50	<50
Vinyl Chloride	0.2	ug/l	<50	<50	<50	<50	<50	<50
TCLP Base/Neutral Extractables : (8270)								
1,4-Dichlorobenzene	7.5	ug/l	<500	<500	<500	<500	<500	<500
2,4-Dinitrotoluene	0.13	ug/l	<50	<50	<50	<50	<50	<50
Hexachlorobutadiene	0.5	ug/l	<50	<50	<50	<50	<50	<50
Hexachlorobenzene	0.13	ug/l	<100	<100	<100	<100	<100	<100
Hexachloroethane	3.0	ug/l	<500	<500	<500	<500	<500	<500
Nitrobenzene	2.0	ug/l	<100	<100	<100	<100	<100	<100
Pyridine	5.0	ug/l	<500	<500	<500	<500	<500	<500

TABLE 5-4 (Continued)
SUMMARY OF
ENVIRONMENTAL MONITORING
SOLID WASTE AND BY PRODUCT
ECONOMIZER ASH

SAMPLE LOCATION : ECONOMIZER HOPPER (3)

PARAMETERS	REGULATORY LIMIT (mg/l)* (if established)	UNITS	BASELINE (9-2-92)	BASELINE (9-22-93)	PARAMETRIC (9-23-93)	PARAMETRIC (9-24-93)	OPTIMIZATION (12-7-93)	OPTIMIZATION (12-8-93)
TCLP Acid Extractables : (8270)								
Total Cresol	200.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000
Pentachlorophenol	100.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000
2,4,5-Trichlorophenol	400.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000
2,4,6-Trichlorophenol	2.0	ug/l	<100	<100	<100	<100	<100	<100
Acetone	-	ug/kg	<500	<13000	<13000	<13000	<13000	<13000
Benzene	0.5	ug/kg	<25	<630	<630	<630	<630	<630
Bromodichloromethane	-	ug/kg	<25	<630	<630	<630	<630	<630
Bromoform	-	ug/kg	<25	<630	<630	<630	<630	<630
Bromomethane	-	ug/kg	<50	<1300	<1300	<1300	<1300	<1300
2-Butanone	200.0	ug/kg	<500	<13000	<13000	<13000	<13000	<13000
Carbon Disulfide	-	ug/kg	<25	<630	<630	<630	<630	<630
Carbon Tetrachloride	0.5	ug/kg	<25	<630	<630	<630	<630	<630
Chlorobenzene	100.0	ug/kg	<25	<630	<630	<630	<630	<630
Chlorodibromomethane	-	ug/kg	<25	<630	<630	<630	<630	<630
Chloroethane	-	ug/kg	<50	<1300	<1300	<1300	<1300	<1300
Chloromethane	-	ug/kg	<50	<1300	<1300	<1300	<1300	<1300
Chloroform	6.0	ug/kg	<25	<630	<630	<630	<630	<630
1,1-Dichloroethane	-	ug/kg	<25	<630	<630	<630	<630	<630
1,2-Dichloroethane	0.5	ug/kg	<25	<630	<630	<630	<630	<630
1,1-Dichloroethene	0.7	ug/kg	<25	<630	<630	<630	<630	<630
cis-1,2-Dichloroethene	-	ug/kg	<25	<630	<630	<630	<630	<630
trans-1,2-Dichloroethene	-	ug/kg	<25	<630	<630	<630	<630	<630
1,2-Dichloropropane	-	ug/kg	<25	<630	<630	<630	<630	<630
cis-1,3-Dichloropropene	-	ug/kg	<25	<630	<630	<630	<630	<630
trans-1,3-Dichloropropene	-	ug/kg	<25	<630	<630	<630	<630	<630
Ethylbenzene	-	ug/kg	<25	<630	<630	<630	<630	<630
2-Hexanone	-	ug/kg	<250	<6300	<6300	<6300	<6300	<6300
Methylene Chloride	-	ug/kg	46	<630	<630	<630	<630	<630
4-Methyl-2-Pentanone (MIBK)	-	ug/kg	<250	<6300	<6300	<6300	<6300	<6300
Styrene	-	ug/kg	<25	<630	<630	<630	<630	<630
1,1,2,2-Tetrachloroethane	-	ug/kg	<25	<630	<630	<630	<630	<630
Tetrachloroethene	0.7	ug/kg	<25	<630	<630	<630	<630	<630
Toluene	-	ug/kg	<25	<630	<630	<630	<630	<630
1,1,1-Trichloroethane	-	ug/kg	<25	<630	<630	<630	<630	<630
1,1,2-Trichloroethane	-	ug/kg	<25	<630	<630	<630	<630	<630
Trichloroethene	0.5	ug/kg	<25	<630	<630	<630	<630	<630
Vinyl Chloride	0.2	ug/kg	<50	<1300	<1300	<1300	<1300	<1300
Xylenes (Total)	-	ug/kg	<25	<630	<630	<630	<630	<630

* Regulatory limit units may differ from measured value units.

(See footnotes for methodology on actual laboratory analytical reports attached in Appendix B)

TABLE 5-5
SUMMARY OF
ENVIRONMENTAL MONITORING
SOLID WASTE AND BY PRODUCT
LIFAC ASH

SAMPLE LOCATION : REACTOR BOTTOM ASH (4)

PARAMETERS	REGULATORY LIMIT (mg/l)* (if established)	UNITS	PARAMETRIC (9-23-93)	PARAMETRIC (9-24-93)	OPTIMIZATION (12-7-93)	OPTIMIZATION (12-8-93)
Alkalinity		mg/l CaCO3	2220	2440	1050	1850
pH		pH units	12.33	12.48	12.42	12.41
Sulfate		mg/l	850	950	1500	990
Percent Carbon		%	3.9	2.9	3.3	3.5
Total Metals:						
Arsenic (total)	5.0	mg/kg	–	25	32	23
TCLP Metals :						
Silver	5.0	mg/l	<0.10	<0.10	<0.10	<0.10
Arsenic	5.0	mg/l	<0.10	<0.10	<0.10	<0.10
Barium	100.0	mg/l	<10	<10	<10	<10
Cadmium	1.0	mg/l	<0.10	<0.10	<0.10	<0.10
Chromium	5.0	mg/l	<0.10	<0.10	<0.10	<0.10
Mercury	0.2	mg/l	<0.010	<0.010	<0.010	<0.010
Lead	5.0	mg/l	<0.10	<0.10	<0.10	<0.10
Selenium	1.0	mg/l	<0.10	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:						
Extraction Fluid			No.2	No.2	No.2	No.2
pH w/ Deionized Water		pH Units	11.65	11.60	12.46	12.52
pH after Addition of 1 Normal HCL		pH Units	11.09	10.65	11.23	11.88
pH of TCLP Extract		pH Units	12.02	12.11	12.02	6.74
Amount of Sample Extracted		g	100	100	100	100
TCLP Volatile Organic Analysis : (8260)						
Benzene	0.5	ug/l	<50	<50	<50	<50
2-Butanone	200.0	ug/l	<5000	<5000	<5000	<5000
Carbon Tetrachloride	0.5	ug/l	<50	<50	<50	<50
Chlorobenzene	100.0	ug/l	<1000	<1000	<1000	<1000
Chloroform	6.0	ug/l	<500	<500	<500	<500
1,2-Dichloroethane	0.5	ug/l	<50	<50	<50	<50
1,1-Dichloroethene	0.7	ug/l	<50	<50	<50	<50
Tetrachloroethene	0.7	ug/l	<50	<50	<50	<50
Trichloroethene	0.5	ug/l	<50	<50	<50	<50
Vinyl Chloride	0.2	ug/l	<50	<50	<50	<50
TCLP Base/Neutral Extractables : (8270)						
1,4-Dichlorobenzene	7.5	ug/l	<500	<500	<500	<500
2,4-Dinitrotoluene	0.13	ug/l	<50	<50	<50	<50
Hexachlorobutadiene	0.5	ug/l	<50	<50	<50	<50
Hexachlorobenzene	0.13	ug/l	<100	<100	<100	<100
Hexachloroethane	3.0	ug/l	<500	<500	<500	<500
Nitrobenzene	2.0	ug/l	<100	<100	<100	<100
Pyridine	5.0	ug/l	<500	<500	<500	<500

TABLE 5-5
SUMMARY OF
ENVIRONMENTAL MONITORING
SOLID WASTE AND BY PRODUCT
LIFAC ASH

SAMPLE LOCATION : REACTOR BOTTOM ASH (4)

PARAMETERS	REGULATORY LIMIT (mg/l)* (if established)	UNITS	PARAMETRIC (9-23-93)	PARAMETRIC (9-24-93)	OPTIMIZATION (12-7-93)	OPTIMIZATION (12-8-93)
TCLP Acid Extractables : (8270)						
Total Cresol	200.0	ug/l	<5000	<5000	<5000	<5000
Pentachlorophenol	100.0	ug/l	<5000	<5000	<5000	<5000
2,4,5-Trichlorophenol	400.0	ug/l	<5000	<5000	<5000	<5000
2,4,6-Trichlorophenol	2.0	ug/l	<100	<100	<100	<100
Acetone		ug/kg	<13000	<13000	<13000	<13000
Benzene	0.5	ug/kg	<630	<630	<630	<630
Bromodichloromethane		ug/kg	<630	<630	<630	<630
Bromoform		ug/kg	<630	<630	<630	<630
Bromomethane		ug/kg	<1300	<1300	<1300	<1300
2-Butanone	200.0	ug/kg	<13000	<13000	<13000	<13000
Carbon Disulfide		ug/kg	<630	<630	<630	<630
Carbon Tetrachloride	0.5	ug/kg	<630	<630	<630	<630
Chlorobenzene	100.0	ug/kg	<630	<630	<630	<630
Chlorodibromomethane		ug/kg	<630	<630	<630	<630
Chloroethane		ug/kg	<1300	<1300	<1300	<1300
Chloromethane		ug/kg	<1300	<1300	<1300	<1300
Chloroform	6.0	ug/kg	<630	<630	<630	<630
1,1-Dichloroethane		ug/kg	<630	<630	<630	<630
1,2-Dichloroethane	0.5	ug/kg	<630	<630	<630	<630
1,1-Dichloroethene	0.7	ug/kg	<630	<630	<630	<630
cis-1,2-Dichloroethene		ug/kg	<630	<630	<630	<630
trans-1,2-Dichloroethene		ug/kg	<630	<630	<630	<630
1,2-Dichloropropane		ug/kg	<630	<630	<630	<630
cis-1,3-Dichloropropene		ug/kg	<630	<630	<630	<630
trans-1,3-Dichloropropene		ug/kg	<630	<630	<630	<630
Ethylbenzene		ug/kg	<630	<630	<630	<630
2-Hexanone		ug/kg	<6300	<6300	<6300	<6300
Methylene Chloride		ug/kg	<630	<630	<630	<630
4-Methyl-2-Pentanone (MIBK)		ug/kg	<6300	<6300	<6300	<6300
Styrene		ug/kg	<630	<630	<630	<630
1,1,2,2-Tetrachloroethane		ug/kg	<630	<630	<630	<630
Tetrachloroethene	0.7	ug/kg	<630	<630	<630	<630
Toluene		ug/kg	<630	<630	<630	<630
1,1,1-Trichloroethane		ug/kg	<630	<630	<630	<630
1,1,2-Trichloroethane		ug/kg	<630	<630	<630	<630
Trichloroethene	0.5	ug/kg	<630	<630	<630	<630
Vinyl Chloride	0.2	ug/kg	<1300	<1300	<1300	<1300
Xylenes (Total)		ug/kg	<630	<630	<630	<630

TABLE 5-6
SUMMARY OF
ENVIRONMENTAL MONITORING
SOLID WASTE AND BY PRODUCT
ESP INLET HOPPER

what are these #'s

SAMPLE LOCATION : ESP INLET HOPPERS #7 & #8 (5A)

PARAMETERS	REGULATORY LIMIT (mg/l)* (if established)	UNITS	BASELINE (9-2-92)	BASELINE (9-22-93)	PARAMETRIC (9-23-93)	PARAMETRIC (9-24-93) (5A-1)	PARAMETRIC (9-24-93) (5A-2)	OPTIMIZATION (12-7-93)	OPTIMIZATION (12-8-93)
Alkalinity	–	mg/l CaCO3	299	2070	2920	3060	2780	2250	2400
pH	–	pH units	11.60	12.65	12.51	12.44	12.50	12.42	12.60
Sulfate	–	mg/l	260	810.0	1400	1200	1100	1700	1600
Percent Carbon	–	%	–	3.6	3.3	2.6	2.3	3.3	3.1
Total Metals:									
Arsenic (Total)	5.0	mg/kg	–	340	–	69	36	60	50
TCLP Metals :									
Silver	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	5.0	mg/l	1.3	0.14	<0.10	<0.10	<0.10	<0.10	<0.10
Barium	100.0	mg/l	<10	<10	<10	<10	<10	<10	<10
Cadmium	1.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Mercury	0.2	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Selenium	1.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:									
Extraction Fluid	–		No.1	No.2	No.2	No.2	No.2	No.2	No.2
pH w/ Deionized Water	–	pH Units	11.50	11.18	11.74	11.76	11.76	12.61	12.71
pH after Addition of 1 Normal HCL	–	pH Units	1.90	10.39	11.60	11.37	11.59	11.48	12.20
pH of TCLP Extract	–	pH Units	5.20	6.31	12.44	12.55	12.45	12.36	12.66
Amount of Sample Extracted	–	g	100	100	100	100	100	100	100
TCLP Volatile Organic Analysis : (8260)									
Benzene	0.5	ug/l	<50	<50	<50	<50	<50	<50	<50
2-Butanone	200.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000	<5000
Carbon Tetrachloride	0.5	ug/l	<50	<50	<50	<50	<50	<50	<50
Chlorobenzene	100.0	ug/l	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Chloroform	6.0	ug/l	<500	<500	<500	<500	<500	<500	<500
1,2-Dichloroethane	0.5	ug/l	<50	<50	<50	<50	<50	<50	<50
1,1-Dichloroethene	0.7	ug/l	<50	<50	<50	<50	<50	<50	<50
Tetrachloroethene	0.7	ug/l	<50	<50	<50	<50	<50	<50	<50
Trichloroethene	0.5	ug/l	<50	<50	<50	<50	<50	<50	<50
Vinyl Chloride	0.2	ug/l	<50	<50	<50	<50	<50	<50	<50
TCLP Base/Neutral Extractables : (8270)									
1,4-Dichlorobenzene	7.5	ug/l	<500	<500	<500	<500	<500	<500	<500
2,4-Dinitrotoluene	0.13	ug/l	<50	<50	<50	<50	<50	<50	<50
Hexachlorobutadiene	0.5	ug/l	<50	<50	<50	<50	<50	<50	<50
Hexachlorobenzene	0.13	ug/l	<100	<100	<100	<100	<100	<100	<100
Hexachloroethane	3.0	ug/l	<500	<500	<500	<500	<500	<500	<500
Nitrobenzene	2.0	ug/l	<100	<100	<100	<100	<100	<100	<100
Pyridine	5.0	ug/l	<500	<500	<500	<500	<500	<500	<500

TABLE 5-6 (Continued)
SUMMARY OF
ENVIRONMENTAL MONITORING
SOLID WASTE AND BY PRODUCT
ESP INLET HOPPER

SAMPLE LOCATION : ESP INLET HOPPERS #7 & #8 (5A)

PARAMETERS	REGULATORY LIMIT (mg/l)* (if established)	UNITS	BASELINE (9-2-92)	BASELINE (9-22-93)	PARAMETRIC (9-23-93)	PARAMETRIC (9-24-93)	PARAMETRIC (9-24-93)	OPTIMIZATION (12-7-93)	OPTIMIZATION (12-8-93)
TCLP Acid Extractables : (8270)									
Total Cresol	200.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000	<5000
Pentachlorophenol	100.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000	<5000
2,4,5-Trichlorophenol	400.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000	<5000
2,4,6-Trichlorophenol	2.0	ug/l	<100	<100	<100	<100	<100	<100	<100
Acetone	–	ug/kg	<13000	<13000	<13000	<13000	<13000	<13000	<13000
Benzene	0.5	ug/kg	<630	<630	<630	<630	<630	<630	<630
Bromodichloromethane	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
Bromoform	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
Bromomethane	–	ug/kg	<1300	<1300	<1300	<1300	<1300	<1300	<1300
2-Butanone	200.0	ug/kg	<13000	<13000	<13000	<13000	<13000	<13000	<13000
Carbon Disulfide	–	ug/kg	730	<630	<630	<630	<630	<630	<630
Carbon Tetrachloride	0.5	ug/kg	<630	<630	<630	<630	<630	<630	<630
Chlorobenzene	100.0	ug/kg	<630	<630	<630	<630	<630	<630	<630
Chlorodibromomethane	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
Chloroethane	–	ug/kg	<1300	<1300	<1300	<1300	<1300	<1300	<1300
Chloromethane	–	ug/kg	<1300	<1300	<1300	<1300	<1300	<1300	<1300
Chloroform	6.0	ug/kg	<630	<630	<630	<630	<630	<630	<630
1,1-Dichloroethane	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
1,2-Dichloroethane	0.5	ug/kg	<630	<630	<630	<630	<630	<630	<630
1,1-Dichloroethene	0.7	ug/kg	<630	<630	<630	<630	<630	<630	<630
cis-1,2-Dichloroethene	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
trans-1,2-Dichloroethene	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
1,2-Dichloropropane	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
cis-1,3-Dichloropropene	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
trans-1,3-Dichloropropene	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
Ethylbenzene	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
2-Hexanone	–	ug/kg	<6300	<6300	<6300	<6300	<6300	<6300	<6300
Methylene Chloride	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
4-Methyl-2-Pentanone (MIBK)	–	ug/kg	<6300	<6300	<6300	<6300	<6300	<6300	<6300
Styrene	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
1,1,2,2-Tetrachloroethane	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
Tetrachloroethene	0.7	ug/kg	<630	<630	<630	<630	<630	<630	<630
Toluene	–	ug/kg	2200	<630	<630	<630	<630	<630	<630
1,1,1-Trichloroethane	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
1,1,2-Trichloroethane	–	ug/kg	<630	<630	<630	<630	<630	<630	<630
Trichloroethene	0.5	ug/kg	<630	<630	<630	<630	<630	<630	<630
Vinyl Chloride	0.2	ug/kg	<1300	<1300	<1300	<1300	<1300	<1300	<1300
Xylenes (Total)	–	ug/kg	<630	<630	<630	<630	<630	<630	<630

* Regulatory limit units may differ from measured value units.

(See footnotes for methodology on actual laboratory analytical reports attached in Appendix B)

TABLE 5-7
SUMMARY OF
ENVIRONMENTAL MONITORING
SOLID WASTE AND BY PRODUCT
ESP OUTLET HOPPER ASH

what are these numbers

SAMPLE LOCATION : ESP OUTLET HOPPERS #5 & #6 (5B)

PARAMETERS	REGULATORY LIMIT (mg/l)* (if established)	UNITS	PARAMETRIC (9-23-93)	PARAMETRIC (9-24-93)	OPTIMIZATION (12-7-93)	OPTIMIZATION (12-8-93)
Alkalinity	–	mg/l CaCO3	2840	2990	2560	2400
pH	–	pH units	12.47	12.46	12.52	12.52
Sulfate	–	mg/l	1700	1200	1600	1600
Percent Carbon	–	%	NA**	4.1	2.7	2.8
Total Metals:						
Arsenic (total)	5.0	mg/kg	–	95	67	68
TCLP Metals :						
Silver	5.0	mg/l	<0.10	<0.10	<0.10	<0.10
Arsenic	5.0	mg/l	<0.10	<0.10	<0.10	<0.10
Barium	100.0	mg/l	<10	<10	<10	<10
Cadmium	1.0	mg/l	<0.10	<0.10	<0.10	<0.10
Chromium	5.0	mg/l	1.1	<0.10	<0.10	<0.10
Mercury	0.2	mg/l	<0.010	<0.010	<0.010	<0.010
Lead	5.0	mg/l	<0.10	<0.10	<0.10	<0.10
Selenium	1.0	mg/l	<0.10	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:						
Extraction Fluid			No.2	No.2	No.2	No.2
pH w/ Deionized Water	–	pH Units	12.17	11.69	12.69	12.69
pH after Addition of 1 Normal HCL	–	pH Units	12.05	11.51	12.03	12.14
pH of TCLP Extract*	–	pH Units	12.02	12.51	12.13	12.66
Amount of Sample Extracted	–	g	50.0	100	100	100
TCLP Volatile Organic Analysis : (8260) (3)						
Benzene	0.5	ug/l	<50	<50	<50	<50
2-Butanone	200.0	ug/l	<5000	<5000	<5000	<5000
Carbon Tetrachloride	0.5	ug/l	<50	<50	<50	<50
Chlorobenzene	100.0	ug/l	<1000	<1000	<1000	<1000
Chloroform	6.0	ug/l	<500	<500	<500	<500
1,2-Dichloroethane	0.5	ug/l	<50	<50	<50	<50
1,1-Dichloroethene	0.7	ug/l	<50	<50	<50	<50
Tetrachloroethene	0.7	ug/l	<50	<50	<50	<50
Trichloroethene	0.5	ug/l	<50	<50	<50	<50
Vinyl Chloride	0.2	ug/l	<50	<50	<50	<50
TCLP Base/Neutral Extractables : (8270) (3)						
1,4-Dichlorobenzene	7.5	ug/l	<500	<500	<500	<500
2,4-Dinitrotoluene	0.13	ug/l	<50	<50	<50	<50
Hexachlorobutadiene	0.5	ug/l	<50	<50	<50	<50
Hexachlorobenzene	0.13	ug/l	<100	<100	<100	<100
Hexachloroethane	3.0	ug/l	<500	<500	<500	<500
Nitrobenzene	2.0	ug/l	<100	<100	<100	<100
Pyridine	5.0	ug/l	<500	<500	<500	<500

TABLE 5-7 (Continued)
SUMMARY OF
ENVIRONMENTAL MONITORING
SOLID WASTE AND BY PRODUCT
ESP OUTLET HOPPER ASH

SAMPLE LOCATION : ESP OUTLET HOPPERS #5 & #6 (5B)

PARAMETERS	REGULATORY LIMIT (mg/l)* (if established)	UNITS	PARAMETRIC (9-23-93)	PARAMETRIC (9-24-93)	OPTIMIZATION (12-7-93)	OPTIMIZATION (12-8-93)
TCLP Acid Extractables : (8270) (3)						
Total Cresol	200.0	ug/l	<5000	<5000	<5000	<5000
Pentachlorophenol	100.0	ug/l	<5000	<5000	<5000	<5000
2,4,5-Trichlorophenol	400.0	ug/l	<5000	<5000	<5000	<5000
2,4,6-Trichlorophenol	2.0	ug/l	<100	<100	<100	<100
Acetone	–	ug/kg	<500	<13000	<13000	<13000
Benzene	0.5	ug/kg	<25	<630	<630	<630
Bromodichloromethane	–	ug/kg	<25	<630	<630	<630
Bromoform	–	ug/kg	<25	<630	<630	<630
Bromomethane	–	ug/kg	<50	<1300	<1300	<1300
2-Butanone	200.0	ug/kg	<500	<13000	<13000	<13000
Carbon Disulfide	–	ug/kg	<25	<630	<630	<630
Carbon Tetrachloride	0.5	ug/kg	<25	<630	<630	<630
Chlorobenzene	100.0	ug/kg	<25	<630	<630	<630
Chlorodibromomethane	–	ug/kg	<25	<630	<630	<630
Chloroethane	–	ug/kg	<50	<1300	<1300	<1300
Chloromethane	–	ug/kg	<50	<1300	<1300	<1300
Chloroform	6.0	ug/kg	<25	<630	<630	<630
1,1-Dichloroethane	–	ug/kg	<25	<630	<630	<630
1,2-Dichloroethane	0.5	ug/kg	<25	<630	<630	<630
1,1-Dichloroethene	0.7	ug/kg	<25	<630	<630	<630
cis-1,2-Dichloroethene	–	ug/kg	<25	<630	<630	<630
trans-1,2-Dichloroethene	–	ug/kg	<25	<630	<630	<630
1,2-Dichloropropane	–	ug/kg	<25	<630	<630	<630
cis-1,3-Dichloropropene	–	ug/kg	<25	<630	<630	<630
trans-1,3-Dichloropropene	–	ug/kg	<25	<630	<630	<630
Ethylbenzene	–	ug/kg	<25	<630	<630	<630
2-Hexanone	–	ug/kg	<250	<6300	<6300	<6300
Methylene Chloride	–	ug/kg	900	<630	<630	<630
4-Methyl-2-Pentanone (MIBK)	–	ug/kg	<250	<6300	<6300	<6300
Styrene	–	ug/kg	<25	<630	<630	<630
1,1,2,2-Tetrachloroethane	–	ug/kg	<25	<630	<630	<630
Tetrachloroethene	0.7	ug/kg	<25	<630	<630	<630
Toluene	–	ug/kg	40	<630	<630	<630
1,1,1-Trichloroethane	–	ug/kg	<25	<630	<630	<630
1,1,2-Trichloroethane	–	ug/kg	<25	<630	<630	<630
Trichloroethene	0.5	ug/kg	<25	<630	<630	<630
Vinyl Chloride	0.2	ug/kg	<50	<1300	<1300	<1300
Xylenes (Total)	–	ug/kg	<25	<630	<630	<630

* Regulatory limit units may differ from measured value units.
** Not Analyzed (Insufficient amount of sample)

(See footnotes for methodology on actual laboratory analytical reports attached in Appendix B)

TABLE 5-8
SUMMARY OF
ENVIRONMENTAL MONITORING
SOLID WASTE AND BY PRODUCT
BOILER BOTTOM ASH (SOLID)

SAMPLE LOCATION : BOILER BOTTOM ASH BIN (6B)

PARAMETERS	REGULATORY LIMIT (mg/l)* (if established)	UNITS	BASELINE (9-22-93)	PARAMETRIC (9-23-93) 6B-1	(9-23-93) 6B-2	(9-24-93)	OPTIMIZATION (12-7-93)	(12-8-93)
Alkalinity	–	mg/l CaCO3	17	20	51	123	87	168
pH	–	pH units	8.57	10.47	10.98	11.14	11.21	11.86
Sulfate	–	mg/l	8.6	49	80	240	110	920
Percent Carbon	–	%	2.5	0.54	0.32	1.5	0.5	1.1
Total Metals:								
Arsenic (total)	5.0	mg/kg	10	–	–	9.6	5.4	8.7
TCLP (5) Metals :								
Silver	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Barium	100.0	mg/l	<10	<10	<10	<10	<10	<10
Cadmium	1.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Mercury	0.2	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	5.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Selenium	1.0	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:								
Extraction Fluid			No.1	No.1	No.1	No.1	No.1	No.2
pH w/ Deionized Water	–	pH Units	9.70	10.00	9.57	9.48	10.61	11.16
pH after Addition of 1 Normal HCL	–	pH Units	2.93	1.62	1.68	2.02	1.35	8.69
pH of TCLP Extract	–	pH Units	5.21	4.97	3.76	5.69	5.02	4.78
Amount of Sample Extracted	–	g	100	100	100	100	100	100
TCLP Volatile Organic Analysis : (8260)								
Benzene	0.5	ug/l	<50	<50	<50	<50	<50	<50
2-Butanone	200.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000
Carbon Tetrachloride	0.5	ug/l	<50	<50	<50	<50	<50	<50
Chlorobenzene	100.0	ug/l	<1000	<1000	<1000	<1000	<1000	<1000
Chloroform	6.0	ug/l	<500	<500	<500	<500	<500	<500
1,2-Dichloroethane	0.5	ug/l	<50	<50	<50	<50	<50	<50
1,1-Dichloroethene	0.7	ug/l	<50	<50	<50	<50	<50	<50
Tetrachloroethene	0.7	ug/l	<50	<50	<50	<50	<50	<50
Trichloroethene	0.5	ug/l	<50	<50	<50	<50	<50	<50
Vinyl Chloride	0.2	ug/l	<50	<50	<50	<50	<50	<50
TCLP Base/Neutral Extractables : (8270)								
1,4-Dichlorobenzene	7.5	ug/l	<500	<500	<500	<500	<500	<500
2,4-Dinitrotoluene	0.13	ug/l	<50	<50	<50	<50	<50	<50
Hexachlorobutadiene	0.5	ug/l	<50	<50	<50	<50	<50	<50
Hexachlorobenzene	0.13	ug/l	<100	<100	<100	<100	<100	<100
Hexachloroethane	3.0	ug/l	<500	<500	<500	<500	<500	<500
Nitrobenzene	2.0	ug/l	<100	<100	<100	<100	<100	<100
Pyridine	5.0	ug/l	<500	<500	<500	<500	<500	<500

TABLE 5-8 (Continued)
SUMMARY OF
ENVIRONMENTAL MONITORING
SOLID WASTE AND BY PRODUCT
BOILER BOTTOM ASH (SOLID)

SAMPLE LOCATION : BOILER BOTTOM ASH BIN (6B)

PARAMETERS	REGULATORY LIMIT (mg/l)*	UNITS	BASELINE (9-22-93)	PARAMETRIC (9-23-93) 6B-1	(9-23-93) 6B-2	(9-24-93)	OPTIMIZATION (12-7-93)	(12-8-93)
TCLP Acid Extractables : (8270)								
Total Cresol	200.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000
Pentachlorophenol	100.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000
2,4,5-Trichlorophenol	400.0	ug/l	<5000	<5000	<5000	<5000	<5000	<5000
2,4,6-Trichlorophenol	2.0	ug/l	<100	<100	<100	<100	<100	<100
Acetone	-	ug/kg	<100	<100	<100	<13000	<100	<13000
Benzene	0.5	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Bromodichloromethane	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Bromoform	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Bromomethane	-	ug/kg	<10	<10	<10	<1300	<10	<1300
2-Butanone	200.0	ug/kg	<100	<100	<100	<13000	<100	<13000
Carbon Disulfide	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Carbon Tetrachloride	0.5	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Chlorobenzene	100.0	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Chlorodibromomethane	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Chloroethane	-	ug/kg	<10	<10	<10	<1300	<10	<1300
Chloromethane	-	ug/kg	<10	<10	<10	<1300	<10	<1300
Chloroform	6.0	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
1,1-Dichloroethane	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
1,2-Dichloroethane	0.5	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
1,1-Dichloroethene	0.7	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
cis-1,2-Dichloroethene	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
trans-1,2-Dichloroethene	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
1,2-Dichloropropane	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
cis-1,3-Dichloropropene	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
trans-1,3-Dichloropropene	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Ethylbenzene	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
2-Hexanone	-	ug/kg	<50	<50	<50	<6300	<50	<6300
Methylene Chloride	-	ug/kg	<5.0	8.0	<5.0	<630	13	<630
4-Methyl-2-Pentanone (MIBK)	-	ug/kg	<50	<50	<50	<6300	<50	<6300
Styrene	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
1,1,2,2-Tetrachloroethane	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Tetrachloroethene	0.7	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Toluene	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
1,1,1-Trichloroethane	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
1,1,2-Trichloroethane	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Trichloroethene	0.5	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630
Vinyl Chloride	0.2	ug/kg	<10	<10	<10	<1300	<10	<1300
Xylenes (Total)	-	ug/kg	<5.0	<5.0	<5.0	<630	<5.0	<630

* Regulatory limit units may differ from measured value units.

(See footnotes for methodology on actual laboratory analytical reports attached in Appendix B)

TABLE 5–9
SUMMARY OF
ENVIRONMENTAL MONITORING
BOILER BOTTOM ASH (AQUEOUS)

SAMPLE LOCATION : BOILER BOTTOM ASH (AQUEOUS) (6A)

why no baseline ?

PARAMETERS	LIMITS (RP&L's NPDES Permit)	BASELINE (9–2–92)	PARAMETRIC (9–23–93) 6A–1	(9–23–93) 6A–2	(9–24–93)	OPTIMIZATION (12–7–93)	(12–8–93)
FLOW	REPORT	–	–	–	–	–	–
TSS (mg/l)	70	–	17	1	9	30	38
OIL & GREASE (mg/l)	15	–	<1.0	<1.0	<1.0	<1.0	<1.0
TOT. RESID. OXIDANTS (mg/l)	0.02	–	<1.0	<1.0	<.10	<1.0	<1.0
TEMPERATURE (F)	REPORT	–	–	–	–	–	–
AMMONIA (NH3) (mg/l)	1.8 (summer) 2.6 (winter)	–	0.11	0.13	0.15	<0.10	0.37
COPPER (mg/l)	0.05	–	0.014	<0.010	0.011	<0.010	0.012
LEAD (mg/l)	0.02	–	<0.10	<0.10	<0.10	<0.10	<0.10
ZINC (mg/l)	0.46	–	0.026	0.023	<0.005	0.011	0.020
ALUMINUM (mg/l)	0.40	–	0.59	0.60	0.25	0.46	0.53
IRON (mg/l)	REPORT	–	0.20	0.18	0.061	0.16	0.11
PCBS (mg/l)	REPORT	–	<1.0	<1.0	<1.0	<1.0	<1.0
ALKALINITY (mg CaCO3)	(per EMP)	111	182	200	65	31.1	40

(See footnotes for methodology on actual laboratory analytical reports attached in Appendix B)

TABLE 5–10
SUMMARY OF
ENVIRONMENTAL MONITORING
RP&L's NPDES DISCHARGE AND FEEDWATER

		RP&L MONTHLY MONITORING (1993)*						FEEDWATER SAMPLE LOCATION (Z)				
PARAMETERS	LIMITS	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	(9–22–93)	(9–23–93)	(9–24–93)	(12–7–93)	(12–8–93)
FLOW	REPORT	–	–	–	–	–	–	–	–	–	–	–
TSS (mg/l)	70	17.9	20.4	19.1	13.1	19.5	15.4	2	73	<1	<1	9
OIL & GREASE (mg/l)	15	<1.0	<1.0	<1.1	<2.72	<1.82	<1.34	1.0	1.8	<1.0	<1.0	<1.0
TOT. RESID. OXIDANTS (mg/l)	0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<1.0	0.12	<1.0	<1.0
TEMPERATURE (F)	REPORT	88.2	85.2	77.1	64.7	61.2	61.3	–	–	–	–	–
AMMONIA (NH3) (mg/l)	1.8 (SUM) 2.6 (WIN)	0.16	0.09	0.110	0.18	0.03	0.062	<0.10	0.14	0.14	<0.10	<0.10
COPPER (mg/l)	0.05	0.033	0.038	0.057	0.046	0.064	0.020	0.035	<0.01	0.013	<0.010	<0.010
LEAD (mg/l)	0.02	0.007	0.007	0.006	0.006	0.004	0.002	<0.10	<0.10	<0.10	<0.10	<0.10
ZINC (mg/l)	0.46	0.053	0.046	0.054	0.071	0.098	0.040	0.035	0.026	0.023	0.024	0.019
ALUMINUM (mg/l)	0.40	1.094	1.045	1.066	0.824	0.528	0.880	0.63	0.31	0.29	0.36	0.82
IRON (mg/l)	REPORT	1.281	0.612	0.936	1.040	1.747	0.280	0.056	0.20	0.099	0.057	0.73
pH (pH units)	6.0 MIN/9.0 MAX	7.5	7.5	7.7	7.4	7.7	7.8	–	–	–	–	–
PCBS (mg/l)	(EMP)	–	–	–	–	–	–	<1.0	<1.0	<1.0	<1.0	<1.0
ALKALINITY (mg CaCO3)	(EMP)	–	–	–	–	–	–	232	61	205	262	248

exceeds limits

* RP&L monthly monitoring reports attached in Appendix E.

(See footnotes for methodology on actual laboratory analytical reports attached in Appendix B)

exceeds limit

6.0 REFERENCES

1. Baseline Environmental Monitoring Report - LIFAC Sorbent Injection Desulfurization Demonstration Project presented to the U.S. Department of Energy dated October 13, 1993.

APPENDIX A

PARTICULATE MATTER TEST DATA

LIFAC NA DEMONSTRATION PROJECT
RICHMOND POWER AND LIGHT
WHITEWATER VALLEY GENERATING UNIT #2

PARAMETRIC AND OPTIMIZATION TESTS
ENVIRONMENTAL MONITORING REPORT

ICF KAISER ENGINEERS, INC.
PITTSBURGH, PENNSYLVANIA

TABLE 4-1

RICHMOND POWER AND LIGHT
RICHMOND, IN
WHITEWATER VALLEY GENERATING STATION UNIT #2

PARTICULATE MATTER TEST DATA: SEPTEMBER 23, 1993
WITHOUT RECYCLE

	Test Run Test Date Test ID Number Units	1 9/23/93 1M5	2 9/23/93 2M5	3[5] 9/23/93 3M5	Average
Process Conditions[1]					
Power Generation	(MW)	60.4	62.5	64	62.3
Coal Feed Rate	(lb/hr)	56160	60660	59760	58860
Heat Input	(MBtu/hr)	638.6	687.6	668.7	665.0
Particulate Matter Loadings					
Concentration	(gr/dscf)	0.0412	0.0382	0.0481	0.0425
Mass Flow Rate	(lb/hr)	55.70	48.79	61.58	55.36
Mass Emission/Heat Input[2]	(lb/MBtu)	0.087	0.071	0.097	0.085
Mass Emission/Heat Input[3]	(lb/MBtu)	0.072	0.067	0.083	0.074
Duct Conditions					
Average Flow Rate	(acfm)	244565	232521	232780	236622
Dry Standard Flow Rate	(dscfm)	157819	148929	149520	152089
Temperature	(°F)	225	225	226	225
Percent Moisture	(%)	13.0	13.6	13.2	13.2
Percent O_2[4]	(%)	4.2	4.2	4.0	4.1
Percent CO_2[4]	(%)	14.0	14.0	14.0	14.0
Sampling Conditions					
Test Clock Times		9:10 to 10:20	11:00 to 12:06	12:55 to 14:16	
Sampling Time	(minutes)	60	60	60	
Sampling Volume	(dscf)	41.031	38.046	38.663	
Isokinetics	(%)	106	104	105	

Notes:
[1] Only Unit #2 was operating for testing
[2] Based on measured coal feed rates and heating values.
[3] Based on EPA Method 19 (F factor method).
[4] Percent O_2 and CO_2 are collected as grab sample and analyzed with a Fyrite gas analyzer
[5] Soot blow during sampling period.

TABLE 4-2

RICHMOND POWER AND LIGHT
RICHMOND, IN
WHITEWATER VALLEY GENERATING STATION UNIT #2

PARTICULATE MATTER TEST DATA: SEPTEMBER 24, 1993
WITH RECYCLE

	Test Run Test Date Test ID Number Units	1 9/24/93 1M5	2[5] 9/24/93 2M5	3 9/24/93 3M5	Average
Process Conditions[1]					
Power Generation	(MW)	59.9	61.2	60.6	60.6
Coal Feed Rate	(lb/hr)	57,780	57,480	56,520	54,360
Heat Input	(MBtu/hr)	653.7	644.5	642.8	614.2
Particulate Matter Loadings					
Concentration	(gr/dscf)	0.0494	0.0936	0.0587	0.0672
Mass Flow Rate	(lb/hr)	62.27	118.77	73.45	84.83
Mass Emission/Heat Input[2]	(lb/MBtu)	0.095	0.184	0.114	0.131
Mass Emission/Heat Input[3]	(lb/MBtu)	0.100	0.197	0.123	0.140
Duct Conditions					
Average Flow Rate	(acfm)	228,832	228,780	230,100	229,237
Dry Standard Flow Rate	(dscfm)	147,184	147,996	146,078	147,086
Temperature	(°F)	223	225	226	225
Percent Moisture	(%)	14.0	13.3	14.8	14.0
Percent O_2[4]	(%)	6.5	7.0	7.0	6.8
Percent CO_2[4]	(%)	12.5	13.0	13.5	13.0
Sampling Conditions					
Test Clock Times		8:10 to 9:18	9:50 to 10:57	12:00 to 13:54	
Sampling Time	(minutes)	60	60	60	
Sampling Volume	(dscf)	37.624	38.538	37.601	
Isokinetics	(%)	104	106	104	

Notes: [1] Only Unit #2 was operating for testing
[2] Based on measured coal feed rates and heating values.
[3] Based on EPA Method 19 (F factor method).
[4] Percent O_2 and CO_2 are collected as grab sample and analyzed with a Fyrite gas analyzer
[5] Soot blow during sampling period.

TABLE 4-3

RICHMOND POWER AND LIGHT
RICHMOND, IN
WHITEWATER VALLEY GENERATING STATION UNIT #2

OPACITY MEASUREMENTS: SEPTEMBER 23 AND 24, 1993

9/23/93

Test Run	Maximum[1] Opacity (%)	Average[2] Opacity (%)
1	15	12.4
2	13	11.5
3	18	13.8

9/24/93

Test Run	Maximum Opacity (%)	Average Opacity (%)
1	15	11.5
2	13	11.5
3	18	13.3

Notes: [1] Highest 6 minute reading during test period.
[2] Average of all six minute readings during test periods.

LIFAC NA RICHMOND POWER AND LIGHT
AIR EMISSIONS TESTING
TEST DATES: 9/23&24/93
PROJECT NO.: 91001-002-33

DETERMINATION OF FURNACE HEAT INPUT AND ACTUAL PARTICULATE MATTER MASS EMISSIONS PER HEAT INPUT

TEST DATE	TEST TIME	COAL ANALYSIS SAMPLE ID #	COAL HEATING VALUE AS REC'D (BTU/lb)	COAL FEED RATE (lb/min)	COAL FEED RATE (lb/hr)	HEAT INPUT (MMBTU/hr)	PARTICULATE MATTER EMISSION RATE (lb/hr)	ACTUAL PM MASS EMISSIONS PER HEAT INPUT (lb/MMBTU)
9-23-93	9:10-10:25	Coal Feeder Test #1	11,371	936	56,160	638.6	55.703	0.0872
9-23-93	11:00-12:10	Coal Feeder Test #2	11,335	1,011	60,660	687.6	48.794	0.0710
9-23-93	12:55-14:10	Coal Feeder Test #3	11,189	996	59,760	668.7	64.581	0.0966
Average			11,298		58,860	664.9	56.359	0.0849
9-24-93	8:10-9:20	Coal Feeder Test #1	11,314	963	57,780	653.7	62.268	0.0953
9-24-93	9:50-10:57	Coal Feeder Test #2	11,213	958	57,480	644.5	118.774	0.1843
9-24-93	12:40-13:52	Coal Feeder Test #3	11,373	942	56,520	642.8	73.449	0.1143
Average			11,300		57,260	647.0	84.830	0.1313

LIFAC NA RICHMOND POWER AND LIGHT
AIR EMISSIONS TESTING
TEST DATES: 9/23&24/93
PROJECT NO.: 91001-002-33

DETERMINATION OF MASS EMISSIONS PER HEAT INPUT BASED ON EPA METHOD 19, 40 CFR 60

E = Cd * Fd * (20.9/(20.9-%O2d))

where:
E = Mass Emissions per Heat Input, lb/MMBTU
Cd = Particulate matter concentration, lb/dscf
Fd = F Factor (dry basis) for bituminous coal, 9780 dscf/MMBTU
20.9 = percent of oxygen in ambient air
%O2d = Percent oxygen by volume (dry basis)

TEST DATE	TEST TIME	Cd (gr/dscf)	Cd (lb/dscf)	Fd (dscf/MMBTU)	%O2d (%)	E (lb/MMBTU)
9-23-93	9:10-10:25	0.0412	5.89E-06	9,780	4.2	0.0720
9-23-93	11:00-12:10	0.0382	5.46E-06	9,780	4.2	0.0668
9-23-93	12:55-14:10	0.0481	6.87E-06	9,780	4.0	0.0831
Average						0.0740
9-24-93	8:10-9:20	0.0494	7.06E-06	9,780	6.5	0.1002
9-24-93	9:50-10:57	0.0936	1.34E-05	9,780	7.0	0.1970
9-24-93	12:40-13:52	0.0587	8.39E-06	9,780	7.0	0.1233
Average						0.1402

TABLE 4-1

RICHMOND POWER AND LIGHT
RICHMOND, IN
WHITEWATER VALLEY GENERATING STATION UNIT #2

PARTICULATE MATTER TEST DATA: DECEMBER 7, 1993
WITH RECYCLE

	Test Run Test Date Units	1 12/7/93	2[5] 12/7/93	3 12/7/93	Average
Process Conditions[1]					
Power Generation	(MW)	59	66.2	64.8	63.3
Coal Feed Rate	(lb/hr)	55620	61380	53400	56800
Heat Input	(MBtu/hr)	631.6	697.7	605.2	644.9
Particulate Matter Loadings					
Concentration	(gr/dscf)	0.1262	0.1739	0.1003	0.1335
Mass Flow Rate	(lb/hr)	179.6	252.2	147.4	193.1
Mass Emission/Heat Input[2]	(lb/MBtu)	0.284	0.358	0.244	0.295 (0.292)[6]
Mass Emission/Heat Input[3]	(lb/MBtu)	0.246	0.334	0.191	0.257 (0.253)[6]
Duct Conditions					
Average Flow Rate	(acfm)	258300	264900	269400	264200
Dry Standard Flow Rate	(dscfm)	166000	169300	171500	168900
Temperature	(°F)	249	252	250	250
Percent Moisture	(%)	12.2	12.3	12.9	12.5
Percent O_2[4]	(%)	5.9	5.7	5.6	5.7
Percent CO_2[4]	(%)	13.3	13.3	13.4	13.3
Sampling Conditions					
Test Clock Times		9:30 to 10:44	12:05 to 13:17	14:20 to 15:36	
Sampling Time	(minutes)	64	64	64	
Sampling Volume	(dscf)	41.639	42.324	42.519	
Isokinetics	(%)	103	103	102	

Notes:
[1] Only Unit #2 was operating for testing
[2] Based on measured coal feed rates and heating values.
[3] Based on EPA Method 19 (F factor method).
[4] Percent O_2 and CO_2 are collected as grab sample and analyzed with a Orsat gas analyzer
[5] Soot blow during sampling period.
[6] Numbers in parentheses indicate correction for soot blowing.

TABLE 4-2

RICHMOND POWER AND LIGHT
RICHMOND, IN
WHITEWATER VALLEY GENERATING STATION UNIT #2

PARTICULATE MATTER TEST DATA: DECEMBER 8, 1993
WITHOUT RECYCLE

	Test Run Test Date Units	1 12/8/93	2[5] 12/8/93	3 12/8/93	Average
Process Conditions[1]					
Power Generation	(MW)	58.4	58.6	58.5	58.5
Coal Feed Rate	(lb/hr)	54720	51240	54240	53400
Heat Input	(MBtu/hr)	625.5	582.8	620.5	609.6
Particulate Matter Loadings					
Concentration	(gr/dscf)	0.1055	0.1662	0.0610	0.1109
Mass Flow Rate	(lb/hr)	148.3	233.0	85.4	155.6
Mass Emission/Heat Input[2]	(lb/MBtu)	0.237	0.374	0.138	0.250 (0.246)[6]
Mass Emission/Heat Input[3]	(lb/MBtu)	0.202	0.311	0.114	0.209 (0.206)[6]
Duct Conditions					
Average Flow Rate	(acfm)	256700	257000	259700	257800
Dry Standard Flow Rate	(dscfm)	163900	163500	163300	163600
Temperature	(°F)	253	255	253	254
Percent Moisture	(%)	12.0	12.0	13.3	12.5
Percent O_2[4]	(%)	5.6	5.3	5.2	5.4
Percent CO_2[4]	(%)	13.6	13.8	13.9	13.8
Sampling Conditions					
Test Clock Times		8:45 to 9:59	10:45 to 11:55	13:00 to 14:10	
Sampling Time	(minutes)	64	64	64	
Sampling Volume	(dscf)	41.034	40.132	40.231	
Isokinetics	(%)	103	101	101	

Notes:
[1] Only Unit #2 was operating for testing
[2] Based on measured coal feed rates and heating values.
[3] Based on EPA Method 19 (F factor method).
[4] Percent O_2 and CO_2 are collected as grab sample and analyzed with a Orsat gas analyzer
[5] Soot blow during sampling period.
[6] Numbers in parentheses indicate correction for soot blowing.

TABLE 4-3

RICHMOND POWER AND LIGHT
RICHMOND, IN
WHITEWATER VALLEY GENERATING STATION UNIT #2

OPACITY MEASUREMENTS: DECEMBER 7 AND 8, 1993

12/7/93

Test Run	Maximum[1] Opacity (%)	Average[2] Opacity (%)
1	21	19
2	26	21
3	20	19

12/8/93

Test Run	Maximum Opacity (%)	Average Opacity (%)
1	17	15
2	21	18
3	16	14

Notes: [1] Highest 6 minute reading during test run period.
[2] Average of all six minute readings during test run periods.

LIFAC RICHMOND POWER AND LIGHT
UNIT #2 AIR EMISSIONS TESTING
TEST DATES: DECEMBER 7 & 8, 1993
PROJECT NO.: 91001-002-33

DETERMINATION OF FURNACE HEAT INPUT AND ACTUAL PARTICULATE MATTER MASS EMISSIONS PER HEAT INPUT

TEST DATE	STACK TEST TIME	COAL ANALYSIS SAMPLE ID #	COAL HEATING VALUE AS REC'D (BTU/lb)	COAL FEED RATE (lb/min)	COAL FEED RATE (lb/hr)	HEAT INPUT (MMBTU/hr)	PARTICULATE MATTER EMISSION RATE (lb/hr)	ACTUAL PM MASS EMISSIONS PER HEAT INPUT (lb/MMBTU)
12-7-93	9:30-10:44	Stack Test #1	11,356	927	55,620	631.6	179.6	0.2843
12-7-93	12:05-13:17 *	Stack Test #2	11,367	1,032	61,920	703.8	252.2	0.3583
12-7-93	14:20-15:36	Stack Test #3	11,334	890	53,400	605.2	147.4	0.2435
Average			11,352		56,980	646.9	193.1	0.2954
12-8-93	8:45-9:59	Stack Test #1	11,431	912	54,720	625.5	148.3	0.2371
12-8-93	10:45-11:55 *	Stack Test #2	11,373	912	54,720	622.3	233.0	0.3744
12-8-93	13:00-14:10	Stack Test #3	11,440	904	54,240	620.5	85.4	0.1376
Average			11,415		54,560	622.8	155.6	0.2497

* = Soot blown during test run

LIFAC RICHMOND POWER AND LIGHT
UNIT #2 AIR EMISSIONS TESTING
TEST DATES: DECEMBER 7 & 8, 1993
PROJECT NO.: 91001-002-33

CORRECTION FOR SOOT BLOWING FOR ACTUAL PARTICULATE MATTER MASS EMISSIONS PER HEAT INPUT

$$E = Ecc * [((A+B)*S)/(A*R)] + Eccc * [((R-S)/R) - ((B*S)/(A*R))]$$

where:
- E = Average emission concentration (lb/MMBtu)
- Ecc = Average emission concentration for sootblowing run (lb/MMBtu)
- Eccc = Average emission concentration for non-sootblowing runs (lb/MMBtu)
- A = Hours of sootblowing during sootblowing run (hours)
- B = Hours of not sootblowing during sootblowing run (hours)
- S = Average hours of sootblowing per day (hours)
- R = Average hours of operation of the source tested per day (hours)

TEST DATE	Ecc (lb/MMBtu)	Eccc (lb/MMBtu)	A (hours)	B (hours)	S (hours)	R (hours)	E (lb/MMBtu)
12-7-93	0.3583	0.2639	1.05	0.017	7	24	0.2919
12-8-93	0.3744	0.1874	1	0.067	7	24	0.2456

LIFAC RICHMOND POWER AND LIGHT
UNIT #2 AIR EMISSIONS TESTING
TEST DATES: DECEMBER 7 & 8, 1993
PROJECT NO.: 91001-002-33

DETERMINATION OF MASS EMISSIONS PER HEAT INPUT BASED ON EPA METHOD 19, 40 CFR 60

$$E = Cd * Fd * (20.9/(20.9 - \%O2d))$$

where:
E Mass Emissions per Heat Input, lb/MMBTU
Cd = Particulate matter concentration, lb/dscf
Fd = F Factor (dry basis) for bituminous coal, 9780 dscf/MMBTU
20.9 = percent of oxygen in ambient air
%O2d = Percent oxygen by volume (dry basis)

TEST DATE	TEST TIME	Cd (gr/dscf)	Cd (lb/dscf)	Fd (dscf/MMBTU)	%O2d (%)	E (lb/MMBTU)
12-7-93	9:30-10:44	0.1262	1.80E-05	9,780	5.90	0.2457
12-7-93	12:05-13:17	0.1739	2.48E-05	9,780	5.70	0.3341
12-7-93	14:20-15:36	0.1003	1.43E-05	9,780	5.60	0.1914
Average		0.1335				0.2571
12-8-93	8:45-9:59	0.1055	1.51E-05	9,780	5.63	0.2017
12-8-93	10:45-11:55	0.1662	2.37E-05	9,780	5.30	0.3111
12-8-93	13:00-14:10	0.0610	8.71E-06	9,780	5.20	0.1135
Average		0.1109				0.2088

APPENDIX B

ANALYTICAL RESULTS:
AQUEOUS AND SOLID WASTE SAMPLES

LIFAC NA DEMONSTRATION PROJECT
RICHMOND POWER AND LIGHT
WHITEWATER VALLEY GENERATING UNIT #2

PARAMETRIC AND OPTIMIZATION TESTS
ENVIRONMENTAL MONITORING REPORT

ICF KAISER ENGINEERS, INC.
PITTSBURGH, PENNSYLVANIA

Antech Ltd.

One Triangle Drive • Export, Pennsylvania 15632 • Phone: (412) 733-1161 • Fax: (412) 327-7793

October 14, 1993

Ms. Kathleen D. Conner
ICF Kaiser Engineers, Inc.
Four Gateway Center
Pittsburgh, PA 15222-1207

Waste Characterization; 91001-002-33
LIFAC
Antech Ltd. Project No. 93-2966

Dear Ms. Conner:

Enclosed are analytical results for the samples submitted by ICF Kaiser Engineers, Inc. The samples were received and logged in for analysis on September 23, 1993.

Appropriate U.S. Environmental Protection Agency methods were used and are indicated accordingly on the data tables. Appropriate quality assurance/quality control analyses were performed in accordance with Antech Ltd.'s Statement of Qualifications. If you have any questions, please call me.

Sincerely,

Dominic J. Nestasie
Technical Manager

DJN:aeb

Enclosures

ANTECH LTD.
CASE NARRATIVE

I. GENERAL:

A: PROJECT NUMBERS:

ANTECH LTD.: 93-2966
CLIENT: 91001-002-33

B: SAMPLE IDENTIFICATIONS:

ANTECH LTD.: 9309-1787 through 9309-1790
CLIENT: 3, 5A, 6B, and Z

C: SHIPPING/RECEIVING COMMENTS:

None

II. PREPARATION/ANALYSIS COMMENTS:

A: PREPARATION:

None

B: GENERAL CHEMISTRY:

None

C: METALS:

None

D: ORGANICS:

1. VOLATILES:
Detection levels were elevated for samples 9309-1787 (3) and 9309-1788 (5A) due to the sample matrix.

2. SEMIVOLATILES:
None

3. PCB'S:
None

III. GENERAL COMMENTS:

Trailing zeroes and decimal places appearing on the data should not be interpreted as precision of the analytical procedure, but rather as a result of reporting format. Please refer to the enclosed TCLP Regulatory Levels table for appropriate regulatory levels and hazardous waste numbers.

Table 1
General Data Table
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-2966
Waste Characterization; 91001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification			
			9309-1787 3 (9/22/93)	9309-1788 5A (9/22/93)	9309-1789 6B (9/22/93)	9309-1791 Method Blank (9/23/93)
Alkalinity (ASTM)	310.2(1)	mg/l $CaCO_3$	417	2070	17.0	2.00
pH	9045(2)	pH units	12.48	12.65	8.57	NAP(3)
Sulfate (ASTM)	9038(2)	mg/l	170	810	8.6	4.3
Percent Carbon	D3178(4)	%	5.6	3.6	2.5	NAP(3)

See footnotes at end of table.

Table 3
Volatile Organic Analyses
Target Compound List/EPA Method 8260(1)
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-2966
Waste Characterization; 91001-002-33
LIFAC

Parameter	CAS(2) Number	Units	Sample Identification 9309-1787 3 (9/22/93)	Sample Identification 9309-1788 5A (9/22/93)
Acetone	67-64-1	µg/kg	<13000	<13000
Benzene	71-43-2	µg/kg	<630	<630
Bromodichloromethane	75-27-4	µg/kg	<630	<630
Bromoform	75-25-2	µg/kg	<630	<630
Bromomethane	74-83-9	µg/kg	<1300	<1300
2-Butanone (MEK)	78-93-3	µg/kg	<13000	<13000
Carbon disulfide	75-15-0	µg/kg	<630	<630
Carbon tetrachloride	56-23-5	µg/kg	<630	<630
Chlorobenzene	108-90-7	µg/kg	<630	<630
Chlorodibromomethane	124-48-1	µg/kg	<630	<630
Chloroethane	75-00-3	µg/kg	<1300	<1300
Chloromethane	74-87-3	µg/kg	<1300	<1300
Chloroform	67-66-3	µg/kg	<630	<630
1,1-Dichloroethane	75-34-3	µg/kg	<630	<630
1,2-Dichloroethane	107-06-2	µg/kg	<630	<630
1,1-Dichloroethene	75-35-4	µg/kg	<630	<630
cis-1,2-Dichloroethene	156-59-2	µg/kg	<630	<630
trans-1,2-Dichloroethene	156-60-5	µg/kg	<630	<630
1,2-Dichloropropane	78-87-5	µg/kg	<630	<630
cis-1,3-Dichloropropene	10061-01-5	µg/kg	<630	<630
trans-1,3-Dichloropropene	10061-02-6	µg/kg	<630	<630
Ethylbenzene	100-41-4	µg/kg	<630	<630
2-Hexanone	591-78-6	µg/kg	<6300	<6300
Methylene chloride	75-09-2	µg/kg	<630	<630
4-Methyl-2-pentanone (MIBK)	108-10-1	µg/kg	<6300	<6300
Styrene	100-42-5	µg/kg	<630	<630
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	<630	<630
Tetrachloroethene	127-18-4	µg/kg	<630	<630
Toluene	108-88-3	µg/kg	<630	<630
1,1,1-Trichloroethane	71-55-6	µg/kg	<630	<630
1,1,2-Trichloroethane	79-00-5	µg/kg	<630	<630
Trichloroethene	79-01-6	µg/kg	<630	<630
Vinyl chloride	75-01-4	µg/kg	<1300	<1300
Xylenes (Total)	1330-20-7	µg/kg	<630	<630

See footnotes at end of table.

Table 3
(Continued)

Parameter	CAS[2] Number	Units	Sample Identification 9309-1789 6B (9/22/93)	Sample Identification 9309-1791 Method Blank (9/23/93)
Acetone	67-64-1	µg/kg	<100	<13000
Benzene	71-43-2	µg/kg	<5.0	<630
Bromodichloromethane	75-27-4	µg/kg	<5.0	<630
Bromoform	75-25-2	µg/kg	<5.0	<630
Bromomethane	74-83-9	µg/kg	<10	<1300
2-Butanone (MEK)	78-93-3	µg/kg	<100	<13000
Carbon disulfide	75-15-0	µg/kg	<5.0	<630
Carbon tetrachloride	56-23-5	µg/kg	<5.0	<630
Chlorobenzene	108-90-7	µg/kg	<5.0	<630
Chlorodibromomethane	124-48-1	µg/kg	<5.0	<630
Chloroethane	75-00-3	µg/kg	<10	<1300
Chloromethane	74-87-3	µg/kg	<10	<1300
Chloroform	67-66-3	µg/kg	<5.0	<630
1,1-Dichloroethane	75-34-3	µg/kg	<5.0	<630
1,2-Dichloroethane	107-06-2	µg/kg	<5.0	<630
1,1-Dichloroethene	75-35-4	µg/kg	<5.0	<630
cis-1,2-Dichloroethene	156-59-2	µg/kg	<5.0	<630
trans-1,2-Dichloroethene	156-60-5	µg/kg	<5.0	<630
1,2-Dichloropropane	78-87-5	µg/kg	<5.0	<630
cis-1,3-Dichloropropene	10061-01-5	µg/kg	<5.0	<630
trans-1,3-Dichloropropene	10061-02-6	µg/kg	<5.0	<630
Ethylbenzene	100-41-4	µg/kg	<5.0	<630
2-Hexanone	591-78-6	µg/kg	<50	<6300
Methylene chloride	75-09-2	µg/kg	<5.0	<630
4-Methyl-2-pentanone (MIBK)	108-10-1	µg/kg	<50	<6300
Styrene	100-42-5	µg/kg	<5.0	<630
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	<5.0	<630
Tetrachloroethene	127-18-4	µg/kg	<5.0	<630
Toluene	108-88-3	µg/kg	<5.0	<630
1,1,1-Trichloroethane	71-55-6	µg/kg	<5.0	<630
1,1,2-Trichloroethane	79-00-5	µg/kg	<5.0	<630
Trichloroethene	79-01-6	µg/kg	<5.0	<630
Vinyl chloride	75-01-4	µg/kg	<10	<1300
Xylenes (Total)	1330-20-7	µg/kg	<5.0	<630

(1)U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(2)CAS = Chemical Abstracts Services.

Table 1
(Continued)

Parameter	Analytical Method	Units	Sample Identification 9309-1787 3 (9/22/93)	9309-1788 5A (9/22/93)	9309-1789 6B (9/22/93)	9309-1791 Method Blank (9/23/93)
TCLP[5] Metals:						
Silver (TCLP)	6010[2]	mg/l	<0.10	<0.10	<0.10	<0.10
Arsenic (TCLP)	6010[2]	mg/l	<0.10	0.14	<0.10	<0.10
Barium (TCLP)	6010[2]	mg/l	<10	<10	<10	<10
Cadmium (TCLP)	6010[2]	mg/l	<0.10	<0.10	<0.10	<0.10
Chromium (TCLP)	6010[2]	mg/l	<0.10	<0.10	<0.10	<0.10
Mercury (TCLP)	7470[2]	mg/l	<0.010	<0.010	<0.010	<0.010
Lead (TCLP)	6010[2]	mg/l	<0.10	<0.10	<0.10	<0.10
Selenium (TCLP)	7740[2]	mg/l	<0.10	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:						
Extraction Fluid	1311[2]	-	No.1	No.2	No.1	No.1
pH with Deionized Water		pH units	10.70	11.18	9.70	NAP[3]
pH After Addition of 1 Normal HCL		pH units	3.21	10.39	2.93	NAP[3]
pH of TCLP Extract		pH units	5.33	6.31	5.21	4.93
Amount of Sample Extracted		g	100	100	100	NAP[3]

(1) U.S. Environmental Protection Agency, 1983, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.
(2) U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(3) NAP - Not applicable.
(4) American Society for Testing and Materials, Annual Book of ASTM Standards, Philadelphia, PA.
(5) TCLP - Toxicity Characteristic Leaching Procedure.

Table 4
TCLP[1] Organic Analyses
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-2966
Waste Characterization; 91001-002-33
LIFAC

Parameter	CAS[2] Number	Units	Sample Identification 9309-1787 3 (9/22/93)	9309-1788 5A (9/22/93)
TCLP Volatile Organic Analyses:(8260)[3]				
Benzene	71-43-2	µg/l	<50	<50
2-Butanone	78-93-3	µg/l	<5000	<5000
Carbon tetrachloride	56-23-5	µg/l	<50	<50
Chlorobenzene	108-90-7	µg/l	<1000	<1000
Chloroform	67-66-3	µg/l	<500	<500
1,2-Dichloroethane	107-06-2	µg/l	<50	<50
1,1-Dichloroethene	75-35-4	µg/l	<50	<50
Tetrachloroethene	127-18-4	µg/l	<50	<50
Trichloroethene	79-01-6	µg/l	<50	<50
Vinyl chloride	75-01-4	µg/l	<50	<50
TCLP Base/Neutral Extractables:(8270)[3]				
1,4-Dichlorobenzene	106-46-7	µg/l	<500	<500
2,4-Dinitrotoluene	121-14-2	µg/l	<50	<50
Hexachlorobutadiene	87-68-3	µg/l	<50	<50
Hexachlorobenzene	118-74-1	µg/l	<100	<100
Hexachloroethane	67-72-1	µg/l	<500	<500
Nitrobenzene	98-95-3	µg/l	<100	<100
Pyridine	110-86-1	µg/l	<500	<500
TCLP Acid Extractables:(8270)[3]				
Total Cresol (TCLP)	(4)	µg/l	<5000	<5000
Pentachlorophenol	87-86-5	µg/l	<5000	<5000
2,4,5-Trichlorophenol	95-95-4	µg/l	<5000	<5000
2,4,6-Trichlorophenol	88-06-2	µg/l	<100	<100

See footnotes at end of table.

Table 4
(Continued)

Parameter	CAS[2] Number	Units	Sample Identification 9309-1789 6B (9/22/93)	9309-1791 Method Blank (9/23/93)
TCLP Volatile Organic Analyses:(8260)[3]				
Benzene	71-43-2	µg/l	<50	<50
2-Butanone	78-93-3	µg/l	<5000	<5000
Carbon tetrachloride	56-23-5	µg/l	<50	<50
Chlorobenzene	108-90-7	µg/l	<1000	<1000
Chloroform	67-66-3	µg/l	<500	<500
1,2-Dichloroethane	107-06-2	µg/l	<50	<50
1,1-Dichloroethene	75-35-4	µg/l	<50	<50
Tetrachloroethene	127-18-4	µg/l	<50	<50
Trichloroethene	79-01-6	µg/l	<50	<50
Vinyl chloride	75-01-4	µg/l	<50	<50
TCLP Base/Neutral Extractables:(8270)[3]				
1,4-Dichlorobenzene	106-46-7	µg/l	<500	<500
2,4-Dinitrotoluene	121-14-2	µg/l	<50	<50
Hexachlorobutadiene	87-68-3	µg/l	<50	<50
Hexachlorobenzene	118-74-1	µg/l	<100	<100
Hexachloroethane	67-72-1	µg/l	<500	<500
Nitrobenzene	98-95-3	µg/l	<100	<100
Pyridine	110-86-1	µg/l	<500	<500
TCLP Acid Extractables:(8270)[3]				
Total Cresol (TCLP)	(4)	µg/l	<5000	<5000
Pentachlorophenol	87-86-5	µg/l	<5000	<5000
2,4,5-Trichlorophenol	95-95-4	µg/l	<5000	<5000
2,4,6-Trichlorophenol	88-06-2	µg/l	<100	<100

(1)TCLP - Toxicity Characteristic Leaching Procedure.
(2)CAS - Chemical Abstracts Services.
(3)U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(4)m-Cresol 108-39-4, o-Cresol 95-48-7, and p-Cresol 106-44-5.

Table 2
General Data Table
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-2966
Water Characterization; 91001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification: 9309-1790 Z (9/22/93)	Sample Identification: 9309-1792 Method Blank (9/23/93)
Alkalinity (Total)	310.1[1]	mg/l $CaCO_3$	232	2.00
Chlorine (Residual)	330.4[1]	mg/l	<0.10	<0.10
Ammonia	350.1[1]	mg/l NH_3-N	<0.10	<0.10
Oil and Grease	413.1[1]	mg/l	1.0	<1.0
Total Suspended Solids @ 105°C	160.2[1]	mg/l	2	<1
Polychlorinated Biphenyls	8080[2]	µg/l	<1.0	<1.0
Metals:				
Aluminum (Total)	6010[2]	mg/l	0.63	<0.10
Copper (Total)	6010[2]	mg/l	0.035	<0.010
Iron (Total)	6010[2]	mg/l	0.056	<0.030
Lead (Total)	6010[2]	mg/l	<0.10	<0.10
Zinc (Total)	6010[2]	mg/l	0.035	<0.0050

[1] U.S. Environmental Protection Agency, 1983, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.
[2] U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.

Table 1
General Data Table
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-3401
Waste Characterization; 92001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification			
			9310-2217 3 (9/22/93)	9310-2218 5A (9/22/93)	9310-2219 6B (9/22/93)	9310-2220 Method Blank (10/26/93)
Arsenic (Total)	7060[1]	mg/kg	35	340	10	<0.20

[1] U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.

Antech Ltd.

One Triangle Drive • Export, Pennsylvania 15632 • Phone: (412) 733-1161 • Fax: (412) 327-7793

October 18, 1993

Ms. Kathleen D. Conner
ICF Kaiser Engineers, Inc.
Four Gateway Center
Pittsburgh, PA 15222-1207

Water/Waste Characterization; 91001-002-33
LIFAC
Antech Ltd. Project No. 93-2987

Dear Ms. Conner:

Enclosed is the updated table - which had IP's in for the %carbon results. Please discard the original table submitted on September 24, 1993 and replace it with the new table enclosed. If you have any questions, please call me.

Sincerely,

Dominic J. Nestasie
Technical Manager

DJN:jac

Enclosures

Antech Ltd.

One Triangle Drive • Export, Pennsylvania 15632 • Phone: (412) 733-1161 • Fax: (412) 327-7793

October 15, 1993

Ms. Kathleen D. Conner
ICF Kaiser Engineers, Inc.
Four Gateway Center
Pittsburgh, PA 15222-1207

Water/Waste Characterization; 91001-002-33
LIFAC
Antech Ltd. Project No. 93-2987

Dear Ms. Conner:

Enclosed are analytical results for the samples submitted by ICF Kaiser Engineers, Inc. The samples were received and logged in for analysis on September 24, 1993.

Appropriate U.S. Environmental Protection Agency methods were used and are indicated accordingly on the data tables. Appropriate quality assurance/quality control analyses were performed in accordance with Antech Ltd.'s Statement of Qualifications. If you have any questions, please call me.

Sincerely,

Dominic J. Nestaste
Technical Manager

DJN:sja

Enclosures

ANTECH LTD.
CASE NARRATIVE

I. GENERAL:

A: PROJECT NUMBERS:

ANTECH LTD.: 93-2987
CLIENT: 91001-002-33

B: SAMPLE IDENTIFICATIONS:

ANTECH LTD.: 9309-1949 through 9309-1957
CLIENT: 6A-1, 6A-2, 2, 3, 4, 5A, 6B-1, 6B-2, and 5B

C: SHIPPING/RECEIVING COMMENTS:

None

II. PREPARATION/ANALYSIS COMMENTS:

A: PREPARATION:

None

B: GENERAL CHEMISTRY:

None

C: METALS:

None

D: ORGANICS:

1. VOLATILES:

Due to the nature of Samples Nos. 9309-1952 (3), 9309-1953 (4), and 9309-1954 (5A), they were analyzed as dilutions resulting in elevated detection limits.

2. SEMIVOLATILES:

None

3. PCB'S:

None

III. GENERAL COMMENTS:

Trailing zeroes and decimal places appearing on the data should not be interpreted as precision of the analytical procedure, but rather as a result of reporting format. Please refer to the enclosed TCLP Regulatory Levels table for appropriate regulatory levels and hazardous waste numbers.

Table 1
General Data Table
ICF Kaiser Engineers, Inc
Antech Ltd. Project No 93-2987
Water Characterization; 91001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification			
			9309-1949 6A-1 (9/23/93)	9309-1950 6A-2 (9/23/93)	9309-1951 2 (9/23/93)	9309-1958 Method Blank (9/24/93)
Alkalinity (Total)	310.2[1]	mg/l $CaCO_3$	182	200	61 0	2 00
Chlorine (Residual)	330.4[1]	mg/l	<1 0	<1 0	<1 0	<1 0
Ammonia	350.1[1]	mg/l NH_3-N	0 11	0 13	0 14	<0 10
Oil and Grease	413.1[1]	mg/l	<1 0	<1 0	1 8	<1 0
Total Suspended Solids @ 105°C	160.2[1]	mg/l	17	1	73	<1
Polychlorinated Biphenyls	608[2]	µg/l	<1 0	<1 0	<1 0	<1 0
Metals:						
Aluminum (Total)	200.7[1]	mg/l	0.59	0.60	0 31	<0.10
Copper (Total)	200.7[1]	mg/l	0.014	<0.010	<0.010	<0.010
Iron (Total)	200.7[1]	mg/l	0.20	0.18	0.20	<0.030
Lead (Total)	200.7[1]	mg/l	<0.10	<0.10	<0.10	<0.10
Zinc (Total)	200.7[1]	mg/l	0.026	0.023	0.026	<0.0050

[1] U.S. Environmental Protection Agency, 1983, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.

[2] U.S. Environmental Protection Agency, 1982, Test Methods, Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, J. E. Longbottom and J. J. Lichtenberg, eds., EPA-600/4-82-057, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.

Table 2
General Data Table
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No 93-2987
Waste Characterization; 91001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification						
			9309-1952 3 (9/23/93)	9309-1953 4 (9/23/93)	9309-1954 5A (9/23/93)	9309-1955 6B-1 (9/23/93)	9309-1956 6B-2 (9/23/93)	9309-1957 5B (9/23/93)	9309-1959 Method Blank (9/24/93)
pH	9045[1]	pH units	12 55	12 33	12 51	10 47	10 98	12 47	NAP[2]
Percent Carbon		%	4 5	3 9	3 3	0 54	0 32	NA[3]	NAP[2]
ASTM:									
Alkalinity (ASTM)	310 2[4]	mg/l $CaCO_3$	2540	2220	2020	20 0	51 0	2840	2 00
Sulfate (ASTM)	375.4[4]	mg/l	1200	850	1400	49	80	1700	2 2
TCLP Metals:[5]									
Silver (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0 10
Arsenic (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Barium (TCLP)	6010[1]	mg/l	<10	<10	<10	<10	<10	<10	<10
Cadmium (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	1.1	<0.10
Mercury (TCLP)	7470[1]	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Selenium (TCLP)	7740[1]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:									
Extraction Fluid	1311[1]	-	No.2	No.2	No.2	No 1	No.1	No.2	No 1
pH with Deionized Water		pH units	11.75	11.65	11.74	10.00	9.57	12.17	NAP[2]
pH After Addition of 1 Normal HCL		pH units	11.17	11.09	11.60	1.62	1.68	12.05	NAP[2]
pH of TCLP Extract		pH units	12.31	12.02	12.44	4.97	3.76	12.02	4.93
Amount of Sample Extracted		g	100	100	100	100	100	50.0	NAP[2]

[1] U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
[2] NAP = Not applicable.
[3] NA = Not analyzed.
[4] U.S. Environmental Protection Agency, 1983, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.
[5] TCLP = Toxicity Characteristic Leaching Procedure.

Table 3
Volatile Organic Analyses
Target Compound List/EPA Method 8260[1]
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-2987
Water Characterization; 91001-002-33
LIFAC

Parameter	CAS[2] Number	Units	Sample Identification 9309-1952 3 (9/23/93)	9309-1953 4 (9/23/93)	9309-1954 5A (9/23/93)	9309-1955 6B-1 (9/23/93)
Acetone	67-64-1	µg/kg	<13000	<13000	<13000	<100
Benzene	71-43-2	µg/kg	<630	<630	<630	<5.0
Bromodichloromethane	75-27-4	µg/kg	<630	<630	<630	<5.0
Bromoform	75-25-2	µg/kg	<630	<630	<630	<5.0
Bromomethane	74-83-9	µg/kg	<1300	<1300	<1300	<10
2-Butanone (MEK)	78-93-3	µg/kg	<13000	<13000	<13000	<100
Carbon disulfide	75-15-0	µg/kg	<630	<630	<630	<5.0
Carbon tetrachloride	56-23-5	µg/kg	<630	<630	<630	<5.0
Chlorobenzene	108-90-7	µg/kg	<630	<630	<630	<5.0
Chlorodibromomethane	124-48-1	µg/kg	<630	<630	<630	<5.0
Chloroethane	75-00-3	µg/kg	<1300	<1300	<1300	<10
Chloromethane	74-87-3	µg/kg	<1300	<1300	<1300	<10
Chloroform	67-66-3	µg/kg	<630	<630	<630	<5.0
1,1-Dichloroethane	75-34-3	µg/kg	<630	<630	<630	<5.0
1,2-Dichloroethane	107-06-2	µg/kg	<630	<630	<630	<5.0
1,1-Dichloroethene	75-35-4	µg/kg	<630	<630	<630	<5.0
cis-1,2-Dichloroethene	156-59-2	µg/kg	<630	<630	<630	<5.0
trans-1,2-Dichloroethene	156-60-5	µg/kg	<630	<630	<630	<5.0
1,2-Dichloropropane	78-87-5	µg/kg	<630	<630	<630	<5.0
cis-1,3-Dichloropropene	10061-01-5	µg/kg	<630	<630	<630	<5.0
trans-1,3-Dichloropropene	10061-02-6	µg/kg	<630	<630	<630	<5.0
Ethylbenzene	100-41-4	µg/kg	<630	<630	<630	<5.0
2-Hexanone	591-78-6	µg/kg	<6300	<6300	<6300	<50
Methylene chloride	75-09-2	µg/kg	<630	<630	<630	8.0
4-Methyl-2-pentanone (MIBK)	108-10-1	µg/kg	<6300	<6300	<6300	<50
Styrene	100-42-5	µg/kg	<630	<630	<630	<5.0
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	<630	<630	<630	<5.0
Tetrachloroethene	127-18-4	µg/kg	<630	<630	<630	<5.0
Toluene	108-88-3	µg/kg	<630	<630	<630	<5.0
1,1,1-Trichloroethane	71-55-6	µg/kg	<630	<630	<630	<5.0
1,1,2-Trichloroethane	79-00-5	µg/kg	<630	<630	<630	<5.0
Trichloroethene	79-01-6	µg/kg	<630	<630	<630	<5.0
Vinyl chloride	75-01-4	µg/kg	<1300	<1300	<1300	<10
Xylenes (Total)	1330-20-7	µg/kg	<630	<630	<630	<5.0

See footnotes at end of table.

Table 3
(Continued)

Parameter	CAS[2] Number	Units	Sample Identification 9309-1988 5B (9/24/93)	9309-1989 6B-1 (9/24/93)	9309-1991 Method Blank (9/25/93)
Acetone	67-64-1	µg/kg	<13000	<13000	<13000
Benzene	71-43-2	µg/kg	<630	<630	<630
Bromodichloromethane	75-27-4	µg/kg	<630	<630	<630
Bromoform	75-25-2	µg/kg	<630	<630	<630
Bromomethane	74-83-9	µg/kg	<1300	<1300	<1300
2-Butanone (MEK)	78-93-3	µg/kg	<13000	<13000	<13000
Carbon disulfide	75-15-0	µg/kg	<630	<630	<630
Carbon tetrachloride	56-23-5	µg/kg	<630	<630	<630
Chlorobenzene	108-90-7	µg/kg	<630	<630	<630
Chlorodibromomethane	124-48-1	µg/kg	<630	<630	<630
Chloroethane	75-00-3	µg/kg	<1300	<1300	<1300
Chloromethane	74-87-3	µg/kg	<1300	<1300	<1300
Chloroform	67-66-3	µg/kg	<630	<630	<630
1,1-Dichloroethane	75-34-3	µg/kg	<630	<630	<630
1,2-Dichloroethane	107-06-2	µg/kg	<630	<630	<630
1,1-Dichloroethene	75-35-4	µg/kg	<630	<630	<630
cis-1,2-Dichloroethene	156-59-2	µg/kg	<630	<630	<630
trans-1,2-Dichloroethene	156-60-5	µg/kg	<630	<630	<630
1,2-Dichloropropane	78-87-5	µg/kg	<630	<630	<630
cis-1,3-Dichloropropene	10061-01-5	µg/kg	<630	<630	<630
trans-1,3-Dichloropropene	10061-02-6	µg/kg	<630	<630	<630
Ethylbenzene	100-41-4	µg/kg	<630	<630	<630
2-Hexanone	591-78-6	µg/kg	<6300	<6300	<6300
Methylene chloride	75-09-2	µg/kg	<630	<630	<630
4-Methyl-2-pentanone (MIBK)	108-10-1	µg/kg	<6300	<6300	<6300
Styrene	100-42-5	µg/kg	<630	<630	<630
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	<630	<630	<630
Tetrachloroethene	127-18-4	µg/kg	<630	<630	<630
Toluene	108-88-3	µg/kg	<630	<630	<630
1,1,1-Trichloroethane	71-55-6	µg/kg	<630	<630	<630
1,1,2-Trichloroethane	79-00-5	µg/kg	<630	<630	<630
Trichloroethene	79-01-6	µg/kg	<630	<630	<630
Vinyl chloride	75-01-4	µg/kg	<1300	<1300	<1300
Xylenes (Total)	1330-20-7	µg/kg	<630	<630	<630

(1) U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(2) CAS = Chemical Abstracts Services.

Table 4
TCLP[1] Organic Analyses
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-2987
Water Characterization; 91001-002-33
LIFAC

Parameter	CAS[2] Number	Units	Sample Identification 9309-1952 3 (9/23/93)	9309-1953 4 (9/23/93)	9309-1954 5A (9/23/93)	9309-1955 6B-1 (9/23/93)
TCLP Volatile Organic Analyses:(8260)[3]						
Benzene	71-43-2	µg/l	<50	<50	<50	<50
2-Butanone	78-93-3	µg/l	<5000	<5000	<5000	<5000
Carbon tetrachloride	56-23-5	µg/l	<50	<50	<50	<50
Chlorobenzene	108-90-7	µg/l	<1000	<1000	<1000	<1000
Chloroform	67-66-3	µg/l	<500	<500	<500	<500
1,2-Dichloroethane	107-06-2	µg/l	<50	<50	<50	<50
1,1-Dichloroethene	75-35-4	µg/l	<50	<50	<50	<50
Tetrachloroethene	127-18-4	µg/l	<50	<50	<50	<50
Trichloroethene	79-01-6	µg/l	<50	<50	<50	<50
Vinyl chloride	75-01-4	µg/l	<50	<50	<50	<50
TCLP Base/Neutral Extractables:(8270)[3]						
1,4-Dichlorobenzene	106-46-7	µg/l	<500	<500	<500	<500
2,4-Dinitrotoluene	121-14-2	µg/l	<50	<50	<50	<50
Hexachlorobutadiene	87-68-3	µg/l	<50	<50	<50	<50
Hexachlorobenzene	118-74-1	µg/l	<100	<100	<100	<100
Hexachloroethane	67-72-1	µg/l	<500	<500	<500	<500
Nitrobenzene	98-95-3	µg/l	<100	<100	<100	<100
Pyridine	110-86-1	µg/l	<500	<500	<500	<500
TCLP Acid Extractables:(8270)[3]						
Total Cresol (TCLP)	(4)	µg/l	<5000	<5000	<5000	<5000
Pentachlorophenol	87-86-5	µg/l	<5000	<5000	<5000	<5000
2,4,5-Trichlorophenol	95-95-4	µg/l	<5000	<5000	<5000	<5000
2,4,6-Trichlorophenol	88-06-2	µg/l	<100	<100	<100	<100

See footnotes at end of table.

Table 4
(Continued)

Parameter	CAS[2] Number	Units	Sample Identification 9309-1988 5B (9/24/93)	9309-1989 6B-1 (9/24/93)	9309-1991 Method Blank (9/25/93)
TCLP Volatile Organic Analyses:(8260)[3]					
Benzene	71-43-2	µg/l	<50	<50	<50
2-Butanone	78-93-3	µg/l	<5000	<5000	<5000
Carbon tetrachloride	56-23-5	µg/l	<50	<50	<50
Chlorobenzene	108-90-7	µg/l	<1000	<1000	<1000
Chloroform	67-66-3	µg/l	<500	<500	<500
1,2-Dichloroethane	107-06-2	µg/l	<50	<50	<50
1,1-Dichloroethene	75-35-4	µg/l	<50	<50	<50
Tetrachloroethene	127-18-4	µg/l	<50	<50	<50
Trichloroethene	79-01-6	µg/l	<50	<50	<50
Vinyl chloride	75-01-4	µg/l	<50	<50	<50
TCLP Base/Neutral Extractables:(8270)[3]					
1,4-Dichlorobenzene	106-46-7	µg/l	<500	<500	<500
2,4-Dinitrotoluene	121-14-2	µg/l	<50	<50	<50
Hexachlorobutadiene	87-68-3	µg/l	<50	<50	<50
Hexachlorobenzene	118-74-1	µg/l	<100	<100	<100
Hexachloroethane	67-72-1	µg/l	<500	<500	<500
Nitrobenzene	98-95-3	µg/l	<100	<100	<100
Pyridine	110-86-1	µg/l	<500	<500	<500
TCLP Acid Extractables:(8270)[3]					
Total Cresol (TCLP)	[4]	µg/l	<5000	<5000	<5000
Pentachlorophenol	87-86-5	µg/l	<5000	<5000	<5000
2,4,5-Trichlorophenol	95-95-4	µg/l	<5000	<5000	<5000
2,4,6-Trichlorophenol	88-06-2	µg/l	<100	<100	<100

[1]TCLP = Toxicity Characteristic Leaching Procedure.
[2]CAS = Chemical Abstracts Services.
[3]U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
[4]m-Cresol 108-39-4, o-Cresol 95-48-7, and p-Cresol 106-44-5.

Antech Ltd.

One Triangle Drive • Export, Pennsylvania 15632 • Phone: (412) 733-1161 • Fax: (412) 327-7793

October 18, 1993

Ms. Kathleen D. Conner
ICF Kaiser Engineers, Inc.
Four Gateway Center
Pittsburgh, PA 15222-1207

Water/Waste Characterization; 91001-002-33
LIFAC
Antech Ltd. Project No. 93-2994

Dear Ms. Conner:

Enclosed are analytical results for the samples submitted by ICF Kaiser Engineers, Inc. The samples were received on September 25, 1993 and logged in for analysis on September 27, 1993.

Appropriate U.S. Environmental Protection Agency methods were used and are indicated accordingly on the data tables. Appropriate quality assurance/quality control analyses were performed in accordance with Antech Ltd.'s Statement of Qualifications. If you have any questions, please call me.

Sincerely,

Dominic J. Nestasie
Technical Manager

DJN:jac

Enclosures

ANTECH LTD.
CASE NARRATIVE

I. GENERAL:

A: PROJECT NUMBERS:

ANTECH LTD.: 93-2994
CLIENT: 91001-002-33

B: SAMPLE IDENTIFICATIONS:

ANTECH LTD.: 9309-1982 through 9309-1989
CLIENT: 6A, 2, 3, 4, 5A-1, 5A-2, 5B, and 6B-1

C: SHIPPING/RECEIVING COMMENTS:

None

II. PREPARATION/ANALYSIS COMMENTS:

A: PREPARATION:

None

B: GENERAL CHEMISTRY:

None

C: METALS:

None

D: ORGANICS:

1. VOLATILES:

Elevated detection levels due to matrix interference.

2. SEMIVOLATILES:

None

3. PCB'S:

None

III. GENERAL COMMENTS:

Trailing zeroes and decimal places appearing on the data should not be interpreted as precision of the analytical procedure, but rather as a result of reporting format. Please refer to the enclosed TCLP Regulatory Levels table for appropriate regulatory levels and hazardous waste numbers.

Table 1
General Data Table
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-2994
Water Characterization; 91001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification 9309-1982 6A (9/24/93)	9309-1983 2 (9/24/93)	9309-1990 Method Blank (9/25/93)
Alkalinity (Total)	310.2[1]	mg/l $CaCO_3$	65.0	205	2.00
Chlorine (Residual)	330.4[1]	mg/l	<0.10	0.12	<0.10
Ammonia	350.1[1]	mg/l NH_3-N	0.15	0.14	<0.10
Oil and Grease	413.1[1]	mg/l	<1.0	<1.0	<1.0
Total Suspended Solids @ 105°C	160.2[1]	mg/l	9	<1	<1
Polychlorinated Biphenyls	8080[2]	µg/l	<1.0	<1.0	<1.0
Metals:					
Aluminum (Total)	6010[2]	mg/l	0.25	0.29	<0.10
Copper (Total)	6010[2]	mg/l	0.011	0.013	<0.010
Iron (Total)	6010[2]	mg/l	0.061	0.099	<0.030
Lead (Total)	6010[2]	mg/l	<0.10	<0.10	<0.10
Zinc (Total)	6010[2]	mg/l	<0.0050	0.023	<0.0050

[1] U.S. Environmental Protection Agency. 1983. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.

[2] U.S. Environmental Protection Agency. 1987. Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.

Table 2
General Data Table
ICF Kaiser Engineers, Inc
Antech Ltd. Project No. 93-2994
Water Characterization; 91001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification						
			9309-1984 3 (9/24/93)	9309-1985 4 (9/24/93)	9309-1986 5A-1 (9/24/93)	9309-1987 5A-2 (9/24/93)	9309-1988 5B (9/24/93)	9309-1989 6B-1 (9/24/93)	9309-1991 Method Blank (9/25/93)
pH	9045[1]	pH units	12 44	12 48	12 44	12 50	12.46	11 14	NAP[2]
Percent Carbon	D3178;[3]	%	4.4	2.9	2 6	2 3	4 1	1 5	NAP[2]
ASTM Extractions:									
Alkalinity (ASTM)	310 2[4]	mg/l $CaCO_3$	2760	2440	3060	2780	2990	123	2 00
Sulfate (ASTM)	9036[1]	mg/l	1200	950	1200	1100	1200	240	2 2
Total Metal:									
Arsenic (Total)	7060[1]	mg/kg	26	25	69	36	95	9.6	<0.20
TCLP Metals:[5]									
Silver (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Barium (TCLP)	6010[1]	mg/l	<10	<10	<10	<10	<10	<10	<10
Cadmium (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10	<0 10	<0.10	<0.10	<0.10
Chromium (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Mercury (TCLP)	7470[1]	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10	<0 10	<0.10	<0.10	<0 10
Selenium (TCLP)	7740[1]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:									
Extraction Fluid	1311[1]	-	No.2	No 2	No.2	No 2	No. 2	No. 1	No.2
pH with Deionized Water		pH units	11.75	11.60	11.76	11.76	11.69	9.48	NAP[2]
pH After Addition of 1 Normal HCL		pH units	11 40	10.65	11.37	11.59	11.51	2 02	NAP[2]
pH of TCLP Extract		pH units	12 37	12 11	12.55	12.45	12.51	5 69	2.90
Amount of Sample Extracted		g	100	100	100	100	100	100	NAP[2]

(1) U S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed , Office of Solid Waste and Emergency Response, Washington, DC.
(2) NAP = Not applicable.
(3) American Society for Testing and Materials, Annual Book of ASTM Standards, Philadelphia, PA.
(4) U.S. Environmental Protection Agency, 1983, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.
(5) TCLP = Toxicity Characteristic Leaching Procedure.

Table 3
Volatile Organic Analyses
Target Compound List/EPA Method 8260[1]
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-2994
Waste Characterization; 91001-002-33
LIFAC

Parameter	CAS[2] Number	Units	Sample Identification 9309-1984 3 (9/24/93)	9309-1985 4 (9/24/93)	9309-1986 5A-1 (9/24/93)	9309-1987 5A-2 (9/24/93)
Acetone	67-64-1	µg/kg	<13000	<13000	<13000	<13000
Benzene	71-43-2	µg/kg	<630	<630	<630	<630
Bromodichloromethane	75-27-4	µg/kg	<630	<630	<630	<630
Bromoform	75-25-2	µg/kg	<630	<630	<630	<630
Bromomethane	74-83-9	µg/kg	<1300	<1300	<1300	<1300
2-Butanone (MEK)	78-93-3	µg/kg	<13000	<13000	<13000	<13000
Carbon disulfide	75-15-0	µg/kg	<630	<630	<630	<630
Carbon tetrachloride	56-23-5	µg/kg	<630	<630	<630	<630
Chlorobenzene	108-90-7	µg/kg	<630	<630	<630	<630
Chlorodibromomethane	124-48-1	µg/kg	<630	<630	<630	<630
Chloroethane	75-00-3	µg/kg	<1300	<1300	<1300	<1300
Chloromethane	74-87-3	µg/kg	<1300	<1300	<1300	<1300
Chloroform	67-66-3	µg/kg	<630	<630	<630	<630
1,1-Dichloroethane	75-34-3	µg/kg	<630	<630	<630	<630
1,2-Dichloroethane	107-06-2	µg/kg	<630	<630	<630	<630
1,1-Dichloroethene	75-35-4	µg/kg	<630	<630	<630	<630
cis-1,2-Dichloroethene	156-59-2	µg/kg	<630	<630	<630	<630
trans-1,2-Dichloroethene	156-60-5	µg/kg	<630	<630	<630	<630
1,2-Dichloropropane	78-87-5	µg/kg	<630	<630	<630	<630
cis-1,3-Dichloropropene	10061-01-5	µg/kg	<630	<630	<630	<630
trans-1,3-Dichloropropene	10061-02-6	µg/kg	<630	<630	<630	<630
Ethylbenzene	100-41-4	µg/kg	<630	<630	<630	<630
2-Hexanone	591-78-6	µg/kg	<6300	<6300	<6300	<6300
Methylene chloride	75-09-2	µg/kg	<630	<630	<630	<630
4-Methyl-2-pentanone (MIBK)	108-10-1	µg/kg	<6300	<6300	<6300	<6300
Styrene	100-42-5	µg/kg	<630	<630	<630	<630
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	<630	<630	<630	<630
Tetrachloroethene	127-18-4	µg/kg	<630	<630	<630	<630
Toluene	108-88-3	µg/kg	<630	<630	<630	<630
1,1,1-Trichloroethane	71-55-6	µg/kg	<630	<630	<630	<630
1,1,2-Trichloroethane	79-00-5	µg/kg	<630	<630	<630	<630
Trichloroethene	79-01-6	µg/kg	<630	<630	<630	<630
Vinyl chloride	75-01-4	µg/kg	<1300	<1300	<1300	<1300
Xylenes (Total)	1330-20-7	µg/kg	<630	<630	<630	<630

See footnotes at end of table.

Table 3
(Continued)

Parameter	CAS[2] Number	Units	Sample Identification 9309-1956 6B-2 (9/23/93)	9309-1957 5B (9/23/93)	9309-1959 Method Blank (9/24/93)
Acetone	67-64-1	µg/kg	<100	<500	<100
Benzene	71-43-2	µg/kg	<5.0	<25	<5.0
Bromodichloromethane	75-27-4	µg/kg	<5.0	<25	<5.0
Bromoform	75-25-2	µg/kg	<5.0	<25	<5.0
Bromomethane	74-83-9	µg/kg	<10	<50	<10
2-Butanone (MEK)	78-93-3	µg/kg	<100	<500	<100
Carbon disulfide	75-15-0	µg/kg	<5.0	<25	<5.0
Carbon tetrachloride	56-23-5	µg/kg	<5.0	<25	<5.0
Chlorobenzene	108-90-7	µg/kg	<5.0	<25	<5.0
Chlorodibromomethane	124-48-1	µg/kg	<5.0	<25	<5.0
Chloroethane	75-00-3	µg/kg	<10	<50	<10
Chloromethane	74-87-3	µg/kg	<10	<50	<10
Chloroform	67-66-3	µg/kg	<5.0	<25	<5.0
1,1-Dichloroethane	75-34-3	µg/kg	<5.0	<25	<5.0
1,2-Dichloroethane	107-06-2	µg/kg	<5.0	<25	<5.0
1,1-Dichloroethene	75-35-4	µg/kg	<5.0	<25	<5.0
cis-1,2-Dichloroethene	156-59-2	µg/kg	<5.0	<25	<5.0
trans-1,2-Dichloroethene	156-60-5	µg/kg	<5.0	<25	<5.0
1,2-Dichloropropane	78-87-5	µg/kg	<5.0	<25	<5.0
cis-1,3-Dichloropropene	10061-01-5	µg/kg	<5.0	<25	<5.0
trans-1,3-Dichloropropene	10061-02-6	µg/kg	<5.0	<25	<5.0
Ethylbenzene	100-41-4	µg/kg	<5.0	<25	<5.0
2-Hexanone	591-78-6	µg/kg	<50	<250	<50
Methylene chloride	75-09-2	µg/kg	<5.0	900	6.0
4-Methyl-2-pentanone (MIBK)	108-10-1	µg/kg	<50	<250	<50
Styrene	100-42-5	µg/kg	<5.0	<25	<5.0
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	<5.0	<25	<5.0
Tetrachloroethene	127-18-4	µg/kg	<5.0	<25	<5.0
Toluene	108-88-3	µg/kg	<5.0	40	<5.0
1,1,1-Trichloroethane	71-55-6	µg/kg	<5.0	<25	<5.0
1,1,2-Trichloroethane	79-00-5	µg/kg	<5.0	<25	<5.0
Trichloroethene	79-01-6	µg/kg	<5.0	<25	<5.0
Vinyl chloride	75-01-4	µg/kg	<10	<50	<10
Xylenes (Total)	1330-20-7	µg/kg	<5.0	<25	<5.0

(1) U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(2) CAS = *Chemical Abstracts Services*.

Table 4
TCLP[1] Organic Analyses
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-2994
Water Characterization; 91001-002-33
LIFAC

Parameter	CAS[2] Number	Units	Sample Identification 9309-1984 3 (9/24/93)	9309-1985 4 (9/24/93)	9309-1986 5A-1 (9/24/93)	9309-1987 5A-2 (9/24/93)
TCLP Volatile Organic Analyses:(8260)[3]						
Benzene	71-43-2	µg/l	<50	<50	<50	<50
2-Butanone	78-93-3	µg/l	<5000	<5000	<5000	<5000
Carbon tetrachloride	56-23-5	µg/l	<50	<50	<50	<50
Chlorobenzene	108-90-7	µg/l	<1000	<1000	<1000	<1000
Chloroform	67-66-3	µg/l	<500	<500	<500	<500
1,2-Dichloroethane	107-06-2	µg/l	<50	<50	<50	<50
1,1-Dichloroethene	75-35-4	µg/l	<50	<50	<50	<50
Tetrachloroethene	127-18-4	µg/l	<50	<50	<50	<50
Trichloroethene	79-01-6	µg/l	<50	<50	<50	<50
Vinyl chloride	75-01-4	µg/l	<50	<50	<50	<50
TCLP Base/Neutral Extractables:(8270)[3]						
1,4-Dichlorobenzene	106-46-7	µg/l	<500	<500	<500	<500
2,4-Dinitrotoluene	121-14-2	µg/l	<50	<50	<50	<50
Hexachlorobutadiene	87-68-3	µg/l	<50	<50	<50	<50
Hexachlorobenzene	118-74-1	µg/l	<100	<100	<100	<100
Hexachloroethane	67-72-1	µg/l	<500	<500	<500	<500
Nitrobenzene	98-95-3	µg/l	<100	<100	<100	<100
Pyridine	110-86-1	µg/l	<500	<500	<500	<500
TCLP Acid Extractables:(8270)[3]						
Total Cresol (TCLP)	(4)	µg/l	<5000	<5000	<5000	<5000
Pentachlorophenol	87-86-5	µg/l	<5000	<5000	<5000	<5000
2,4,5-Trichlorophenol	95-95-4	µg/l	<5000	<5000	<5000	<5000
2,4,6-Trichlorophenol	88-06-2	µg/l	<100	<100	<100	<100

See footnotes at end of table.

Table 4
(Continued)

Parameter	CAS[2] Number	Units	Sample Identification 9309-1956 6B-2 (9/23/93)	9309-1957 5B (9/23/93)	9309-1959 Method Blank (9/24/93)
TCLP Volatile Organic Analyses:(8260)[3]					
Benzene	71-43-2	µg/l	<50	<50	<50
2-Butanone	78-93-3	µg/l	<5000	<5000	<5000
Carbon tetrachloride	56-23-5	µg/l	<50	<50	<50
Chlorobenzene	108-90-7	µg/l	<1000	<1000	<1000
Chloroform	67-66-3	µg/l	<500	<500	<500
1,2-Dichloroethane	107-06-2	µg/l	<50	<50	<50
1,1-Dichloroethene	75-35-4	µg/l	<50	<50	<50
Tetrachloroethene	127-18-4	µg/l	<50	<50	<50
Trichloroethene	79-01-6	µg/l	<50	<50	<50
Vinyl chloride	75-01-4	µg/l	<50	<50	<50
TCLP Base/Neutral Extractables:(8270)[3]					
1,4-Dichlorobenzene	106-46-7	µg/l	<500	<500	<500
2,4-Dinitrotoluene	121-14-2	µg/l	<50	<50	<50
Hexachlorobutadiene	87-68-3	µg/l	<50	<50	<50
Hexachlorobenzene	118-74-1	µg/l	<100	<100	<100
Hexachloroethane	67-72-1	µg/l	<500	<500	<500
Nitrobenzene	98-95-3	µg/l	<100	<100	<100
Pyridine	110-86-1	µg/l	<500	<500	<500
TCLP Acid Extractables:(8270)[3]					
Total Cresol (TCLP)	(4)	µg/l	<5000	<5000	<5000
Pentachlorophenol	87-86-5	µg/l	<5000	<5000	<5000
2,4,5-Trichlorophenol	95-95-4	µg/l	<5000	<5000	<5000
2,4,6-Trichlorophenol	88-06-2	µg/l	<100	<100	<100

(1)TCLP = Toxicity Characteristic Leaching Procedure.
(2)CAS = Chemical Abstracts Services.
(3)U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(4)m-Cresol 108-39-4, o-Cresol 95-48-7, and p-Cresol 106-44-5.

Antech Ltd.

One Triangle Drive • Export Pennsylvania 15632 • Phone: (412) 733-1161 • Fax: (412) 327-7793

December 23, 1993

Ms. Kathleen D. Conner
ICF Kaiser Engineers, Inc.
Four Gateway Center
Pittsburgh, PA 15222-1207

Water/Waste Characterization; 91001-002-33
LIFAC
Antech Ltd. Project No. 93-3935

Dear Ms. Conner:

Enclosed are analytical results for samples submitted by ICF Kaiser Engineers, Inc. Samples were received and logged in for analysis on December 8, 1993.

Appropriate U.S. Environmental Protection Agency methods were used and are indicated accordingly on the data tables. Appropriate quality assurance/quality control analyses were performed in accordance with Antech Ltd.'s Statement of Qualifications. If you have any questions, please call me.

Sincerely,

Edward W. Kifer

Edward W. Kifer, Ph.D.
Inorganic Chemistry Manager

EWK:jac

Enclosures

ANTECH LTD.
CASE NARRATIVE

I. GENERAL:

A: PROJECT NUMBERS:

ANTECH LTD.: 93-3935
CLIENT: 91001-002-33

B: SAMPLE IDENTIFICATIONS:

ANTECH LTD.: 9312-0574 through 9312-0580
CLIENT: 2, 6A, 3, 4, 5A, 5B, and 6B

C: SHIPPING/RECEIVING COMMENTS:

None

II. PREPARATION/ANALYSIS COMMENTS:

A: PREPARATION:

None

B: GENERAL CHEMISTRY:

None

C: METALS:

None

D: ORGANICS:

1. VOLATILES:

All samples except 9312-0580 have elevated detection limits due to matrix effects. At lower dilutions the affected samples had no internal standard or surrogate recoveries. Therefore, the samples were analyzed at a medium level.

2. SEMIVOLATILES:

None

3. PCBS:

None

III. GENERAL COMMENTS:

Trailing zeroes and decimal places appearing on the data should not be interpreted as precision of the analytical procedure, but rather as a result of reporting format. Please refer to the enclosed TCLP Regulatory Levels table for appropriate regulatory levels and hazardous waste numbers.

Table 1
General Data Table
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-3935
Water Characterization; 91001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification		
			9312-0574 2 (12/7/93)	9312-0575 6A (12/7/93)	9312-0582 Method Blank (12/8/93)
Chlorine (Residual)	330.4[1]	mg/l	<1.0	<1.0	<1.0
Ammonia	350.1[1]	mg/l NH_3-N	<0.10	<0.10	<0.10
Oil and Grease	413.1[1]	mg/l	<1.0	<1.0	<1.0
Total Suspended Solids @ 105°C	160.2[1]	mg/l	<1	30	<1
Polychlorinated Biphenyls	8080[2]	µg/l	<1.0	<1.0	<1.0
Metals:					
Aluminum (Total)	6010[2]	mg/l	0.36	0.46	<0.10
Copper (Total)	6010[2]	mg/l	<0.010	<0.010	<0.010
Iron (Total)	6010[2]	mg/l	0.057	0.16	<0.030
Lead (Total)	6010[2]	mg/l	<0.10	<0.10	<0.10
Zinc (Total)	6010[2]	mg/l	0.024	0.011	<0.0050

[1] U.S. Environmental Protection Agency, 1983, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.
[2] U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.

Table 2
General Data Table
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-3935
Waste Characterization; 91001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification					
			9312-0576 3 (12/7/93)	9312-0577 4 (12/7/93)	9312-0578 5A (12/7/93)	9312-0579 5B (12/7/93)	9312-0580 6B (12/7/93)	9312-0581 Method Blank (12/8/93)
Percent Carbon		%	6.5	3.3	3.3	2.7	0.50	NAP[1]
ASTM:								
Alkalinity (ASTM)	310.2[2]	mg/l $CaCO_3$	2090	1050	2250	2560	87.0	<2.00
pH	9045[3]	pH units	12.55	12.42	12.42	12.52	11.21	NAP
Sulfate (ASTM)	9038[3]	mg/l	1600	1500	1700	1600	110	2.3
Total Metal:								
Arsenic (Total)	7060[3]	mg/kg	47	32	60	67	5.4	<0.20
TCLP Metals:[4]								
Silver (TCLP)	6010[3]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (TCLP)	6010[3]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Barium (TCLP)	6010[3]	mg/l	<10	<10	<10	<10	<10	<10
Cadmium (TCLP)	6010[3]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chromium (TCLP)	6010[3]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Mercury (TCLP)	7470[3]	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (TCLP)	6010[3]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Selenium (TCLP)	7740[3]	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:								
Extraction Fluid	1311[3]	-	No.2	No.2	No.2	No.2	No.1	No.2
pH with Deionized Water		pH units	12.69	12.46	12.61	12.69	10.61	NAP
pH After Addition of 1 Normal HCL		pH units	11.95	11.23	11.48	12.03	1.35	NAP
pH of TCLP Extract		pH units	12.30	12.02	12.36	12.13	5.02	2.88
Amount of Sample Extracted		g	100	100	100	100	100	NAP

(1) NAP = Not applicable.
(2) U.S. Environmental Protection Agency, 1983, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.
(3) U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(4) TCLP = Toxicity Characteristic Leaching Procedure.

Table 3
Volatile Organic Analyses
Target Compound List/EPA Method 8260[1]
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-3935
Water Characterization; 91001-002-33
LIFAC

Parameter	CAS[2] Number	Units	Sample Identification 9312-0576 3 (12/7/93)	9312-0577 4 (12/7/93)	9312-0578 5A (12/7/93)
Acetone	67-64-1	µg/kg	<13000	<13000	<13000
Benzene	71-43-2	µg/kg	<630	<630	<630
Bromodichloromethane	75-27-4	µg/kg	<630	<630	<630
Bromoform	75-25-2	µg/kg	<630	<630	<630
Bromomethane	74-83-9	µg/kg	<1300	<1300	<1300
2-Butanone (MEK)	78-93-3	µg/kg	<13000	<13000	<13000
Carbon disulfide	75-15-0	µg/kg	<630	<630	<630
Carbon tetrachloride	56-23-5	µg/kg	<630	<630	<630
Chlorobenzene	108-90-7	µg/kg	<630	<630	<630
Chlorodibromomethane	124-48-1	µg/kg	<630	<630	<630
Chloroethane	75-00-3	µg/kg	<1300	<1300	<1300
Chloromethane	74-87-3	µg/kg	<1300	<1300	<1300
Chloroform	67-66-3	µg/kg	<630	<630	<630
1,1-Dichloroethane	75-34-3	µg/kg	<630	<630	<630
1,2-Dichloroethane	107-06-2	µg/kg	<630	<630	<630
1,1-Dichloroethene	75-35-4	µg/kg	<630	<630	<630
cis-1,2-Dichloroethene	156-59-2	µg/kg	<630	<630	<630
trans-1,2-Dichloroethene	156-60-5	µg/kg	<630	<630	<630
1,2-Dichloropropane	78-87-5	µg/kg	<630	<630	<630
cis-1,3-Dichloropropene	10061-01-5	µg/kg	<630	<630	<630
trans-1,3-Dichloropropene	10061-02-6	µg/kg	<630	<630	<630
Ethylbenzene	100-41-4	µg/kg	<630	<630	<630
2-Hexanone	591-78-6	µg/kg	<6300	<6300	<6300
Methylene chloride	75-09-2	µg/kg	<630	<630	<630
4-Methyl-2-pentanone (MIBK)	108-10-1	µg/kg	<6300	<6300	<6300
Styrene	100-42-5	µg/kg	<630	<630	<630
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	<630	<630	<630
Tetrachloroethene	127-18-4	µg/kg	<630	<630	<630
Toluene	108-88-3	µg/kg	<630	<630	<630
1,1,1-Trichloroethane	71-55-6	µg/kg	<630	<630	<630
1,1,2-Trichloroethane	79-00-5	µg/kg	<630	<630	<630
Trichloroethene	79-01-6	µg/kg	<630	<630	<630
Vinyl chloride	75-01-4	µg/kg	<1300	<1300	<1300
Xylenes (Total)	1330-20-7	µg/kg	<630*	<630	<630

See footnotes at end of table.

Table 3
(Continued)

Parameter	CAS[2] Number	Units	Sample Identification 9312-0579 5B (12/7/93)	9312-0580 6B (12/7/93)	9312-0581 Method Blank (12/8/93)
Acetone	67-64-1	µg/kg	<13000	<100	<13000
Benzene	71-43-2	µg/kg	<630	<5.0	<630
Bromodichloromethane	75-27-4	µg/kg	<630	<5.0	<630
Bromoform	75-25-2	µg/kg	<630	<5.0	<630
Bromomethane	74-83-9	µg/kg	<1300	<10	<1300
2-Butanone (MEK)	78-93-3	µg/kg	<13000	<100	<13000
Carbon disulfide	75-15-0	µg/kg	<630	<5.0	<630
Carbon tetrachloride	56-23-5	µg/kg	<630	<5.0	<630
Chlorobenzene	108-90-7	µg/kg	<630	<5.0	<630
Chlorodibromomethane	124-48-1	µg/kg	<630	<5.0	<630
Chloroethane	75-00-3	µg/kg	<1300	<10	<1300
Chloromethane	74-87-3	µg/kg	<1300	<10	<1300
Chloroform	67-66-3	µg/kg	<630	<5.0	<630
1,1-Dichloroethane	75-34-3	µg/kg	<630	<5.0	<630
1,2-Dichloroethane	107-06-2	µg/kg	<630	<5.0	<630
1,1-Dichloroethene	75-35-4	µg/kg	<630	<5.0	<630
cis-1,2-Dichloroethene	156-59-2	µg/kg	<630	<5.0	<630
trans-1,2-Dichloroethene	156-60-5	µg/kg	<630	<5.0	<630
1,2-Dichloropropane	78-87-5	µg/kg	<630	<5.0	<630
cis-1,3-Dichloropropene	10061-01-5	µg/kg	<630	<5.0	<630
trans-1,3-Dichloropropene	10061-02-6	µg/kg	<630	<5.0	<630
Ethylbenzene	100-41-4	µg/kg	<630	<5.0	<630
2-Hexanone	591-78-6	µg/kg	<6300	<50	<6300
Methylene chloride	75-09-2	µg/kg	<630	13	<630
4-Methyl-2-pentanone (MIBK)	108-10-1	µg/kg	<6300	<50	<6300
Styrene	100-42-5	µg/kg	<630	<5.0	<630
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	<630	<5.0	<630
Tetrachloroethene	127-18-4	µg/kg	<630	<5.0	<630
Toluene	108-88-3	µg/kg	<630	<5.0	<630
1,1,1-Trichloroethane	71-55-6	µg/kg	<630	<5.0	<630
1,1,2-Trichloroethane	79-00-5	µg/kg	<630	<5.0	<630
Trichloroethene	79-01-6	µg/kg	<630	<5.0	<630
Vinyl chloride	75-01-4	µg/kg	<1300	<10	<1300
Xylenes (Total)	1330-20-7	µg/kg	<630	<5.0	<630

(1) U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(2) CAS = Chemical Abstracts Services.

Table 4
TCLP[1] Organic Analyses
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-3935
Waste Characterization; 91001-002-33
LIFAC

Parameter	CAS[2] Number	Units	Sample Identification 9312-0576 3 (12/7/93)	9312-0577 4 (12/7/93)	9312-0578 5A (12/7/93)
Volatile Organic Analyses:(8260)[3]					
Benzene	71-43-2	µg/l	<50	<50	<50
2-Butanone	78-93-3	µg/l	<5000	<5000	<5000
Carbon tetrachloride	56-23-5	µg/l	<50	<50	<50
Chlorobenzene	108-90-7	µg/l	<1000	<1000	<1000
Chloroform	67-66-3	µg/l	<500	<500	<500
1,2-Dichloroethane	107-06-2	µg/l	<50	<50	<50
1,1-Dichloroethene	75-35-4	µg/l	<50	<50	<50
Tetrachloroethene	127-18-4	µg/l	<50	<50	<50
Trichloroethene	79-01-6	µg/l	<50	<50	<50
Vinyl chloride	75-01-4	µg/l	<50	<50	<50
TCLP Base/Neutral Extractables:(8270)[3]					
1,4-Dichlorobenzene	106-46-7	µg/l	<500	<500	<500
2,4-Dinitrotoluene	121-14-2	µg/l	<50	<50	<50
Hexachlorobutadiene	87-68-3	µg/l	<50	<50	<50
Hexachlorobenzene	118-74-1	µg/l	<100	<100	<100
Hexachloroethane	67-72-1	µg/l	<500	<500	<500
Nitrobenzene	98-95-3	µg/l	<100	<100	<100
Pyridine	110-86-1	µg/l	<500	<500	<500
TCLP Acid Extractables:(8270)[3]					
Total Cresol (TCLP)	(4)	µg/l	<5000	<5000	<5000
Pentachlorophenol	87-86-5	µg/l	<5000	<5000	<5000
2,4,5-Trichlorophenol	95-95-4	µg/l	<5000	<5000	<5000
2,4,6-Trichlorophenol	88-06-2	µg/l	<100	<100	<100

See footnotes at end of table.

Table 4
(Continued)

Parameter	CAS[2] Number	Units	Sample Identification 9312-0579 5B (12/7/93)	9312-0580 6B (12/7/93)	9312-0581 Method Blank (12/8/93)
Volatile Organic Analyses:(8260)[3]					
Benzene	71-43-2	µg/l	<50	<50	<50
2-Butanone	78-93-3	µg/l	<5000	<5000	<5000
Carbon tetrachloride	56-23-5	µg/l	<50	<50	<50
Chlorobenzene	108-90-7	µg/l	<1000	<1000	<1000
Chloroform	67-66-3	µg/l	<500	<500	<500
1,2-Dichloroethane	107-06-2	µg/l	<50	<50	<50
1,1-Dichloroethene	75-35-4	µg/l	<50	<50	<50
Tetrachloroethene	127-18-4	µg/l	<50	<50	<50
Trichloroethene	79-01-6	µg/l	<50	<50	<50
Vinyl chloride	75-01-4	µg/l	<50	<50	<50
TCLP Base/Neutral Extractables:(8270)[3]					
1,4-Dichlorobenzene	106-46-7	µg/l	<500	<500	<500
2,4-Dinitrotoluene	121-14-2	µg/l	<50	<50	<50
Hexachlorobutadiene	87-68-3	µg/l	<50	<50	<50
Hexachlorobenzene	118-74-1	µg/l	<100	<100	<100
Hexachloroethane	67-72-1	µg/l	<500	<500	<500
Nitrobenzene	98-95-3	µg/l	<100	<100	<100
Pyridine	110-86-1	µg/l	<500	<500	<500
TCLP Acid Extractables:(8270)[3]					
Total Cresol (TCLP)	(4)	µg/l	<5000	<5000	<5000
Pentachlorophenol	87-86-5	µg/l	<5000	<5000	<5000
2,4,5-Trichlorophenol	95-95-4	µg/l	<5000	<5000	<5000
2,4,6-Trichlorophenol	88-06-2	µg/l	<100	<100	<100

(1)TCLP = Toxicity Characteristic Leaching Procedure.
(2)CAS = Chemical Abstracts Services.
(3)U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(4)m-Cresol 108-39-4, o-Cresol 95-48-7, and p-Cresol 106-44-5.

Antech Ltd.

One Triangle Drive • Export Pennsylvania 15632 • Phone: (412) 733-1161 • Fax: (412) 327-7793

December 27, 1993

Ms. Kathleen D. Conner
ICF Kaiser Engineers, Inc.
Four Gateway Center
Pittsburgh, PA 15222-1207

Water/Waste Characterization: 91001-002-33
LIFAC
Antech Ltd. Project No. 93-3966

Dear Ms. Conner:

Enclosed are analytical results for samples submitted by ICF Kaiser Engineers, Inc. Samples were received and logged in for analysis on December 9, 1993.

Appropriate U.S. Environmental Protection Agency methods were used and are indicated accordingly on the data tables. Appropriate quality assurance/quality control analyses were performed in accordance with Antech Ltd.'s Statement of Qualifications. If you have any questions, please call me.

Sincerely,

Edward W. Kifer

Edward W. Kifer, Ph.D.
Inorganic Chemistry Manager

EWK:sja

Enclosures

ANTECH LTD.
CASE NARRATIVE

I. GENERAL:

A: PROJECT NUMBERS:

ANTECH LTD.: 93-3966
CLIENT: 91001-002-33

B: SAMPLE IDENTIFICATIONS:

ANTECH LTD.: 9312-0810 through 9312-0816
CLIENT: 2, 6A, 3, 4, 5A, 5B, and 6B

C: SHIPPING/RECEIVING COMMENTS:

None

II. PREPARATION/ANALYSIS COMMENTS:

A: PREPARATION:

Samples were also forwarded to PSU for particle size analyses.

B: GENERAL CHEMISTRY:

None

C: METALS:

None

D: ORGANICS:

1. VOLATILES:

Detection limits were elevated due to sample matrix.

2. SEMIVOLATILES:

None

3. PCBS:

None

III. GENERAL COMMENTS:

Trailing zeroes and decimal places appearing on the data should not be interpreted as precision of the analytical procedure, but rather as a result of reporting format. Please refer to the enclosed TCLP Regulatory Levels table for appropriate regulatory levels and hazardous waste numbers.

Table 1
General Data Table
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-3966
Water Characterization; 91001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification		
			9312-0810 2 (12/8/93)	9312-0811 6A (12/8/93)	9312-0817 Method Blank (12/9/93)
Alkalinity (Total)	310.2[1]	mg/l $CaCO_3$	248	40.0	3.00
Chlorine (Residual)	330.4[1]	mg/l	<1.0	<1.0	<1.0
Ammonia	350.1[1]	mg/l NH_3-N	<0.10	0.37	<0.10
Oil and Grease	413.1[1]	mg/l	<1.0	<1.0	<1.0
Total Suspended Solids @ 105°C	160.2[1]	mg/l	9	38	<1
Polychlorinated Biphenyls	8080[2]	µg/l	<1.0	<1.0	<1.0
Metals:					
Aluminum (Total)	6010[2]	mg/l	0.82	0.53	<0.10
Copper (Total)	6010[2]	mg/l	<0.010	0.012	<0.010
Iron (Total)	6010[2]	mg/l	0.73	0.11	<0.030
Lead (Total)	6010[2]	mg/l	<0.10	<0.10	<0.10
Zinc (Total)	6010[2]	mg/l	0.019	0.020	<0.0050

[1] U.S. Environmental Protection Agency, 1983, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.
[2] U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.

Table 2
General Data Table
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-3966
Water Characterization; 91001-002-33
LIFAC

Parameter	Analytical Method	Units	Sample Identification 9312-0812 3 (12/8/93)	9312-0813 4 (12/8/93)	9312-0814 5A (12/8/93)
pH	9045(1)	pH units	12.52	12.41	12.60
Percent Carbon		%	5.3	3.5	3.1
ASTM:					
Alkalinity (ASTM)	310.2(2)	mg/l $CaCO_3$	2130	1850	2400
Sulfate (ASTM)	9038(1)	mg/l	1700	990	1600
Total Metal:					
Arsenic (Total)	7060(1)	mg/kg	35	23	50
TCLP Metals:(3)					
Silver (TCLP)	6010(1)	mg/l	<0.10	<0.10	<0.10
Arsenic (TCLP)	6010(1)	mg/l	<0.10	<0.10	<0.10
Barium (TCLP)	6010(1)	mg/l	<10	<10	<10
Cadmium (TCLP)	6010(1)	mg/l	<0.10	<0.10	<0.10
Chromium (TCLP)	6010(1)	mg/l	<0.10	<0.10	<0.10
Mercury (TCLP)	7470(1)	mg/l	<0.010	<0.010	<0.010
Lead (TCLP)	6010(1)	mg/l	<0.10	<0.10	<0.10
Selenium (TCLP)	7740(1)	mg/l	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:					
Extraction Fluid	1311(1)	-	No.2	No.2	No.2
pH with Deionized Water		pH units	12.71	12.52	12.71
pH After Addition of 1 Normal HCL		pH units	11.78	11.88	12.20
pH of TCLP Extract		pH units	12.59	6.74	12.66
Amount of Sample Extracted		g	100	100	100

See footnotes at end of table.

Table 2
(Continued)

Parameter	Analytical Method	Units	Sample Identification 9312-0815 5B (12/8/93)	9312-0816 6B (12/8/93)	9312-0818 Method Blank (12/9/93)
pH	9045[1]	pH units	12.52	11.86	NAP[4]
Percent Carbon		%	2.8	1.1	NAP
ASTM:					
Alkalinity (ASTM)	310.2[2]	mg/l $CaCO_3$	2400	168	12.0
Sulfate (ASTM)	9038[1]	mg/l	1600	920	2.4
Total Metal:					
Arsenic (Total)	7060[1]	mg/kg	68	8.7	<0.20
TCLP Metals:[3]					
Silver (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10
Arsenic (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10
Barium (TCLP)	6010[1]	mg/l	<10	<10	<10
Cadmium (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10
Chromium (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10
Mercury (TCLP)	7470[1]	mg/l	<0.010	<0.010	<0.010
Lead (TCLP)	6010[1]	mg/l	<0.10	<0.10	<0.10
Selenium (TCLP)	7740[1]	mg/l	<0.10	<0.10	<0.10
TCLP Extraction Fluid Data:					
Extraction Fluid	1311[1]	-	No.2	No.2	No.2
pH with Deionized Water		pH units	12.69	11.16	NAP
pH After Addition of 1 Normal HCL		pH units	12.14	8.69	NAP
pH of TCLP Extract		pH units	12.66	4.78	2.89
Amount of Sample Extracted		g	100	100	NAP

(1)U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(2)U.S. Environmental Protection Agency, 1983, Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.
(3)TCLP - Toxicity Characteristic Leaching Procedure.
(4)NAP - Not applicable.

Table 3
Volatile Organic Analyses
Target Compound List/EPA Method 8260[1]
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-3966
Waste Characterization; 91001-002-33
LIFAC

Parameter	CAS[2] Number	Units	Sample Identification 9312-0812 3 (12/8/93)	9312-0813 4 (12/8/93)	9312-0814 5A (12/8/93)
Acetone	67-64-1	µg/kg	<13000	<13000	<13000
Benzene	71-43-2	µg/kg	<630	<630	<630
Bromodichloromethane	75-27-4	µg/kg	<630	<630	<630
Bromoform	75-25-2	µg/kg	<630	<630	<630
Bromomethane	74-83-9	µg/kg	<1300	<1300	<1300
2-Butanone (MEK)	78-93-3	µg/kg	<13000	<13000	<13000
Carbon disulfide	75-15-0	µg/kg	<630	<630	<630
Carbon tetrachloride	56-23-5	µg/kg	<630	<630	<630
Chlorobenzene	108-90-7	µg/kg	<630	<630	<630
Chlorodibromomethane	124-48-1	µg/kg	<630	<630	<630
Chloroethane	75-00-3	µg/kg	<1300	<1300	<1300
Chloromethane	74-87-3	µg/kg	<1300	<1300	<1300
Chloroform	67-66-3	µg/kg	<630	<630	<630
1,1-Dichloroethane	75-34-3	µg/kg	<630	<630	<630
1,2-Dichloroethane	107-06-2	µg/kg	<630	<630	<630
1,1-Dichloroethene	75-35-4	µg/kg	<630	<630	<630
cis-1,2-Dichloroethene	156-59-2	µg/kg	<630	<630	<630
trans-1,2-Dichloroethene	156-60-5	µg/kg	<630	<630	<630
1,2-Dichloropropane	78-87-5	µg/kg	<630	<630	<630
cis-1,3-Dichloropropene	10061-01-5	µg/kg	<630	<630	<630
trans-1,3-Dichloropropene	10061-02-6	µg/kg	<630	<630	<630
Ethylbenzene	100-41-4	µg/kg	<630	<630	<630
2-Hexanone	591-78-6	µg/kg	<6300	<6300	<6300
Methylene chloride	75-09-2	µg/kg	<630	<630	<630
4-Methyl-2-pentanone (MIBK)	108-10-1	µg/kg	<6300	<6300	<6300
Styrene	100-42-5	µg/kg	<630	<630	<630
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	<630	<630	<630
Tetrachloroethene	127-18-4	µg/kg	<630	<630	<630
Toluene	108-88-3	µg/kg	<630	<630	<630
1,1,1-Trichloroethane	71-55-6	µg/kg	<630	<630	<630
1,1,2-Trichloroethane	79-00-5	µg/kg	<630	<630	<630
Trichloroethene	79-01-6	µg/kg	<630	<630	<630
Vinyl chloride	75-01-4	µg/kg	<1300	<1300	<1300
Xylenes (Total)	1330-20-7	µg/kg	<630	<630	<630

See footnotes at end of table.

Table 3
(Continued)

Parameter	CAS[2] Number	Units	Sample Identification 9312-0815 5B (12/8/93)	9312-0816 6B (12/8/93)	9312-0818 Method Blank (12/9/93)
Acetone	67-64-1	µg/kg	<13000	<13000	<13000
Benzene	71-43-2	µg/kg	<630	<630	<630
Bromodichloromethane	75-27-4	µg/kg	<630	<630	<630
Bromoform	75-25-2	µg/kg	<630	<630	<630
Bromomethane	74-83-9	µg/kg	<1300	<1300	<1300
2-Butanone (MEK)	78-93-3	µg/kg	<13000	<13000	<13000
Carbon disulfide	75-15-0	µg/kg	<630	<630	<630
Carbon tetrachloride	56-23-5	µg/kg	<630	<630	<630
Chlorobenzene	108-90-7	µg/kg	<630	<630	<630
Chlorodibromomethane	124-48-1	µg/kg	<630	<630	<630
Chloroethane	75-00-3	µg/kg	<1300	<1300	<1300
Chloromethane	74-87-3	µg/kg	<1300	<1300	<1300
Chloroform	67-66-3	µg/kg	<630	<630	<630
1,1-Dichloroethane	75-34-3	µg/kg	<630	<630	<630
1,2-Dichloroethane	107-06-2	µg/kg	<630	<630	<630
1,1-Dichloroethene	75-35-4	µg/kg	<630	<630	<630
cis-1,2-Dichloroethene	156-59-2	µg/kg	<630	<630	<630
trans-1,2-Dichloroethene	156-60-5	µg/kg	<630	<630	<630
1,2-Dichloropropane	78-87-5	µg/kg	<630	<630	<630
cis-1,3-Dichloropropene	10061-01-5	µg/kg	<630	<630	<630
trans-1,3-Dichloropropene	10061-02-6	µg/kg	<630	<630	<630
Ethylbenzene	100-41-4	µg/kg	<630	<630	<630
2-Hexanone	591-78-6	µg/kg	<6300	<6300	<6300
Methylene chloride	75-09-2	µg/kg	<630	<630	<630
4-Methyl-2-pentanone (MIBK)	108-10-1	µg/kg	<6300	<6300	<6300
Styrene	100-42-5	µg/kg	<630	<630	<630
1,1,2,2-Tetrachloroethane	79-34-5	µg/kg	<630	<630	<630
Tetrachloroethene	127-18-4	µg/kg	<630	<630	<630
Toluene	108-88-3	µg/kg	<630	<630	<630
1,1,1-Trichloroethane	71-55-6	µg/kg	<630	<630	<630
1,1,2-Trichloroethane	79-00-5	µg/kg	<630	<630	<630
Trichloroethene	79-01-6	µg/kg	<630	<630	<630
Vinyl chloride	75-01-4	µg/kg	<1300	<1300	<1300
Xylenes (Total)	1330-20-7	µg/kg	<630	<630	<630

(1)U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
(2)CAS = Chemical Abstracts Services.

Table 4
TCLP[1] Organic Analyses
ICF Kaiser Engineers, Inc.
Antech Ltd. Project No. 93-3966
Waste Characterization; 91001-002-33
LIFAC

Parameter	CAS[2] Number	Units	Sample Identification 9312-0812 3 (12/8/93)	9312-0813 4 (12/8/93)	9312-0814 5A (12/8/93)
TCLP Volatile Organic Analyses:(8260)[3]					
Benzene	71-43-2	µg/l	<50	<50	<50
2-Butanone	78-93-3	µg/l	<5000	<5000	<5000
Carbon tetrachloride	56-23-5	µg/l	<50	<50	<50
Chlorobenzene	108-90-7	µg/l	<1000	<1000	<1000
Chloroform	67-66-3	µg/l	<500	<500	<500
1,2-Dichloroethane	107-06-2	µg/l	<50	<50	<50
1,1-Dichloroethene	75-35-4	µg/l	<50	<50	<50
Tetrachloroethene	127-18-4	µg/l	<50	<50	<50
Trichloroethene	79-01-6	µg/l	<50	<50	<50
Vinyl chloride	75-01-4	µg/l	<50	<50	<50
TCLP Base/Neutral Extractables:(8270)[3]					
1,4-Dichlorobenzene	106-46-7	µg/l	<500	<500	<500
2,4-Dinitrotoluene	121-14-2	µg/l	<50	<50	<50
Hexachlorobutadiene	87-68-3	µg/l	<50	<50	<50
Hexachlorobenzene	118-74-1	µg/l	<100	<100	<100
Hexachloroethane	67-72-1	µg/l	<500	<500	<500
Nitrobenzene	98-95-3	µg/l	<100	<100	<100
Pyridine	110-86-1	µg/l	<500	<500	<500
TCLP Acid Extractables:(8270)[3]					
Total Cresol (TCLP)	(4)	µg/l	<5000	<5000	<5000
Pentachlorophenol	87-86-5	µg/l	<5000	<5000	<5000
2,4,5-Trichlorophenol	95-95-4	µg/l	<5000	<5000	<5000
2,4,6-Trichlorophenol	88-06-2	µg/l	<100	<100	<100

See footnotes at end of table.

Table 4
(Continued)

Parameter	CAS[2] Number	Units	Sample Identification 9312-0815 5B (12/8/93)	9312-0816 6B (12/8/93)	9312-0818 Method Blank (12/9/93)
TCLP Volatile Organic Analyses:(8260)[3]					
Benzene	71-43-2	µg/l	<50	<50	<50
2-Butanone	78-93-3	µg/l	<5000	<5000	<5000
Carbon tetrachloride	56-23-5	µg/l	<50	<50	<50
Chlorobenzene	108-90-7	µg/l	<1000	<1000	<1000
Chloroform	67-66-3	µg/l	<500	<500	<500
1,2-Dichloroethane	107-06-2	µg/l	<50	<50	<50
1,1-Dichloroethene	75-35-4	µg/l	<50	<50	<50
Tetrachloroethene	127-18-4	µg/l	<50	<50	<50
Trichloroethene	79-01-6	µg/l	<50	<50	<50
Vinyl chloride	75-01-4	µg/l	<50	<50	<50
TCLP Base/Neutral Extractables:(8270)[3]					
1,4-Dichlorobenzene	106-46-7	µg/l	<500	<500	<500
2,4-Dinitrotoluene	121-14-2	µg/l	<50	<50	<50
Hexachlorobutadiene	87-68-3	µg/l	<50	<50	<50
Hexachlorobenzene	118-74-1	µg/l	<100	<100	<100
Hexachloroethane	67-72-1	µg/l	<500	<500	<500
Nitrobenzene	98-95-3	µg/l	<100	<100	<100
Pyridine	110-86-1	µg/l	<500	<500	<500
TCLP Acid Extractables:(8270)[3]					
Total Cresol (TCLP)	[4]	µg/l	<5000	<5000	<5000
Pentachlorophenol	87-86-5	µg/l	<5000	<5000	<5000
2,4,5-Trichlorophenol	95-95-4	µg/l	<5000	<5000	<5000
2,4,6-Trichlorophenol	88-06-2	µg/l	<100	<100	<100

[1]TCLP = Toxicity Characteristic Leaching Procedure.
[2]CAS = Chemical Abstracts Services.
[3]U.S. Environmental Protection Agency, 1987, Test Methods for Evaluating Solid Waste, SW-846, 3rd ed., Office of Solid Waste and Emergency Response, Washington, DC.
[4]m-Cresol 108-39-4, o-Cresol 95-48-7, and p-Cresol 106-44-5.

Toxicity Characteristic Leaching Procedure (TCLP)
Regulatory Levels

Contaminant	Regulatory Level (mg/l)	USEPA Hazardous Waste Number
Arsenic	5.0	D004
Barium	100.0	D005
Cadmium	1.0	D006
Chromium	5.0	D007
Lead	5.0	D008
Mercury	0.2	D009
Selenium	1.0	D010
Silver	5.0	D011
Endrin	0.02	D012
Lindane	0.4	D013
Methoxychlor	10.0	D014
Toxaphene	0.5	D015
2,4-D	10.0	D016
2,4,5-TP (silvex)	1.0	D017
Benzene	0.5	D018
Carbon Tetrachloride	0.5	D019
Chlordane	0.03	D020
Chlorobenzene	100.0	D021
Chloroform	6.0	D022
o-Cresol	200.0	D023
m-Cresol	200.0	D024
p-Cresol	200.0	D025
Cresol	200.0	D026
1,4-Dichlorobenzene	7.5	D027
1,2-Dichloroethane	0.5	D028
1,1-Dichloroethene	0.7	D029
2,4-Dinitrotoluene	0.13	D030
Heptachlor (and its epoxide)	0.008	D031
Hexachlorobenzene	0.13	D032
Hexachlorobutadiene	0.5	D033
Hexachloroethane	3.0	D034
2-Butanone	200.0	D035
Nitrobenzene	2.0	D036
Pentachlorophenol	100.0	D037
Pyridine	5.0	D038
Tetrachloroethene	0.7	D039
Trichloroethene	0.5	D040
2,4,5-Trichlorophenol	400.0	D041
2,4,6-Trichlorophenol	2.0	D042
Vinyl Chloride	0.2	D043

APPENDIX C

PRODUCTION INFORMATION - PARAMETRIC TESTS

LIFAC NA DEMONSTRATION PROJECT
RICHMOND POWER AND LIGHT
WHITEWATER VALLEY GENERATING UNIT #2

PARAMETRIC AND OPTIMIZATION TESTS
ENVIRONMENTAL MONITORING REPORT

ICF KAISER ENGINEERS, INC.
PITTSBURGH, PENNSYLVANIA

To: Dave Berowick fax # (412) 497-2212

From: Kathy Conner

Date: Oct. 27, 1993

Subject: Coal Feed Rates

LIFAC

Sept. 23, 1993:

TIME	COAL FEED (lb/min)	UNIT OUTPUT (MW)
9:10 am - 10:25 am (75 min)	936	61
11:00 am - 12:10 pm (70 min)	1011	61
12:55 ~~12:55 pm~~ - 14:10 pm (75 min)	946	61
15:30 pm - 16:43 pm (73 min)	937	61

Sept. 24, 1993:

8:00 am - 9:20 am (80 min)	818	60
9:50 am - 10:57 am (67 min)	958	60
12:40 pm - 13:52 pm (72 min)	942	60
14:45 ~~14:45 pm~~ - 15:52 pm (67 min)	953	60

Lifac Stack Test 61mw

Test #1

		gen #	Coal scales		
1025	stop	94523	21# 094697	22# 151428	23# 772567
0910	start	93768	094624	151348	772483
		75.5	73	80	81

Coal Rate .929

Test #2		gen	#21	#22	#23
1210	stop	95596	094802	151540	772678
1100	start	94867	094728	151460	772596
		72.9	74	80	82

Coal Rate .971

Test #3		gen	#	# 22	#
[illegible]	stop	96[illegible]	094921	151670	772[illegible]
55	start	96025	094843	151585	772[illegible]
		80.0			

Coal Rate .934

Test #4		gen	21	22	23
1643	stop	98330	095068	151830	772968
1530	start	97588	094996	151752	772890
		742	72	78	78

Coal Rate .922

RICHMOND POWER AND LIGHT

WHITEWATER VALLEY STATION

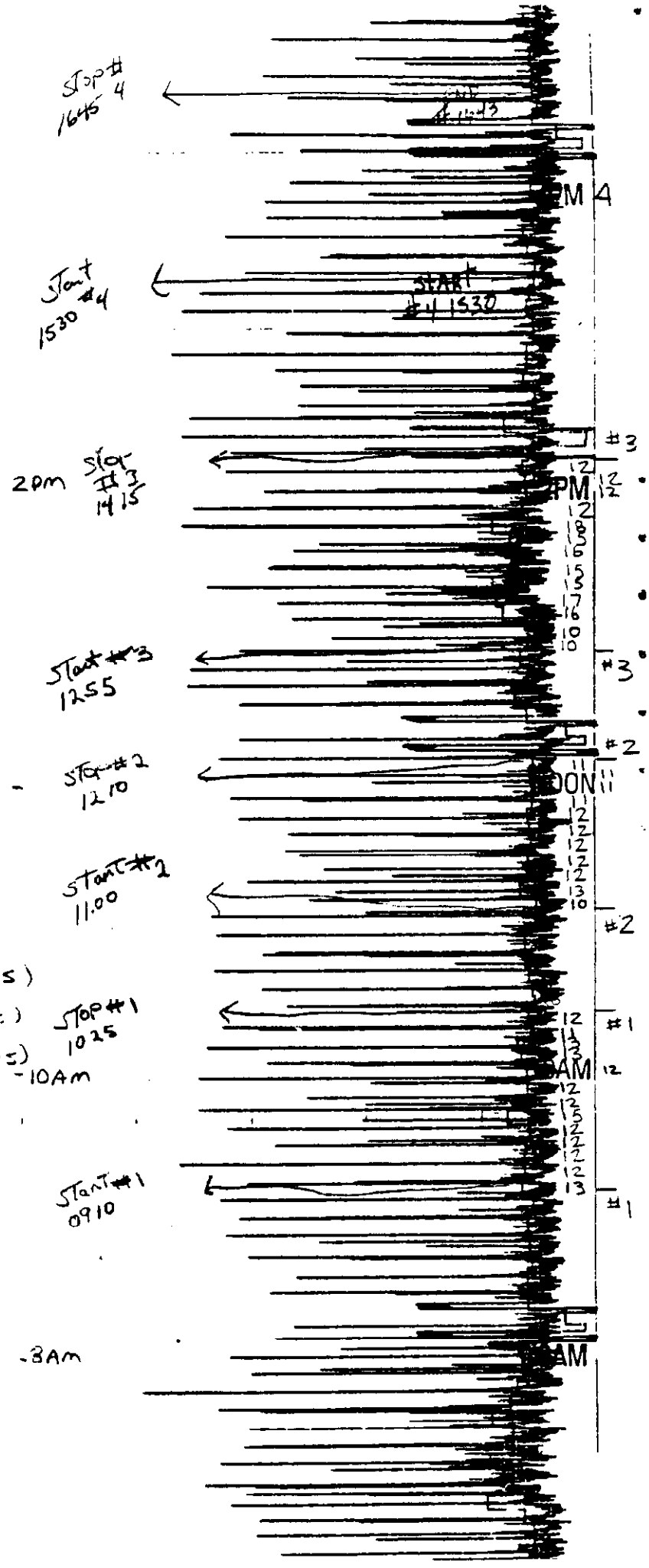
SWITCHBOARD LOG

THURSDAY 4-23-93

GENERATOR No. 2												IMP GEN	INDIANA & MICHIGAN EL. CO. (to R.P.&L.)							UNIT No. 1 AUX TRANS.						UNIT No. 2 AUX TRANS.						TOTAL IDP		SYSTEM MWH		
Temp		Amps							MWH Meter											No. 1 MWH Meter			No. 2 MWH Meter			No. 1 MWH Meter			No. 2 MWH Meter							
T	P	1	2	3	MW	MVAR (+)Lag	KV	Field Amps	Reads	MWH		MW (-) Gen	Reads X.1	MWH	Reserve	Short Term	Emer.	Amps		Reads	MWH	Amps	Reads	MWH	Amps	Reads	MWH	Amps	Reads	MWH	WWVS	IMPA	GROSS	TOTAL HOUSE POWER	NET
									88830				13724							92069			53028			06180			13195							
58	9	2050	2000	2030	51	0	146	500	89346	51.6		28	13997	27.3		18						10	53036	.08	820	06226	48				488	.12	2840	5.00	2340
58	9	2060	2000	2070	51	0	146	500	89658	51.2		26	14256	25.9		16						10	53045	.09	800	06276	48				489	.12	2710	5.01	2209
58	9	2060	1990	2060	51	0	146	500	90369	51.1		26	14507	25.1		16						10	53053	.08	780	06322	46				468	.12	2620	4.80	2140
58	9	2070	1970	2070	51	0	146	500	90882	51.3		26	14751	24.4		16						10	53061	.08	790	06370	48				488	.08	2570	4.96	2074
58	9	2080	1960	2080	51	0	146	510	91396	51.4		25	14995	24.4		18						10	53070	.09	790	06419	49				499	.12	2580	5.11	2069
58	9	2090	1980	2090	52	0	146	520	91914	51.8		30	15277	28.2		18						10	53078	.08	790	06465	46				468	.16	8000	4.84	7516
59	9	2250	2150	2240	56	40	146	550	92458	54.4		41	15636	35.9		29						10	53093	.15	810	06573	48				4.95	.12	90.30	5.07	85.23
60	9	2440	2300	2410	61	20	146	565	93055	59.7		41	16046	41.0		34						10	53116	.23	850	06663	50				5.23	.08	100.70	5.31	95.39
61	9	2440	2320	2410	61	40	146	575	93662	60.7		46	16477	43.1		36						10	53130	.17	840	06614	51				5.24	.12	103.80	5.36	98.44
61	9	2440	2320	2420	61	30	146	570	94266	60.4		46	16939	46.2		38						10	53149	.19	845	06665	51				5.29	.03	106.60	5.37	101.23
61	9	2440	2330	2420	61	20	146	570	94867	60.1		47	17432	49.3		40						10	53160	.11	840	06716	51				5.21	.12	109.40	5.33	104.07
61	9	2440	2320	2400	61	20	146	565	95472	60.5		51	17917	48.5		40						10	53170	.10	840	06767	51				5.20	.12	109.00	5.32	103.68
61	9	2440	2320	2420	61	20	146	565	96077	60.5		48	18402	48.5		40						10	53185	.15	830	06817	50				5.15	.12	109.00	5.27	103.73
61	9	2440	2320	2420	61	20	146	560	96681	60.4		46	18884	48.2		40						10	53195	.10	840	06868	51				5.20	.12	108.60	5.32	103.28
[illegible]	9	2430	[illegible]	2420	61	20	146	545	97287	60.6		43	19327	44.3		38						10	53204	.09	830	06916	50				5.09	.12	104.30	5.21	99.09
[illegible]	9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	146	540	97890	60.3		39	19755	42.8		34						10	53215	.11	835	06970	50				5.11	.12	103.10	[illegible]	97.87
[illegible]	9	[illegible]	2320	[illegible]	[illegible]	[illegible]	146	535	98493	60.3		36	20153	39.8		30						10	53225	.10	840	07019	51				5.20	.12	100.10	5.32	94.78
[illegible]	9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	146	555	99092	59.9		35	20521	36.8		28						10	53234	.09	840	07070	50				5.09	.08	97.70	5.17	91.53
[illegible]	9	2410	2320	2400	60	0	146	555	99689	59.7		40	20902	38.1		30						10	53243	.09	835	07119	50				5.09	.08	97.80	5.12	92.63
[illegible]	9	[illegible]	[illegible]	2390	[illegible]	[illegible]	146	550	00286	59.9		40	21309	40.7		34						10	53253	.09	850	07170	51				5.15	.08	[illegible]	5.27	95.33
[illegible]	9	[illegible]	[illegible]	2410	[illegible]	[illegible]	146	540	00886	59.8		36	21700	39.1		32						10	53261	.09	830	07220	50				5.09	.08	93.30	5.11	93.73
[illegible]	9	2400	2330	2400	60	-40	146	540	01484	59.8		29	22045	34.5		28						10	53270	.09	840	07271	51				5.19	.08	94.30	5.27	89.03
61	9	2410	2300	2400	60	-46	146	535	02084	60.0		24	22300	25.5		18						10	53279	.09	840	07321	50				5.09	.08	85.50	5.17	80.33
61	9	2400	2300	2400	60	-20	146	540	02685	60.1		17	22511	21.1		14						10	53288	.09	840	07372	51				5.19	.12	81.20	5.31	75.89
									13855	1385.5			8787	828.7		665							2.60	2.60		1192	119.2				12180	2.56	22420	124.36	2139.84

Maximum Indicated		Maximum Indicated		Maximum		24 Hour	System Maximum		Time	12M	6AM	12N	6PM	MAX.	MIN.
Time		MW	Time	MWH	Hour	Gross MWH Delivered	Net MWH	Time	Weather / Temp.	CLDY / 65	CLDY / 62	CLDY / 66	CLDY / 62	68	52
										N	NW	NE	E		
2:05/A		61.3	7:20/A	60.7	9A	1385.5	55.51	3P		5mph	5mph	5mph	7 mph		
11:35/P		52.0	12:05/P	49.3	11A	878.7	49.3	11A							
2:43/A		63.0	12:03/P	109.4	11A	2264.2	104.07	11A							

"DON'T SAY IT — WRITE IT"



TEST	MAX. OPACITY	AVERAGE OPACITY
1	15 %	12.4% (12 readings)
2	13 %	11.5% (11 readings)
3	18 %	13.8% (13 readings)

OPACITIES AVERAGED OVER SIX MINUTE INTERVALS

SEPT. 23 1993

Litac Test 9/24/93 60mw

Test #1

	Gen	Coal Scales		
0920 stop	08302	#21 096049	#22 152892	#23 77402
0810 start	07606	095980	152817	77395
	696 MW	69	75	7
				22,200
		.911		

Test #2

	Gen	#21	#22	#23
1057 stop	09286	096147	152997	774132
0950 start	08603	096079	152924	774059
	683	68	73	73
			21,900	(21,900)
			.940	

Test #3

	Gen	#21	#22	#23
1352 stop	11035	096318	153184	774317
1240 start	10308	096247	153106	774240
72	727	71	78	77
		200	(22,400)	23,100
	MW	22		
		21,300	.932	

Test #4

	Gen	21	22	23
1552 stop	12238	096437	153312	774445
1445 start	11560	096369	153240	774372
	678	68	72	73
		20,400	(21,600)	21,900

Coal Rate .942

F. 24 P

361.5
8427
1324.5

919
421.4
7046

RICHMOND POWER AND LIGHT

WHITEWATER VALLEY STATION

.60 1.88 256 | 302 707 1107 | 3080 7258 11326 | .52 124 192 | 45340 12641 20201 | 3132 7383 11517

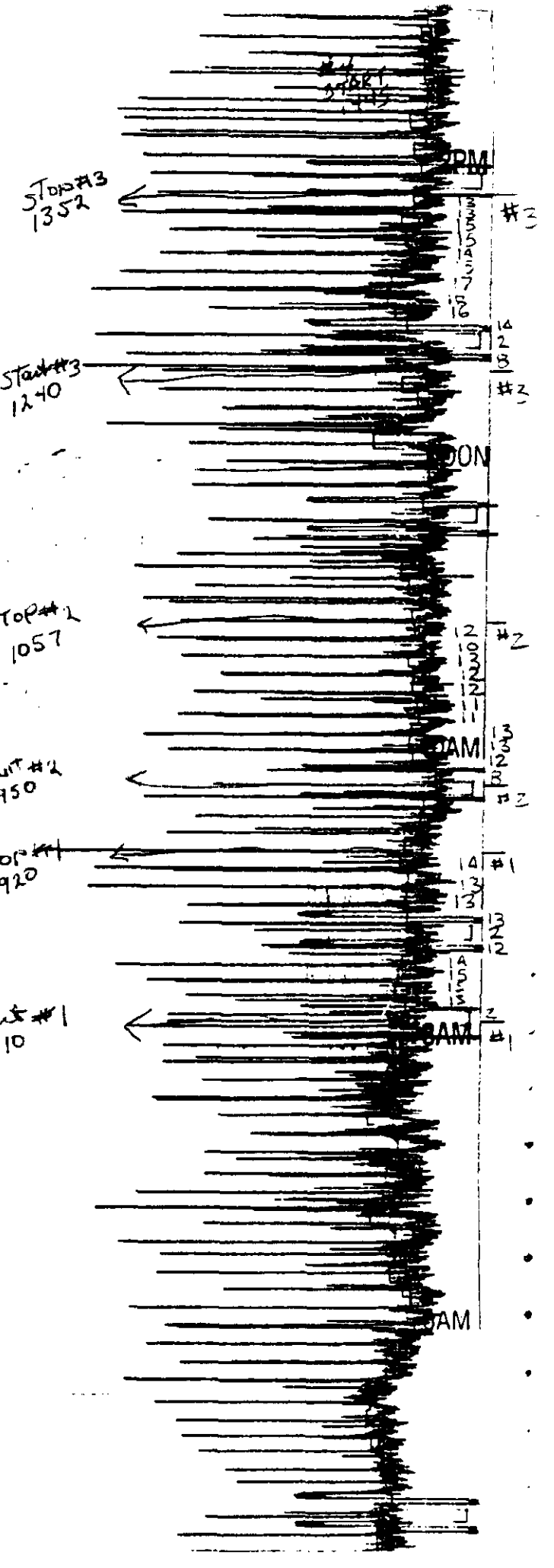
SWITCHBOARD LOG

FRIDAY 9-24-93

	GENERATOR No. 2											IMP GEN	INDIANA & MICHIGAN EL. CO. (to R.P.&L.)							UNIT No. 1 AUX TRANS.						UNIT No. 2 AUX TRANS.						TOTAL HP		SYSTEM MWH		
	Temp		Amps							MWH Meter										No. 1 MWH Meter			No. 2 MWH Meter			No. 1 MWH Meter			No. 2 MWH Meter							
	T	P	1	2	3	MW	MVAR (-) Lag	KV	Field Amps	Reads	MWH		MW (-) Out	Reads X.1	MWH	Reserve	Short Term	Emer.	Amps	Reads	MWH	Amps	Reads	MWH	Amps	Reads	MWH	Amps	Reads	MWH	WW VS	IM PA	GROSS	TOTAL HOUSE POWER	NET
										02685				12511						92069			53288			07372			13195							
	61	9	2400	2300	2400	60	-30	146	540	03217	60.2		16	12684	173		9					10	53297	.09	840	07424	52				529	08	7750	537	7213
	61	9	2400	2300	2400	60	-25	146	540	03889	60.2		14	12834	150		7					10	53306	.09	840	07473	49				499	12	7520	511	7009
	61	9	2400	2300	2400	60	-15	146	535	04489	60.0		14	12979	145		7					10	53317	11	840	07524	51				521	08	7450	529	6921
	61	9	2410	2310	2400	60	-30	146	540	05092	60.3		12	13100	121		7					10	53327	10	825	07574	50				510	08	7240	518	6722
	61	9	2410	2310	2410	60	-20	146	550	05697	60.5		15	13245	145		7					10	53338	.11	830	07624	50				511	08	7500	519	6981
	61	9	2410	2310	2410	60	-10	146	550	06300	60.3		22	13430	185		10					10	53348	.10	840	07674	50				510	.08	7880	518	7362
	61	9	2410	2320	2410	60	10	146	565	06900	60.0		34	13724	294		20					10	53369	.16	840	07725	51				526	12	8940	538	8402
	61	9	2410	2320	2410	60	15	146	560	07501	60.1		39	14092	368		36					10	53388	.24	840	07775	50				524	08	9690	532	9158
	61	9	2410	2310	2410	60	.5	146	560	08103	60.2		44	14500	408		34					10	53409	.16	840	07826	51				526	08	10100	534	9566
	61	9	2410	2310	2410	60	.5	146	560	08705	60.2		45	14954	454		34					10	53423	.19	840	07876	50				519	08	10560	527	10033
	61	9	2410	2310	2410	60	10	146	560	09307	60.2		45	15403	449		40					10	53442	.19	830	07926	50				519	12	10510	531	9979
	61	9	2410	2300	2410	60	0	146	560	09908	60.1		44	15848	445		36					10	53462	.10	840	07978	52				530	.16	10460	542	9918
	61	9	2410	2300	2410	60	15	146	560	10509	60.1		45	16291	443		36					10	53466	.14	840	08028	50				514	08	10440	522	9918
	61	9	2410	2300	2410	60	15	146	560	11112	60.3		42	16725	434		36					10	53476	.10	835	08079	51				520	01	10370	524	9846
	61	9	2400	2300	2400	60	-25	146	540	11713	60.1		37	17115	390		34					10	53495	.09	840	08129	50				509	12	9910	521	9389
	61	9	2400	2310	2400	60	-25	146	540	12313	60.0		40	17502	387		28					10	53494	.09	835	08179	50				509	02	9870	512	9357
	61	9	2400	2320	2400	60	-25	146	545	12911	59.8		33	17879	377		28					10	53502	.08	840	08229	50				508	03	9750	516	9232
	61	9	2420	2320	2420	60	-20	146	545	13515	60.4		34	18273	340		24					10	53510	.08	835	08281	52				516	.08	9480	536	8941
	61	9	2430	2310	2430	60	0	146	555	14120	60.5		38	18590	367		26					10	53519	.09	825	08329	48				489	08	9720	497	9223
	61	9	2400	2320	2400	60	-10	146	555	14725	60.5		33	18953	363		30					10	53526	.09	840	08379	50				500	12	9080	521	8559
	61	9	2420	2320	2420	60	-25	146	540	15328	60.3		30	19279	327		24					10	53536	.08	835	08430	51				518	02	9300	526	8774
	61	9	2420	2310	2420	60	-25	146	545	15910	60.2		25	19557	277		18					10	53544	.08	830	08479	49				498	08	8790	506	8284
	61	9	2400	2310	2400	58	-20	146	520	16532	60.2		20	19765	208		12					10	53553	.09	810	08528	49				499	08	8100	507	7593
	59	9	2400	2090	2400	53	-10	146	500	17081	54.9		20	19986	221		14					10	53561	.08	790	08576	48				488	12	7700	500	7200
										19396	19396			7475	7475		551						2.73	2.73		1204	1204					12313	2.12	21871	12525	20685

Maximum Indicated		Maximum Indicated		Maximum		24 Hour	System Maximum		Time	12M	6AM	12N	6PM	MAX.	MIN.
V	Time	MW	Time	MWH	Hour	Gross MWH Delivered	Net MWH	Time	Weather	P.C	Clear	Clear	[illegible]		
									Temp.	52	47	62	64	68	42
										S	SW	NW	NW		
.	11 00/P	61.0	[illegible]	60.5	5 00/A	14396.0	55.61	7 00 P		3mph	5mph	4mph	[illegible]		
0	3 21/A	48.0	11 00/A	45.4	10 00/A	7475.0	45.4	10 00/A							
0	3 21/A	108.0	9 50/A	105.60	10 00/A	21871.0	100.33	10 00/A							

— "DON'T SAY IT — WRITE IT"



TEST	MAX OPACITY	AVG OPACITY	
1	15%	11.5%	(11 readings)
2	13%	11.5%	(11 readings)
3	18%	13.3%	(12 readings)

OPACITIES AVERAGED OVER SIX MINUTE INTERVALS

SEPT 24 1993

APPENDIX D

PRODUCTION INFORMATION - OPTIMIZATION TESTS

LIFAC NA DEMONSTRATION PROJECT
RICHMOND POWER AND LIGHT
WHITEWATER VALLEY GENERATING UNIT #2

PARAMETRIC AND OPTIMIZATION TESTS
ENVIRONMENTAL MONITORING REPORT

ICF KAISER ENGINEERS, INC.
PITTSBURGH, PENNSYLVANIA

UNIT 2 DEC [illegible] Tuesday

Stack Test #1 930 - 1049 300lb/COUNT

TIME: 930 - 1049 (79 min)

	21 Coal Scale	22 Coal Scale	23 Coal Scale
Stop	[illegible]	[illegible]	[illegible]
Start	[illegible]	221556	[illegible]
	[illegible]	79	84

Stop	MW	63464
Start		62687
		77.7

5/P 120P Stack Test #2 - blew retrs - s # 4H (soot blowing) during test

TIME: 1205 - 1320

	21 Coal Scale	22 Coal Scale	23 Coal Scale
Stop	163984	221323	345432
Start	163356	221739	346346
	88	84	86

Stop	MW	65035
Start		[illegible]
		32.7

10-3 37/P Stack Test #3 NOTE: Mine Tech [illegible] STARTED TEST at 2 30/P, but did not NOTIFY Contr [illegible] UNTIL 2 30/P. SCALE Blanked @ 235pm.

TIME: 1455 - 1537

	21 Coal Scale	22 Coal Scale	23 Coal Scale
Stop	164117	221950	246562
Start	164054	[illegible]	246502
	63	60	61

Stop	MW	[illegible]
Start		[illegible]
		67.0

[illegible] Ty

ICF KAISER ENGINEERS

Job No [illegible]

Sheet 1 of 2

COAL FEED RATES
12-7, 8-93 TESTING

DESIGNED BY JB DATE 1-6-94

CHECKED BY KDC DATE 1-11-94

DECEMBER 7, 1993

TEST #1

930 - 1049 (79 min.)

Total Counts = 81 + 79 + 84 = 244 cts.

$$244 \text{ cts} \times 300 \text{ lb./ct.} = \frac{73200 \text{ lbs.}}{79 \text{ min}} = 927 \text{ lb/min.}$$

TEST # 2

1205 - 1320 (75 min.)

Total Counts = 88 + 84 + 86 = 258 counts

$$258 \text{ counts} \times 300 \text{ lb/ct.} = \frac{77400 \text{ lbs.}}{75 \text{ min.}} = 1032 \text{ lb/min}$$

TEST # 3

1435 - 1537 (62 min.)*

Total Counts = 63 + 60 + 61 = 184 counts

$$184 \text{ counts} \times 300 \text{ lb/ct.} = \frac{55200 \text{ lbs.}}{62 \text{ min.}} = 890 \text{ lb/min.}$$

* Actual test time was from 1420 - 1536. Mostardi-Platt was delayed in informing control room when Test #3 was began. Coal scale readings were not started until 1435.

CALCULATIONS KE Form No E-6 Rev 12-89

12886 4209

RICHMOND POWER

WHITEWATER VALLEY

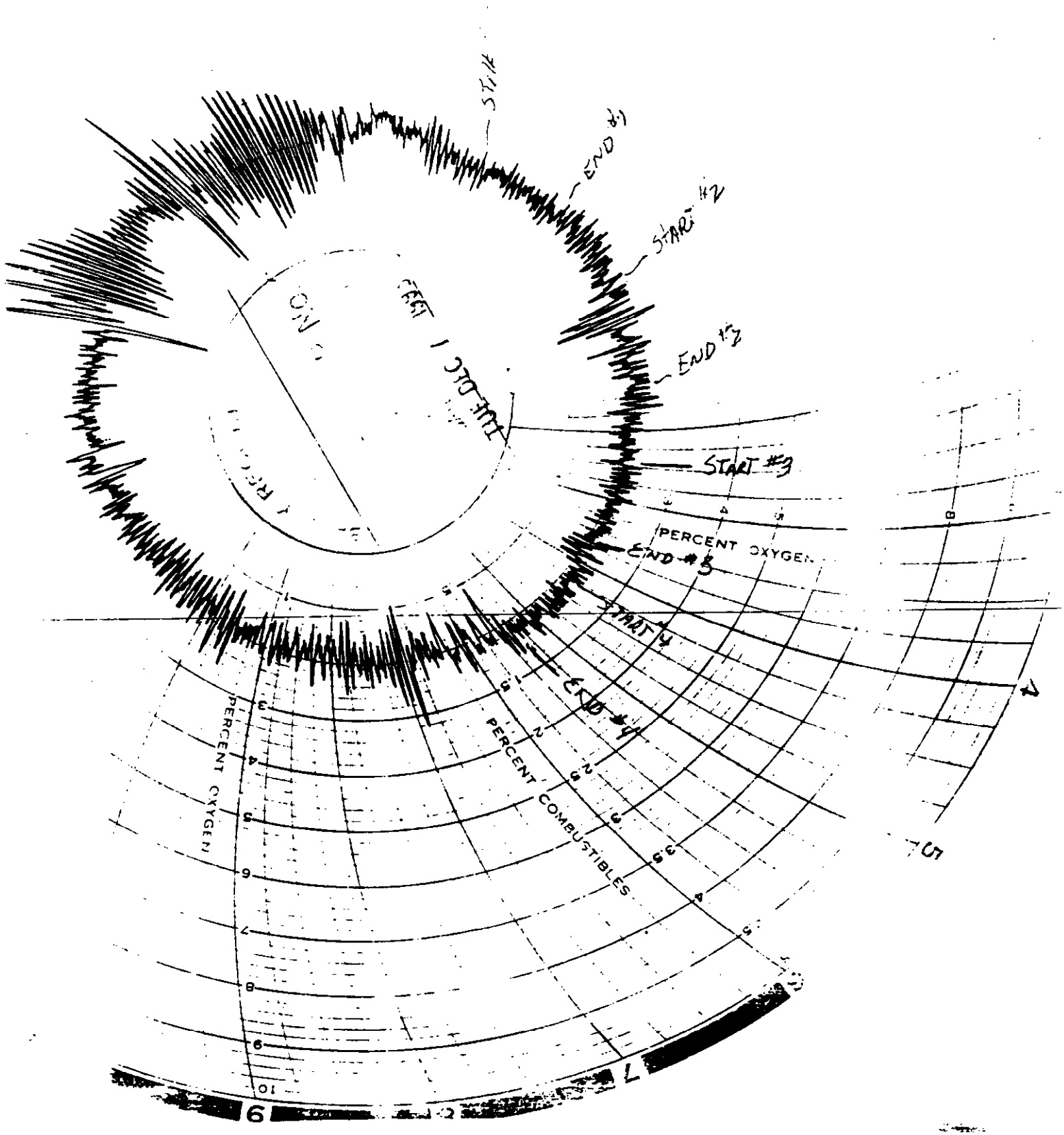
SWITCHBOARD

DEC 7 -93

Meter MWH	GENERATOR No. 2 Temp T	Temp P	Amps 1	Amps 2	Amps 3	MW	MVAR (-) In	KV	Field Amps	MWH Meter Reads	MWH Meter MWH	IMP GEN	MW (-) Out	INDIANA & MICHIGAN EL. CO. (to R.P.& Reads X.1	MWH	Reserve	Short Term	E
										57156				10360			237	
9.2	59	9	2340	2260	2360	59	0	14.7	555	57746	59.0		4	10508	6.4			
24.7	59	9	2390	2290	2390	59	-2.0	14.6	540	58334	58.8		5	10648	6.4			
23.8	59	9	2310	2210	2310	56	-2.0	14.6	[illegible]	58919	58.5		8	10797	7.9			
26.1	59	9	2270	2180	2260	57	-2.0	14.6	510	59481	56.2		8	10955	8.4			
26.7	59	9	2380	2280	2380	59	-1.0	14.6	540	60052	57.1		6	11109	6.5			
29.2	59	9	2390	2275	2390	59	2.0	[illegible]	[illegible]	60636	58.4		8	11296	8.7			
[illegible]	59	[illegible]	[illegible]	[illegible]	[illegible]	59	4.0	[illegible]	[illegible]	61221	58.5		26	11577	18.2		10	
[illegible].6	63	[illegible]	[illegible]	2280	[illegible]	59	[illegible]	[illegible]	[illegible]	61805	58.4		28	[illegible]	29.7	3	15	
[illegible]	65	[illegible]	[illegible]	[illegible]	[illegible]	59	[illegible]	[illegible]	[illegible]	[illegible]	58.7		28	12335	29.6	3	20	
33.1	65	9	2400	2290	2390	59	0	14.6	540	62383	59.1		29	12711	29.7	3	20	
33.0	65	9	2390	2270	2380	59	-1.0	14.6	540	63571	58.8		26	13079	25.7	3	20	
31.8	[illegible]	[illegible]	2390	2270	2370	59	-2.0	14.6	540	64162	59.1		27	13435	27.3	[illegible]	20	
4.0.0	65	9	[illegible]	2350	[illegible]	59	0	[illegible]		64748	58.6		24	13784	27.3		18	
32.6	64	9	2390	2280	2370	59	0	[illegible]	540	65340	59.2		21	14116	24.5	3	15	
32.1	64	9	2380	2280	2360	59	0	14.6	540	65928	58.9		18	14396	18.6	0	10	
32.2	64	9	2380	2280	2350	59	0	14.6	550	66518	58.9		17	14668	18.3		10	
32.4	64	9	2390	2290	2340	59	0	14.6	550	67107	58.9		17	14937	17.5		10	
31.0	64	9	2360	2260	2360	59	0	14.6	550	67694	58.7		24	15249	22.3		15	
33.2	65	9	2390	2290	2390	59	1.0	14.6	555	68281	58.7		22	15584	24.3		15	
32.2	64	9	2370	2270	2370	59	1.0	14.6	550	68869	58.8		20	15860	22.1		15	
32.1	64	9	2390	2280	2390	59	1.0	14.6	550	69456	58.7		19	16210	21.1		10	
33.9	64	9	2390	2280	2380	59	0	14.6	545	70042	58.6		13	16490	17.2	2	5	
31.4	64	9	2340	2270	2370	59	0	14.7	545	70627	58.5		9	16723	12.4	4	0	
29.3	64	9	2310	2210	2310	59	0	14.7	540	71212	58.5		7	16901	7.7	0		
735.5										14056	14056				441.0	21	231	

imum Indicated MW	Time	Maximum Indicated MW	Time	Maximum MWH	Hour	24 Hour Gross MWH Delivered	System Maximum Net MWH	Time	Time	12M	6AM	12N	6PM
									Weather	clear	clear	cldy	cldy
									Temp.	33	30	35	37
0	3:08/A	93.5	9:15/P	92.50	10P	2141.10	85.64	8/6 P		SE	SE	NE	NW
0	12:58/A	30.5	7:45/A	29.90	8A	441.00	29.90	8A		4mph	3mph	7mph	4mph
0	1:08/A	122.5	7:49A	121.90	10A	2582.10	114.58	10A					

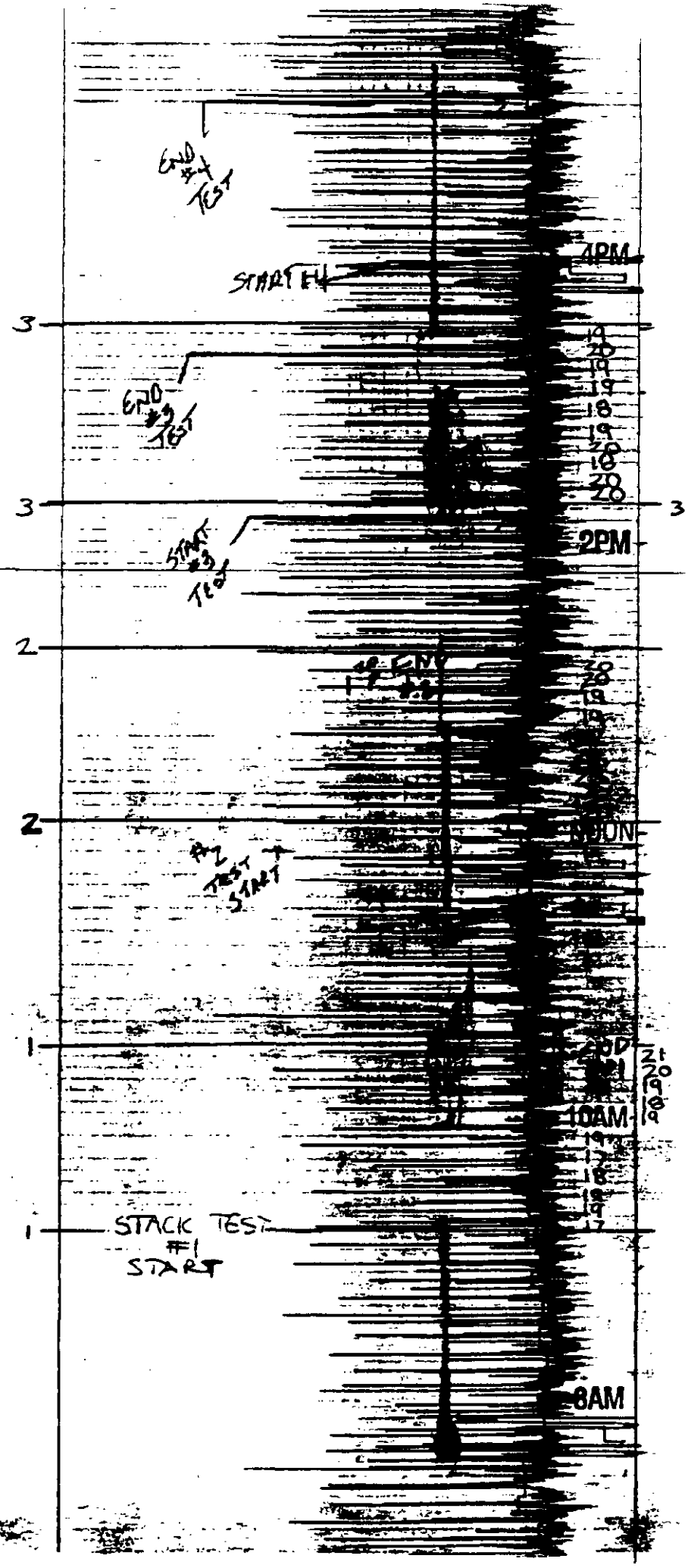
W — "DON'T SAY IT — WRITE IT"


START #1
END #1
START #2
END #2
START #3
END #3
START #4
END #4
PERCENT OXYGEN
PERCENT COMBUSTIBLES
PERCENT OXYGEN

BAILEY RECORDER
NOON
6 PM
1
2
3
4
5
6
7
8
9
START
END

OPACITY CHART
12-7-93

TEST RUN	MAX. OPACITY	AVG. OPACITY
#1	21%	18.7%
#2	26%	21.4%
#3	20%	19.2%



[illegible] DEC 5 PM3 * NEED BOILER LOG

Stack Test #1 845/A – 958

op	21 Coal Scale	165243	22 Coal Scale	223025	23 Coal Scale	847675
tart		165170		222954		847597
		73		71		78
op	MW	77061		* EACH DUMP = 300 LBS		
tart		76351				
		71.0				

Stack Test #2 1045 – 1159 Blew retracts during this test

op	21 Coal Scale	165363	22 Coal Scale	223140	23 Coal Scale	SCALE BYPASSED
tart		165289		223068		847472
		74		72		79
op	MW	78244				
tart		77521				
		723				

Stack Test #3 1300 – 1412

op	21 Coal Scale	165494	22 Coal Scale	223267	23 Coal Scale	
tart		165422		223198		
		72		69		76
top	MW	79[illegible]				
tart		78844				
		70.2				

ICF KAISER ENGINEERS.

Job No. 11001

Sheet 2 of 2

COAL FEED RATES
12-7,8-93 TESTING

DESIGNED BY DB DATE 1-6-94

CHECKED BY KDC DATE 1-11-94

DECEMBER 8, 1993

TEST #1 845-958 (73 min)

Total Counts = 73 + 71 + 78 = 222 counts

$$222 \text{ cts} \times 300 \text{ lb/ct.} = \frac{66600 \text{ lbs}}{73 \text{ min}} = 912. \text{ lb/min}$$

TEST #2

1045 - 1159 (74 min)

Total Counts = 74 + 72 + 79 = 225 counts

$$225 \text{ counts} \times 300 \text{ lb/ct.} = \frac{67500 \text{ lb}}{74 \text{ min}} = 912$$

TEST #3

1300 - 1412 (72 min)

Total Counts = 72 + 69 + 76 = 217 counts

$$217 \text{ counts} \times 300 \text{ lb/count} = \frac{65100 \text{ lbs.}}{72 \text{ min.}} = 904 \text{ lb/min}$$

RICHMOND PC

WHITEWATEI

SWITCH

DEC 8 -93

665.1 415.1

1			GENERATOR No. 2												INDIANA & MICHIGAN EL.			
Field Amps	MWH Meter Reads	MWH	Temp T	Temp P	Amps 1	Amps 2	Amps 3	MW	MVAR (-) In	KV	Field Amps	MWH Meter Reads	MWH	IMP GEN	MW (-) Out	Reads X.1	MWH	Reserv
	29847											71212				16901		
278	30111	26.4	64	9	2320	2220	2320	59	0	14.7	545	71798	58.6		8	17068	7.4	
282	30367	25.6	64	9	2330	2260	2330	59	0	14.7	545	72384	58.6		8	17225	7.6	
280	30616	24.9	64	9	2360	2260	2360	59	0	14.7	545	72969	58.5		8	17388	8.1	
250	30837	22.1	64	9	2390	2340	2390	59	-2.0	14.6	535	73556	58.7		9	17543	7.5	
258	31063	22.6	64	9	2390	2240	2390	59	-1.5	14.6	540	74144	58.9		8	17719	10.0	
300	31334	27.1	64	9	2400	2300	2400	59	0	14.6	540	74731	58.7		13	17906	19.7	
320	31640	30.6	65	9	2400	2380	2390	59	[illegible]	14.6	560	75316	58.5		24	[illegible]	19.8	
322	31970	33.0	64	9	2400	2280	2370	59	0	14.6	550	75906	59.0		27	18570	28.2	2
[illegible]	32295	32.5	64	9	2390	2280	[illegible]	59	0	14.6	540	76492	58.6		27	18[illegible]7	28.4	3
312	32623	32.8	64	9	2390	2280	2380	59	0	14.6	545	77080	58.8		26	19319	28.0	0
311	32950	32.7	64	9	2390	2270	2370	59	-1.0	14.6	540	77667	58.7		25	19571	27.5	
294	33275	32.5	64	9	2390	2290	2370	59	-2.0	14.6	540	78254	58.7		24	10002	23.9	
309	33585	31.0	64	9	2400	2280	2380	59	-1.5	14.6	540	78840	59.0		23	10339	25.1	
300	33898	31.3	64	9	2400	2290	2390	59	-2.0	14.6	530	79431	58.7		20	[illegible]	23.3	
295	34217	31.9	64	9	2400	2300	2400	59	2.5	14.6	525	80021	59.0		18	10971	19.8	
305	34537	32.0	64	9	2400	2300	2400	59	-2.5	14.6	525	80608	58.7		17	11254	18.7	
305	34868	33.1	65	9	2400	2300	2400	59	-3.0	14.6	525	81196	58.8		17	11513	17.1	
315	35201	33.3	65	9	2400	2300	2400	59	0	14.6	540	81786	59.0		21	11792	19.0	
310	35530	32.9	65	9	2400	2300	2400	59	0	14.6	540	82374	58.8		22	12108	22.8	
310	35852	32.2	64	9	2400	2300	2400	59	0	14.6	540	82962	58.8		21	12424	23.4	
310	36174	32.2	64	9	2400	2300	2400	59	0	14.6	540	83549	58.7		16	12704	20.1	
305	36498	32.4	64	9	2380	2280	2380	59	0	14.6	525	84134	58.5		16	12975	19.7	
298	36816	31.8	64	9	2380	2280	2380	59	0	14.6	530	84719	58.5		9	13190	15.3	
300	37129	31.3	64	9	2380	2280	2380	59	-1.5	14.6	530	85303	58.4		5	13341	7.3	
		728.2											1409.1				435.7	5

	Minimum Indicated MW	Minimum Indicated Time	Maximum Indicated MW	Maximum Indicated Time	Maximum MWH	Maximum Hour	24 Hour Gross MWH Delivered	System Maximum Net MWH	System Maximum Time	Time Weather Temp.	12M	6A
IMPA												
WWVS	80.0	4:30A	92.5	5:30P	92.30	6:00P	2137.3	85.29	6:00P		Clear 35 N	Clear 32 NE
I & M	2.5	12:33A	29.5	7:30P	28.40	9:00P	432.7	28.40	9:00P		3mph	4mph
SYSTEM	88.0	4:30A	121.3	7:15P	120.20	8:00P	2573.0	113.08	8:00P			

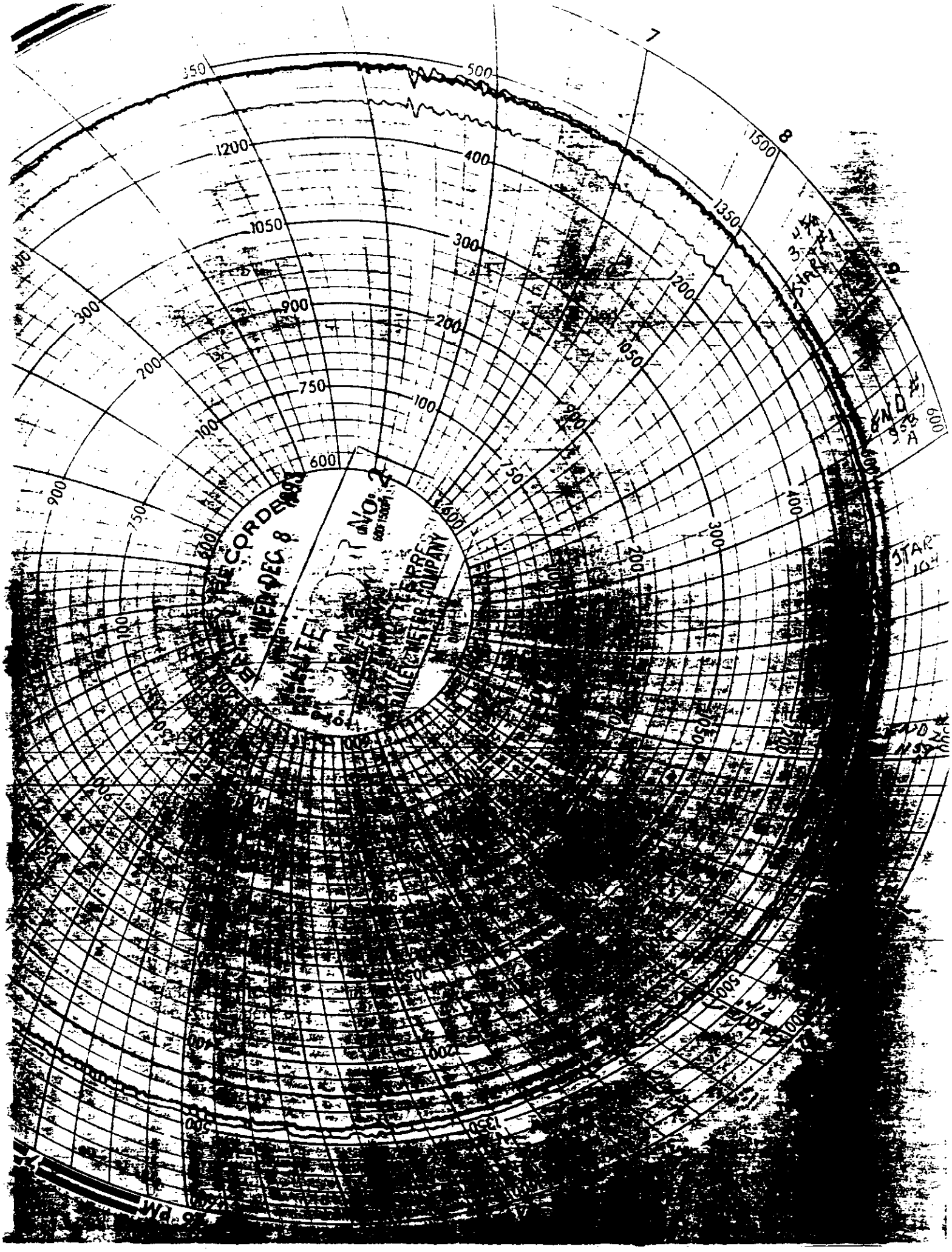
IN SPACE BELOW — "DON'T SAY IT — WRITE IT"

ee) Ordered 192

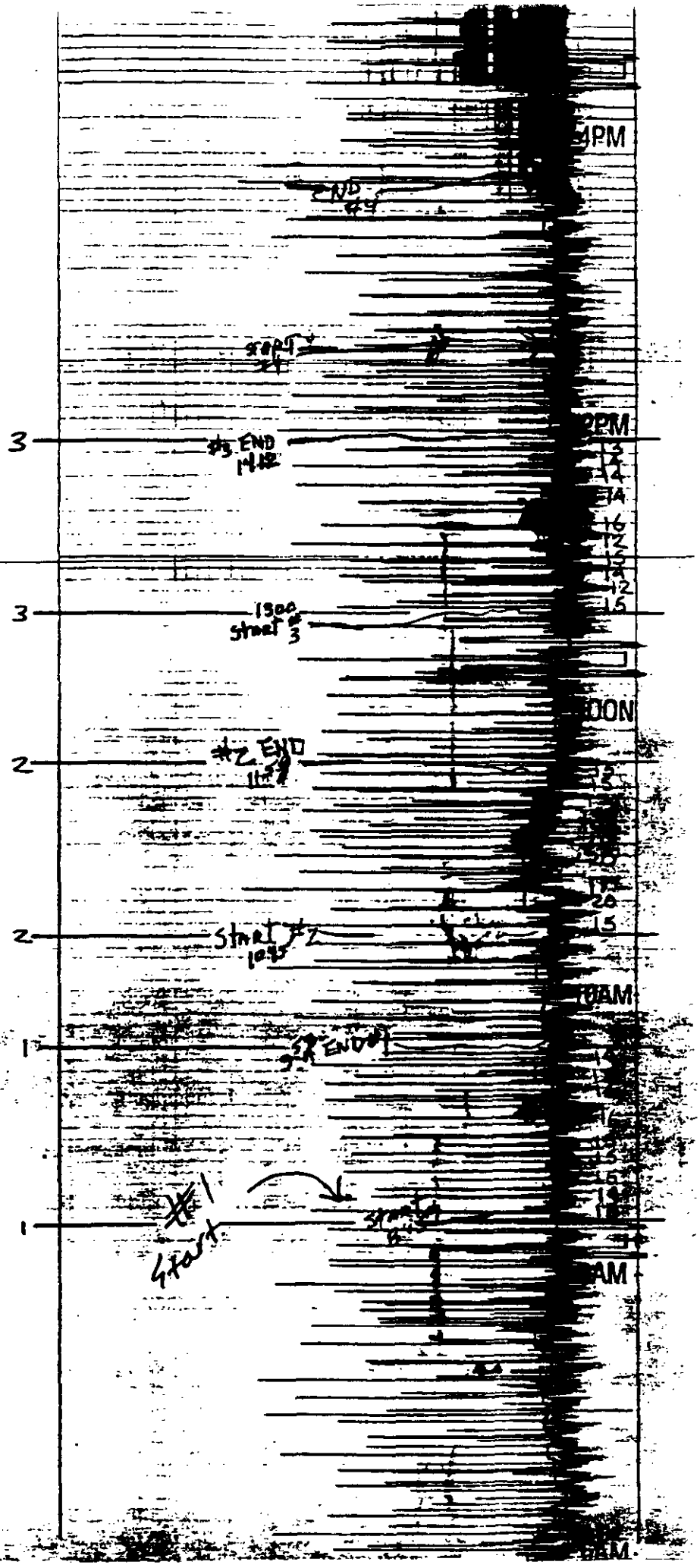
ee) Ordered 236

ee) Ordered 5

BAILEY RE
Meter No.
WATTE
METER NO.
PERCENT OXYGEN
BLUE PERCENT COMBUSTIBL
DATE METER COMPANY
WED DEC 8
1993
PERCENT
START #1 9:45
END #1 9:58
START #2 10:45
START #3 1:00
GEN
7
6
5
4
3.5
3
2.5
2
1.5
1


RECORDER
DEC 8
NO. 2
COMPANY
STARTED
STARTED
STARTED
STARTED
STOPPED
STOPPED
STOPPED
STOPPED

OPACITY CHART
12-8-93



TEST RUN	MAX OPACITY	AVG. OPACITY
#1	17%	15.1%
#2	21%	17.6%
#3	16%	13.9%

APPENDIX E

RP&L'S MONTHLY NPDES MONITORING REPORTS

LIFAC NA DEMONSTRATION PROJECT
RICHMOND POWER AND LIGHT
WHITEWATER VALLEY GENERATING UNIT #2

PARAMETRIC AND OPTIMIZATION TESTS
ENVIRONMENTAL MONITORING REPORT

ICF KAISER ENGINEERS, INC.
PITTSBURGH, PENNSYLVANIA

Facility Name/Location if different

NAME RICHMOND POWER & LIGHT

ADDRESS 2600 U.S. 27 SOUTH

RICHMOND IN 47374

FACILITY

LOCATION

ATTN: MR. ROBERT A. HART

DISCHARGE MONITORING REPORT (DMR)

(2-16) IN0055719 — PERMIT NUMBER

(17-19) 001 A — DISCHARGE NUMBER

MINOR

F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-1-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	93	12	01	TO	93	12	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [ ] ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TEMPERATURE, WATER DEG. FAHRENHEIT 00011 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	61.3	62.9	(15)	NA	02/07	Grab
	PERMIT REQUIREMENT	******	******	*****	******	REPORT MO AVG	REPORT DAILY MX	DEG.F		TWICE/WEEK	GRAB
PH 00400 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		7.74	******	7.86	(12)	0	01/07	Grab
	PERMIT REQUIREMENT	******	******	*****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	15.4	18	(19)	0	02/07	Grab
	PERMIT REQUIREMENT	******	******	*****	******	30.0 MO AVG	70.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
OIL AND GREASE FREON EXTR-GRAV METH 00556 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	<1.34	3.4	(19)	0	02/07	Grab
	PERMIT REQUIREMENT	******	******	*****	******	10.0 MO AVG	15.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
NITROGEN, AMMONIA TOTAL (AS N) 00610 1 2 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.042	0.074	(19)	0	02/31	Grab
	PERMIT REQUIREMENT	******	******	*****	******	1.62 MO AVG	2.60 DAILY MX	MG/L		TWICE/MONTH	GRAB
IRON, TOTAL RECOVERABLE 01980 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.28	0.36	(19)	NA	02/31	Grab
	PERMIT REQUIREMENT	******	******	*****	******	REPORT MO AVG	REPORT DAILY MX	MG/L		TWICE/MONTH	GRAB
ZINC TOTAL RECOVERABLE 01094 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.04	0.05	(19)	0	02/31	Grab
	PERMIT REQUIREMENT	******	******	*****	******	0.20 MO AVG	0.46 DAILY MX	MG/L		TWICE/MONTH	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 317, NUMBER 973-7000

DATE: YEAR 94, MO 1, DAY 17

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME AND ADDRESS (Facility Name/Location if different)

NAME RICHMOND POWER & LIGHT

ADDRESS 2001 U.S. 27 SOUTH

RICHMOND IN 47374

FACILITY

LOCATION

ATTN: MR. ROBERT L. HART

DISCHARGE MONITORING REPORT (DMR)

(2-16) IN0055719 — PERMIT NUMBER

(17-19) 001 A — DISCHARGE NUMBER

MINOR

F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY	TO	YEAR	MO	DAY
FROM	93	12	01		93	12	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [ ] ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		QUANTITY OR LOADING (3 Card Only) (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	QUALITY OR CONCENTRATION (4 Card Only) (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
ALUMINUM, TOTAL RECOVERABLE	SAMPLE MEASUREMENT	******	******		******	0.88	1.19	(19)	2	04/31	Grab
01104 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	0.17 MO AVG	0.40 DAILY MX	MG/L		TWICE/MONTH	GRAB
LEAD TOTAL RECOVERABLE	SAMPLE MEASUREMENT	******	******		******	0.002	0.003	(19)	0	02/31	Grab
01114 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	0.01 MO AVG	0.02 DAILY MX	MG/L		TWICE/MONTH	GRAB
COPPER TOTAL RECOVERABLE	SAMPLE MEASUREMENT	******	******		******	0.02	0.03	(19)	0	02/31	Grab
01119 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	0.02 MO AVG	0.05 DAILY MX	MG/L		TWICE/MONTH	GRAB
OXIDANTS, TOTAL RESIDUAL	SAMPLE MEASUREMENT	******	******		******	<0.05	<0.05	(19)	0	02/07	Grab
34044 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	0.05 MO AVG	0.05 DAILY MX	MG/L		TWICE/WEEK	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	0.5480	0.6097	(03)	******	******	******		NA	03/07	Instant
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	******	******	******	*****		THREE/WEEK	INSTAN
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319 *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
317	973-7200	94	1	17
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: IN 0055719

(17-19) DISCHARGE NUMBER: 001 A

PLANT OR F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

FACILITY: [illegible] STREET
LOCATION: [illegible] RICHMOND IN 47374

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	93	11	01	TO	93	11	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [ ] ***

NOTE: Read instructions before completing this form.

PARAMETER		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
[illegible]	SAMPLE MEASUREMENT	*******	*******		******	61.2	68.0	(15)	NA	02/07	Grab
[illegible] EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	******	REPORT MO AVG	REPORT DAILY MX	DEG.F		TWICE/WEEK	GRAB
[illegible]	SAMPLE MEASUREMENT	*******	*******		7.41	******	8.00	(12)	0	01/07	Grab
[illegible]	PERMIT REQUIREMENT	******	*******	**** ****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		WEEKLY	GRAB
[illegible]	SAMPLE MEASUREMENT	*******	*******		******	19.5	31	(19)	0	02/07	Grab
[illegible]	PERMIT REQUIREMENT	*******	*******	**** ****	******	30.0 MO AVG	70.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
[illegible]	SAMPLE MEASUREMENT	*******	*******		******	<1.82	2.7	(19)	0	02/07	Grab
[illegible] EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	*******	**** ****	******	10.0 MO AVG	15.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
NITROGEN, AMMONIA TOTAL ([illegible])	SAMPLE MEASUREMENT	*******	*******		******	0.03	0.04	(19)	0	02/30	Grab
[illegible] EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	*******	**** ****	******	1.12 MO AVG	1.80 DAILY MX	MG/L		TWICE/MONTH	GRAB
[illegible]	SAMPLE MEASUREMENT	*******	*******		******	1.747	3.335	(19)	NA	04/30	Grab
[illegible] EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*******	*******	**** ****	******	REPORT MO AVG	REPORT DAILY MX	MG/L		TWICE/MONTH	GRAB
ZINC TOTAL [illegible]	SAMPLE MEASUREMENT	*******	*******		******	0.098	0.106	(19)	0	02/30	Grab
[illegible]	PERMIT REQUIREMENT	******	*******	**** ****	******	0.20 MO AVG	0.46 DAILY MX	MG/L		TWICE/MONTH	GRAB

NAME/TITLE OF PRINCIPAL EXECUTIVE OFFICER: [illegible]

CERTIFICATION: I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ATTACHMENTS AND THAT, BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THAT THE INFORMATION IS TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT.

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
317	973 7060	93	12	20
AREA CODE	NUMBER	YEAR	MO	DAY

(USE ONLY FOR SUBMITTING DMR'S FOR PERIODS PRIOR TO JANUARY 1, 2004 — SEE INSTRUCTIONS — SHEET 40 WHICH MAY NOT BE USED) RICHMOND

ATTE

Facility Name/Location if different)

NAME RICHMOND POWER & LIGHT

ADDRESS 2000 U.S. 27 SOUTH

RICHMOND IN 47374

FACILITY

LOCATION

ATTN: MR. ROBERT A. HART

DISCHARGE MONITORING REPORT (DMR)

(2-16) INC055719 PERMIT NUMBER

(17-19) 001 A DISCHARGE NUMBER

MINOR

F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	93	11	01	TO	93	11	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE |__| ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMP TYP (69-
ALUMINUM, TOTAL RECOVERABLE 01104 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.528	0.600	(19)	2	02/30	Gra
	PERMIT REQUIREMENT	******	******	**** ****	******	0.17 MO AVG	0.40 DAILY MX	MG/L		TWICE/ MONTH	GRAB
LEAD TOTAL RECOVERABLE 01114 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.004	0.005	(19)	0	02/30	Gra
	PERMIT REQUIREMENT	******	******	**** ****	******	0.01 MO AVG	0.02 DAILY MX	MG/L		TWICE/ MONTH	GRAB
COPPER TOTAL RECOVERABLE 01119 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.064	0.080	(19)	2	04/30	Gra
	PERMIT REQUIREMENT	******	******	**** ****	******	0.02 MO AVG	0.05 DAILY MX	MG/L		TWICE/ MONTH	GRAB
OXIDANTS, TOTAL RESIDUAL 34044 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	<0.05	<0.05	(19)	0	02/07	Gra
	PERMIT REQUIREMENT	******	******	**** ****	******	0.05 MO AVG	0.05 DAILY MX	MG/L		TWICE/ WEEK	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.5650	0.7039	(03)	******	******	******		NA	03/07	INS
	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		THREE/ WEEK	INST
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 USC § 1001 AND 33 USC § 1319 *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
317	973-7200	93	10	0
AREA CODE	NUMBER	YEAR	MO	D

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

RICHMOND

PAGE OF

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME RICHMOND POWER & LIGHT

ADDRESS 2000 U.S. 27 SOUTH

RICHMOND IN 47374

FACILITY

LOCATION

ATTN: MR. ROBERT A. HART

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: IN0055719

(17-19) DISCHARGE NUMBER: 001 A

MINOR

F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	93	10	01	TO	93	10	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [ ] ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMP TYP (69-7
TEMPERATURE, WATER DEG. FAHRENHEIT	SAMPLE MEASUREMENT	*******	*******		*******	64.7	70.6	(15)	NA	02/07	Gra
00011 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	REPORT MO AVG	REPORT DAILY MX	DEG. F		TWICE/WEEK	GRAB
PH	SAMPLE MEASUREMENT	*******	*******		7.04	******	7.84	(12)	0	01/07	Gra
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	*******	*******		*******	13.11	20	(19)	0	02/07	Gra
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	30.0 MO AVG	70.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
OIL AND GREASE FREON EXTR-GRAV METH	SAMPLE MEASUREMENT	*******	*******		*******	<2.72	13.7	(19)	0	02/07	Gra
00556 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	10.0 MO AVG	15.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
NITROGEN, AMMONIA TOTAL (AS N)	SAMPLE MEASUREMENT	*******	*******		*******	0.182	0.242	(19)	0	02/31	Gra
00610 1 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	1.12 MO AVG	1.80 DAILY MX	MG/L		TWICE/MONTH	GRAB
IRON TOTAL RECOVERABLE	SAMPLE MEASUREMENT	*******	*******		*******	1.040	1.260	(19)	NA	04/31	Gra
01980 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	REPORT MO AVG	REPORT DAILY MX	MG/L		TWICE/MONTH	GRAB
ZINC TOTAL RECOVERABLE	SAMPLE MEASUREMENT	*******	*******		*******	0.071	0.071	(19)	0	02/31	Gra
01094 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	0.20 MO AVG	0.46 DAILY MX	MG/L		TWICE/MONTH	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 USC § 1001 AND 33 USC § 1319 (*Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years*)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
AREA CODE	NUMBER	YEAR	MO	DA
317	973-7200	93	11	0

COMMENT AND EXPLANATION OF ANY VIOLATIONS (*Reference all attachments here*)

PERMITTEE NAME, ADDRESS (Include name of plant)

NAME [illegible] POWER & LIGHT

ADDRESS [illegible] P.O. 27 SOUTH

[illegible] RICHMOND IN 47371

FACILITY

LOCATION

ATTN: Mr. ROBERT A. HART

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) IN 0055719 — PERMIT NUMBER

(17-19) 001 A — DISCHARGE NUMBER

MINOR

F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	93	10	01	TO	93	10	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE |__| ***

NOTE: Read instructions before completing this form.

PARAMETER (PIP)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
[illegible]	SAMPLE MEASUREMENT	*******	*******		******	0.824	0.958	(19)	2	04/31	Grab
[illegible] VALU	PERMIT REQUIREMENT	*******	*******	***** *****	******	0.17 MO AVG	0.40 DAILY MX	MG/L		TWICE/MONTH	GRAB
[illegible]	SAMPLE MEASUREMENT	*******	*******		******	0.006	0.007	(19)	0	02/31	Grab
[illegible] EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	***** *****	******	0.01 MO AVG	0.02 DAILY MX	MG/L		TWICE/MONTH	GRAB
COPPER, TOTAL RECOVERABLE	SAMPLE MEASUREMENT	*******	*******		******	0.046	0.081	(19)	2	04/31	Grab
[illegible] EFFLUENT GROSS VALU	PERMIT REQUIREMENT	******	******	***** *****	******	0.02 MO AVG	0.05 DAILY MX	MG/L		TWICE/MONTH	GRAB
OXIDANTS, TOTAL RESIDUAL	SAMPLE MEASUREMENT	*******	*******		******	<0.05	<0.05	(19)	0	02/07	Grab
[illegible] EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	***** *****	******	0.05 MO AVG	0.05 DAILY MX	MG/L		TWICE/WEEK	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	.6071	.7618	(03)	******	******	******		NA	03/07	Instant
[illegible] EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	******	******	******	***** *****		THREE/WEEK	INSTAN
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME AND TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. (See 18 USC § 1001 and 33 USC § 1319 (Penalties under these statutes may include fines up to $10000 and or maximum imprisonment of between 6 months and 5 years)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
AREA CODE	NUMBER	YEAR	MO	DAY
317	973-7200	93	11	22

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(FORM MAY NOT BE USED) RICHMOND

PAGE OF

Facility Name/Location if different)

NAME RICHMOND POWER & LIGHT

ADDRESS 2000 U.S. 27 SOUTH

RICHMOND IN 47374

FACILITY

LOCATION

ATTN: MR. ROBERT A. HART

DISCHARGE MONITORING REPORT

(2-16) PERMIT NUMBER: IN0055719

(17-19) DISCHARGE NUMBER: 001 A

MINOR

F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	93	09	01	TO	93	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DATA | | ***

NOTE: Read instructions before completing this form

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-65)	FREQUENCY OF ANALYSIS (66-68)	SAMPLE TYPE (69-70)
ALUMINUM, TOTAL RECOVERABLE 01104 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*******	*******		*******	1.066	1.366	(19)	2	04/31	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.17 MO AVG	0.40 DAILY MX	MG/L		TWICE/MONTH	GRAB
LEAD TOTAL RECOVERABLE 01114 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.006	0.006	(19)	0	02/31	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.01 MO AVG	0.02 DAILY MX	MG/L		TWICE/MONTH	GRAB
COPPER TOTAL RECOVERABLE 01119 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.057	0.061	(19)	2	04/31	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.05 MO AVG	0.05 DAILY MX	MG/L		TWICE/MONTH	GRAB
OXIDANTS, TOTAL RESIDUAL 34044 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	<0.05	<0.05	(19)	0	02/07	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.05 MO AVG	0.05 DAILY MX	MG/L		TWICE/WEEK	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.7255	0.9609	(03)	******	******	******		NA	03/07	[illegible]
	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		THREE/WEEK	INST
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

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SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
317	973 7200	93	10	2
AREA CODE	NUMBER	YEAR	MO	DA

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

[illegible] FORM T-10 WHICH MAY NOT BE USED) RICHMOND

PAGE OF

Facility Name/Location (if different)
NAME RICHMOND POWER & LIGHT
ADDRESS 2000 U.S. 27 SOUTH
RICHMOND IN 47374

FACILITY
LOCATION

ATTN: MR. ROBERT A. HART

DISCHARGE MONITORING REPORT (DMR)

(2-16) INC055719 — PERMIT NUMBER

(17-19) 001 A — DISCHARGE NUMBER

MINOR

F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	93	09	01	TO	93	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DATA |__| ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMP TYPE (69-7)
TEMPERATURE, WATER DEG. FAHRENHEIT 00011 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	77.1	81.0	(15)	NA	02/07	Grab
	PERMIT REQUIREMENT	******	******	******	******	REPORT NO AVG	REPORT DAILY MX	DEG. F		TWICE/WEEK	GRAB
PH 00400 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		7.55	******	7.79	(12)	0	01/07	Grab
	PERMIT REQUIREMENT	******	******	******	6.0 MINIMUM	******	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	19.1	25	(19)	0	02/07	Grab
	PERMIT REQUIREMENT	******	******	******	******	[illegible] NO AVG	70.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
OIL AND GREASE FREON EXTR-GRAV METH 00556 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	<1.1	1.5	(19)	0	02/07	Grab
	PERMIT REQUIREMENT	******	******	******	******	[illegible] NO AVG	15.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
NITROGEN, AMMONIA TOTAL (AS N) 00610 1 1 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.110	0.113	(19)	0	02/31	Grab
	PERMIT REQUIREMENT	******	******	******	******	1.17 NO AVG	1.80 DAILY MX	MG/L		TWICE/MONTH	GRAB
IRON TOTAL RECOVERABLE 00980 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.936	0.990	(19)	NA	02/31	Grab
	PERMIT REQUIREMENT	******	******	******	******	REPORT NO AVG	REPORT DAILY MX	MG/L		TWICE/MONTH	GRAB
ZINC TOTAL RECOVERABLE 01094 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.054	0.058	(19)	0	02/31	[illegible]
	PERMIT REQUIREMENT	******	******	******	******	0.20 NO AVG	0.46 DAILY MX	MG/L		TWICE/MONTH	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

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SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
317	973-7200	93	10	2[illegible]
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

FACILITY NAME/ADDRESS (if different)

NAME RICHMOND POWER & LIGHT

ADDRESS 2000 U.S. 27 SOUTH

RICHMOND IN 47374

FACILITY

LOCATION

ATTN: MR. ROBERT A. HART

DISCHARGE MONITORING REPORT (DMR)

PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)
IN0055719	001 A

MINOR

F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	93	08	01	TO	93	08	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO. DATA |__| ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TEMPERATURE, WATER DEG. FAHRENHEIT 00011 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	85.21	89.6	(15)	NA	02/07	Grab
	PERMIT REQUIREMENT	******	******	******	******	REPORT MO AVG	REPORT DAILY MX	DEG.F		TWICE/WEEK	GRAB
PH 00400 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		7.50	******	7.61	(12)	0	01/07	Grab
	PERMIT REQUIREMENT	******	******	******	6.0 MINIMUM	******	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	20.4	22	(19)	0	02/07	Grab
	PERMIT REQUIREMENT	******	******	******	******	30.0 MO AVG	70.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
OIL AND GREASE FREON EXTR-GRAV METH 00556 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	<1.0	<1.0	(19)	0	02/07	Grab
	PERMIT REQUIREMENT	******	******	******	******	10.0 MO AVG	15.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
NITROGEN, AMMONIA TOTAL (AS N) 00610 1 1 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.091	0.148	(19)	0	02/31	Grab
	PERMIT REQUIREMENT	******	******	******	******	1.12 MO AVG	1.80 DAILY MX	MG/L		TWICE/MONTH	GRAB
IRON TOTAL RECOVERABLE 01045 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.612	0.748	(19)	NA	04/31	Grab
	PERMIT REQUIREMENT	******	******	******	******	REPORT MO AVG	REPORT DAILY MX	MG/L		TWICE/MONTH	GRAB
ZINC TOTAL RECOVERABLE 01094 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.046	0.050	(19)	0	04/31	Grab
	PERMIT REQUIREMENT	******	******	******	******	0.20 MO AVG	0.46 DAILY MX	MG/L		TWICE/MONTH	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

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SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
317	973-7000	93	09	17
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
D ARG ONIT NG R T (

Name RICHMOND POWER & LIGHT
ADDRESS 2600 U.S. 27 SOUTH
RICHMOND IN 47374

FACILITY
LOCATION
ATTN: MR. ROBERT A. HART

(2-16) INO055719 PERMIT NUMBER

(19) 00 A DISCHARGE NUMBER

MINOR

F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	93	08	01	TO	93	08	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DATA |__| ***

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
ALUMINUM, TOTAL RECOVERABLE 01104 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	1.045	1.561	(19)	2	04/31	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.17 MO AVG	0.40 DAILY MX	MG/L		TWICE/MONTH	GRAB
LEAD TOTAL RECOVERABLE 01114 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.007	0.008	(19)	0	04/31	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.01 MO AVG	0.02 DAILY MX	MG/L		TWICE/MONTH	GRAB
COPPER TOTAL RECOVERABLE 01119 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.038	0.045	(19)	1	04/31	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.02 MO AVG	0.05 DAILY MX	MG/L		TWICE/MONTH	GRAB
OXIDANTS, TOTAL RESIDUAL 34044 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	<0.05	<0.05	(19)	0	03/07	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.05 MO AVG	0.05 DAILY MX	MG/L		TWICE/WEEK	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.6960	0.8206	(03)	******	******	******		NA	03/07	Instan
	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		THREE/WEEK	INSTAN
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

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SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
317	973-7000	93	09	17
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

NAME RICHMOND POWER & LIGHT
ADDRESS 2000 U.S. 27 SOUTH
RICHMOND IN 47374

FACILITY
LOCATION
ATTN: MR. ROBERT A. HART

DISCHARGE MONITORING REPORT (DMR)

PERMIT NUMBER (2-16): IN0055719
DISCHARGE NUMBER (17-19): 001 A

MINOR
F - FINAL

Form Approved.
OMB No. 2040-0004
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MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	93	07	01	TO	93	07	31
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*** NO DATA |__| ***

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PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TEMPERATURE, WATER DEG. FAHRENHEIT 00011 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	88.2	90.3	(15)	NA	03/07	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT NO AVG	REPORT DAILY MX	DEG.F		TWICE/WEEK	GRAB
PH 00400 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		7.25	******	7.72	(12)	0	01/07	Grab
	PERMIT REQUIREMENT	******	******	**** ****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	17.9	26	(19)	0	03/07	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	30.0 NO AVG	70.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
OIL AND GREASE FREON EXTR-GRAV METH 00556 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	<1.0	<1.0	(19)	0	03/07	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	10.0 NO AVG	15.0 DAILY MX	MG/L		TWICE/WEEK	GRAB
NITROGEN, AMMONIA TOTAL (AS N) 00610 1 1 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.16	0.192	(19)	0	03/31	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	1.12 NO AVG	1.80 DAILY MX	MG/L		TWICE/MONTH	GRAB
IRON TOTAL RECOVERABLE 00980 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	1.281	2.966	(19)	NA	04/31	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT NO AVG	REPORT DAILY MX	MG/L		TWICE/MONTH	GRAB
ZINC TOTAL RECOVERABLE 01094 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.053	0.061	(19)	0	03/31	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.20 NO AVG	0.46 DAILY MX	MG/L		TWICE/MONTH	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

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SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
317	973-7000	93	08	13
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

Facility (Name/Location if different)
NAME RICHMOND POWER & LIGHT
ADDRESS 2000 U.S. 27 SOUTH
RICHMOND IN 47374

FACILITY
LOCATION

ATT : MR. ROBERT A. HART

DISCHARGE MONITORING REPORT (DMR)

(2-16)	(17-19)
IN0055719	001 A
PERMIT NUMBER	DISCHARGE NUMBER

MINOR

F - FINAL

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
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	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DATA |__| ***
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
ALUMINUM, TOTAL RECOVERABLE 01104 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	1.094	1.199	(19)	2	04/31	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.17 MO AVG	0.40 DAILY MX	MG/L		TWICE/MONTH	GRAB
LEAD TOTAL RECOVERABLE 01114 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.007	0.008	(19)	0	03/31	Gra
	PERMIT REQUIREMENT	******	******	**** ****	******	0.01 MO AVG	0.02 DAILY MX	MG/L		TWICE/MONTH	GRAB
COPPER TOTAL RECOVERABLE 01119 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0.033	0.055	(19)	2	04/31	Gra
	PERMIT REQUIREMENT	******	******	**** ****	******	0.02 MO AVG	0.05 DAILY MX	MG/L		TWICE/MONTH	GRAB
OXIDANTS, TOTAL RESIDUAL 34044 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	<0.05	<0.05	(19)	0	02/07	Grab
	PERMIT REQUIREMENT	******	******	**** ****	******	0.05 MO AVG	0.05 DAILY MX	MG/L		TWICE/WEEK	GRAB
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.7558	0.8404	(03)	******	******	******		NA	03/07	INST.
	PERMIT REQUIREMENT	REPORT MO AVG	REPORT DAILY MX	MGD	******	******	******	**** ****		THREE/WEEK	INST
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years)		TELEPHONE		DATE		
			317	973-7000	93	08	1
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DA

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(REPLACES EPA FORM T-45 WHICH MAY NOT BE USED) RICHMOND

PAGE OF

APPENDIX F

COAL ANALYSIS

LIFAC NA DEMONSTRATION PROJECT
RICHMOND POWER AND LIGHT
WHITEWATER VALLEY GENERATING UNIT #2

PARAMETRIC AND OPTIMIZATION TESTS
ENVIRONMENTAL MONITORING REPORT

ICF KAISER ENGINEERS, INC.
PITTSBURGH, PENNSYLVANIA

Lab. No 59017

Date Rec'd 09/27/93

Date Sampled 09/22/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

RECEIVED
OCT 1 0 1993
ENGINEERING DEPARTMENT

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
TEST #1

GRINDABILITY MOISTURE = 2.54%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	11.74	10.78	33.36	44.12	11345	2.24
Dry Basis	-----	12.21	37.80	49.99	12854	2.54
M-A-Free					14642	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2100	2525
SOFTENING	2235	2550
HEMISPHERICAL	2355	2570
FINAL	2510	2610

HARDGROVE GRINDABILITY INDEX : 54

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59017

Date Rec'd 09/27/93

Date Sampled 09/22/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID: COAL FEEDER
TEST #1

ICP KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

ARSENIC = 84.4 ug/g ASH BASIS

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	12.21
HYDROGEN	4.88
CARBON	72.00
NITROGEN	1.50
SULFUR	2.54
OXYGEN	6.87
CHLORINE	0.03

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	48.60
ALUMINUM OXIDE (AL2O3)	22.88
TITANIUM DIOXIDE (TIO2)	1.12
CALCIUM OXIDE (CAO)	2.48
POTASSIUM OXIDE (K2O)	1.74
MAGNESIUM OXIDE (MGO)	0.76
SODIUM OXIDE (NA2O)	0.28
PHOSPHORUS PENTOXIDE (P2O5)	0.24
FERRIC OXIDE (FE2O3)	16.68
SULFUR TRIOXIDE (SO3)	2.42
UNDETERMINED	2.80

BASE/ACID RATIO: 0.3022
LBS OF ASH/MILLION BTU: 9.50
SLAG VISCOSITY: 2550 DEG F. T250 POISE
FOULING INDEX: 0.0846 TYPE: LOW
SLAGGING INDEX: 0.7676 TYPE: MEDIUM
SILICA VALUE: 70.9282
% ALKALI AS NA2O: 0.1759

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Respectfully Submitted,

BRETT A. STOCK

Lab No 59018

Date Rec'd 09/27/93

Date Sampled 09/22/93

Sampled By CLIENT

STANDARD LABORATORIES,

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
TEST #2

GRINDABILITY MOISTURE = 2.52%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfu
As Rec'd.	12.52	10.39	33.75	43.34	11322	2.1
Dry Basis	-----	11.88	38.58	49.54	12942	2.4
M-A-Free					14687	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2150	2580
SOFTENING	2240	2610
HEMISPHERICAL	2385	2620
FINAL	2480	2635

HARDGROVE GRINDABILITY INDEX : 53

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

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BRETT A. STOCK

Lab. No 59018

Date Rec'd 09/27/93

Date Sampled 09/22/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:
COAL FEEDER
TEST #2

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.88
HYDROGEN	4.99
CARBON	72.24
NITROGEN	1.57
SULFUR	2.48
OXYGEN	6.84
CHLORINE	<0.01

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	48.10
ALUMINUM OXIDE (AL2O3)	25.16
TITANIUM DIOXIDE (TIO2)	1.14
CALCIUM OXIDE (CAO)	1.70
POTASSIUM OXIDE (K2O)	1.94
MAGNESIUM OXIDE (MGO)	0.78
SODIUM OXIDE (NA2O)	0.32
PHOSPHORUS PENTOXIDE (P2O5)	0.28
FERRIC OXIDE (FE2O3)	16.62
SULFUR TRIOXIDE (SO3)	0.96
UNDETERMINED	3.00

BASE/ACID RATIO: 0.2871
LBS OF ASH/MILLION BTU: 9.18
SLAG VISCOSITY: 2570 DEG F. T250 POISE
FOULING INDEX: 0.0919 TYPE: LOW
SLAGGING INDEX: 0.7120 TYPE: MEDIUM
SILICA VALUE: 71.5774
% ALKALI AS NA2O: 0.1917

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Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59019

Date Rec'd 09/27/93

Date Sampled 09/22/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
TEST #3

GRINDABILITY MOISTURE = 2.49%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.63	10.41	33.90	43.06	11255	2.34
Dry Basis	-----	11.91	38.80	49.29	12882	2.68
M-A-Free					14624	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2125	2580
SOFTENING	2205	2600
HEMISPHERICAL	2315	2625
FINAL	2465	2635

HARDGROVE GRINDABILITY INDEX : 55

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

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Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59019

Date Rec'd 09/27/93

Date Sampled 09/22/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID: COAL FEEDER
TEST #3

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.91
HYDROGEN	4.97
CARBON	72.01
NITROGEN	1.48
SULFUR	2.68
OXYGEN	6.95
CHLORINE	0.02

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	47.60
ALUMINUM OXIDE (AL2O3)	25.44
TITANIUM DIOXIDE (TIO2)	1.14
CALCIUM OXIDE (CAO)	1.62
POTASSIUM OXIDE (K2O)	1.94
MAGNESIUM OXIDE (MGO)	0.76
SODIUM OXIDE (NA2O)	0.30
PHOSPHORUS PENTOXIDE (P2O5)	0.28
FERRIC OXIDE (FE2O3)	17.42
SULFUR TRIOXIDE (SO3)	0.94
UNDETERMINED	2.56

BASE/ACID RATIO: 0.2971
LBS OF ASH/MILLION BTU: 9.25
SLAG VISCOSITY: 2550 DEG F. T250 POISE
FOULING INDEX: 0.0891 TYPE: LOW
SLAGGING INDEX: 0.7962 TYPE: MEDIUM
SILICA VALUE: 70.6231
% ALKALI AS NA2O: 0.1898

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Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59020

Date Rec'd 09/27/93

Date Sampled 09/23/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.
1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
TEST #1

GRINDABILITY MOISTURE = 2.64%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.30	10.09	34.32	43.29	11371	2.46
Dry Basis	-----	11.50	39.13	49.37	12966	2.80
M-A-Free					14651	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2165	2550
SOFTENING	2245	2570
HEMISPHERICAL	2295	2585
FINAL	2350	2600

HARDGROVE GRINDABILITY INDEX : 52

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

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Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59020

Date Rec'd 09/27/93

Date Sampled 09/23/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID: COAL FEEDER
TEST #1

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

ARSENIC = 6.47 ug/g ASH BASIS

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.50
HYDROGEN	4.91
CARBON	72.32
NITROGEN	1.49
SULFUR	2.80
OXYGEN	6.98
CHLORINE	0.03

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	45.20
ALUMINUM OXIDE (AL2O3)	24.30
TITANIUM DIOXIDE (TIO2)	1.04
CALCIUM OXIDE (CAO)	2.04
POTASSIUM OXIDE (K2O)	1.74
MAGNESIUM OXIDE (MGO)	0.70
SODIUM OXIDE (NA2O)	0.28
PHOSPHORUS PENTOXIDE (P2O5)	0.30
FERRIC OXIDE (FE2O3)	20.30
SULFUR TRIOXIDE (SO3)	1.13
UNDETERMINED	2.97

BASE/ACID RATIO: 0.3553
LBS OF ASH/MILLION BTU: 8.87
SLAG VISCOSITY: 2460 DEG F. T250 POISE
FOULING INDEX: 0.0995 TYPE: LOW
SLAGGING INDEX: 0.9948 TYPE: MEDIUM
SILICA VALUE: 66.2368
% ALKALI AS NA2O: 0.1657

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Respectfully Submitted,

BRETT A. STOCK

Lab. No 59021

Date Rec'd 09/27/93

Date Sampled 09/23/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.
1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
TEST #2

GRINDABILITY MOISTURE = 2.57%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	13.36	9.48	34.09	43.07	11335	2.37
Dry Basis	-----	10.94	39.35	49.71	13083	2.74
M-A-Free					14690	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2170	2560
SOFTENING	2250	2575
HEMISPHERICAL	2345	2585
FINAL	2410	2600

HARDGROVE GRINDABILITY INDEX : 54

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Respectfully Submitted,

BRETT A. STOCK

Lab. No 59021

Date Rec'd 09/27/93

Date Sampled 09/23/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID: COAL FEEDER
TEST #2

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	10.94
HYDROGEN	4.96
CARBON	72.86
NITROGEN	1.56
SULFUR	2.74
OXYGEN	6.94
CHLORINE	0.02

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	45.10
ALUMINUM OXIDE (AL2O3)	24.60
TITANIUM DIOXIDE (TIO2)	1.10
CALCIUM OXIDE (CAO)	2.04
POTASSIUM OXIDE (K2O)	1.74
MAGNESIUM OXIDE (MGO)	0.78
SODIUM OXIDE (NA2O)	0.30
PHOSPHORUS PENTOXIDE (P2O5)	0.28
FERRIC OXIDE (FE2O3)	19.94
SULFUR TRIOXIDE (SO3)	1.13
UNDETERMINED	2.99

BASE/ACID RATIO: 0.3503
LBS OF ASH/MILLION BTU: 8.36
SLAG VISCOSITY: 2470 DEG F. T250 POISE
FOULING INDEX: 0.1051 TYPE: LOW
SLAGGING INDEX: 0.9598 TYPE: MEDIUM
SILICA VALUE: 66.4604
% ALKALI AS NA2O: 0.1598

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Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59022

Date Rec'd 09/27/93

Date Sampled 09/23/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
TEST #3

GRINDABILITY MOISTURE = 2.72%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	13.32	10.31	33.76	42.61	11189	1.86
Dry Basis	-----	11.90	38.95	49.15	12908	2.15
M-A-Free					14652	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2205	2595
SOFTENING	2300	2620
HEMISPHERICAL	2405	2635
FINAL	2505	2650

HARDGROVE GRINDABILITY INDEX : 54

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

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Respectfully Submitted,

BRETT A. STOCK

Lab. No 59022

Date Rec'd 09/27/93

Date Sampled 09/23/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID: COAL FEEDER
TEST #3

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.90
HYDROGEN	4.90
CARBON	71.80
NITROGEN	1.41
SULFUR	2.15
OXYGEN	7.84
CHLORINE	<0.01

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	46.70
ALUMINUM OXIDE (AL2O3)	26.04
TITANIUM DIOXIDE (TIO2)	1.14
CALCIUM OXIDE (CAO)	1.60
POTASSIUM OXIDE (K2O)	2.06
MAGNESIUM OXIDE (MGO)	0.80
SODIUM OXIDE (NA2O)	0.32
PHOSPHORUS PENTOXIDE (P2O5)	0.27
FERRIC OXIDE (FE2O3)	17.40
SULFUR TRIOXIDE (SO3)	0.67
UNDETERMINED	3.00

BASE/ACID RATIO: 0.3002
LBS OF ASH/MILLION BTU: 9.22
SLAG VISCOSITY: 2550 DEG F. T250 POISE
FOULING INDEX: 0.0961 TYPE: LOW
SLAGGING INDEX: 0.6454 TYPE: MEDIUM
SILICA VALUE: 70.2256
% ALKALI AS NA2O: 0.2016

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Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59023

Date Rec'd 09/27/93

Date Sampled 09/23/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
PM 10

GRINDABILITY MOISTURE = 2.72%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	13.98	10.02	33.30	42.70	11104	2.12
Dry Basis	-----	11.65	38.71	49.64	12909	2.47
M-A-Free					14611	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2295	2620
SOFTENING	2400	2635
HEMISPHERICAL	2485	2650
FINAL	2570	2665

HARDGROVE GRINDABILITY INDEX : 53

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BRETT A. STOCK

Lab. No. 59023

Date Rec'd 09/27/93

Date Sampled 09/23/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID: COAL FEEDER
PM 10

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.65
HYDROGEN	4.86
CARBON	72.17
NITROGEN	1.47
SULFUR	2.47
OXYGEN	7.38
CHLORINE	<0.01

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	47.90
ALUMINUM OXIDE (AL2O3)	26.20
TITANIUM DIOXIDE (TIO2)	1.12
CALCIUM OXIDE (CAO)	1.72
POTASSIUM OXIDE (K2O)	2.08
MAGNESIUM OXIDE (MGO)	0.86
SODIUM OXIDE (NA2O)	0.32
PHOSPHORUS PENTOXIDE (P2O5)	0.31
FERRIC OXIDE (FE2O3)	15.54
SULFUR TRIOXIDE (SO3)	0.95
UNDETERMINED	3.00

BASE/ACID RATIO: 0.2728
LBS OF ASH/MILLION BTU: 9.02
SLAG VISCOSITY: 2600 DEG F. T250 POISE
FOULING INDEX: 0.0873 TYPE: LOW
SLAGGING INDEX: 0.6738 TYPE: MEDIUM
SILICA VALUE: 72.5538
% ALKALI AS NA2O: 0.1989

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59024

Date Rec'd 09/27/93

Date Sampled 09/24/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
TEST #1

GRINDABILITY MOISTURE = 2.98%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	13.29	9.44	34.66	42.61	11314	2.32
Dry Basis	-----	10.89	39.97	49.14	13048	2.68
M-A-Free					14643	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2220	2615
SOFTENING	2370	2625
HEMISPHERICAL	2420	2640
FINAL	2495	2655

HARDGROVE GRINDABILITY INDEX : 50

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

Respectfully Submitted,

BRETT A. STOCK

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Lab. No 59024

Date Rec'd 09/27/93

Date Sampled 09/24/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:
COAL FEEDER
TEST #1

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

ARSENIC = 9.61 ug/g ASH BASIS

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	10.89
HYDROGEN	4.94
CARBON	72.57
NITROGEN	1.49
SULFUR	2.68
OXYGEN	7.43
CHLORINE	<0.01

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	45.70
ALUMINUM OXIDE (AL2O3)	25.98
TITANIUM DIOXIDE (TIO2)	1.08
CALCIUM OXIDE (CAO)	2.18
POTASSIUM OXIDE (K2O)	1.82
MAGNESIUM OXIDE (MGO)	0.78
SODIUM OXIDE (NA2O)	0.32
PHOSPHORUS PENTOXIDE (P2O5)	0.29
FERRIC OXIDE (FE2O3)	16.96
SULFUR TRIOXIDE (SO3)	1.88
UNDETERMINED	3.01

BASE/ACID RATIO: 0.3032
LBS OF ASH/MILLION BTU: 8.35
SLAG VISCOSITY: 2550 DEG F. T250 POISE
FOULING INDEX: 0.0970 TYPE: LOW
SLAGGING INDEX: 0.8126 TYPE: MEDIUM
SILICA VALUE: 69.6434
% ALKALI AS NA2O: 0.1670

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59025

Date Rec'd. 09/27/93

Date Sampled 09/24/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.
1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
TEST #2

GRINDABILITY MOISTURE = 2.76%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	13.21	10.12	34.16	42.51	11213	2.16
Dry Basis	-----	11.66	39.36	48.98	12920	2.49
M-A-Free					14625	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2230	2645
SOFTENING	2375	2660
HEMISPHERICAL	2430	2675
FINAL	2490	2690

HARDGROVE GRINDABILITY INDEX : 51

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59025

Date Rec'd 09/27/93

Date Sampled 09/24/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID: COAL FEEDER
TEST #2

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.66
HYDROGEN	4.86
CARBON	72.16
NITROGEN	1.47
SULFUR	2.49
OXYGEN	7.36
CHLORINE	<0.01

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	49.20
ALUMINUM OXIDE (AL2O3)	26.38
TITANIUM DIOXIDE (TIO2)	1.10
CALCIUM OXIDE (CAO)	1.70
POTASSIUM OXIDE (K2O)	2.04
MAGNESIUM OXIDE (MGO)	0.80
SODIUM OXIDE (NA2O)	0.32
PHOSPHORUS PENTOXIDE (P2O5)	0.29
FERRIC OXIDE (FE2O3)	14.34
SULFUR TRIOXIDE (SO3)	0.87
UNDETERMINED	2.96

BASE/ACID RATIO: 0.2504
LBS OF ASH/MILLION BTU: 9.02
SLAG VISCOSITY: 2630 DEG F. T250 POISE
FOULING INDEX: 0.0801 TYPE: LOW
SLAGGING INDEX: 0.6235 TYPE: MEDIUM
SILICA VALUE: 74.5003
% ALKALI AS NA2O: 0.1960

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No 59026

Date Rec'd 09/27/93

Date Sampled 09/24/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.
1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
TEST #3

GRINDABILITY MOISTURE = 2.78%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	13.09	9.62	33.73	43.56	11373	2.09
Dry Basis	-----	11.07	38.81	50.12	13086	2.41
M-A-Free					14715	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2225	2590
SOFTENING	2355	2625
HEMISPHERICAL	2410	2645
FINAL	2505	2675

HARDGROVE GRINDABILITY INDEX : 51

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59026

Date Rec'd 09/27/93

Date Sampled 09/24/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:
COAL FEEDER
TEST #3

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.07
HYDROGEN	4.97
CARBON	73.03
NITROGEN	1.57
SULFUR	2.41
OXYGEN	6.95
CHLORINE	0.02

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	49.00
ALUMINUM OXIDE (AL2O3)	25.98
TITANIUM DIOXIDE (TIO2)	1.18
CALCIUM OXIDE (CAO)	1.96
POTASSIUM OXIDE (K2O)	2.02
MAGNESIUM OXIDE (MGO)	0.84
SODIUM OXIDE (NA2O)	0.30
PHOSPHORUS PENTOXIDE (P2O5)	0.26
FERRIC OXIDE (FE2O3)	15.04
SULFUR TRIOXIDE (SO3)	1.11
UNDETERMINED	2.31

BASE/ACID RATIO: 0.2647
LBS OF ASH/MILLION BTU: 8.46
SLAG VISCOSITY: 2620 DEG F. T250 POISE
FOULING INDEX: 0.0794 TYPE: LOW
SLAGGING INDEX: 0.6379 TYPE: MEDIUM
SILICA VALUE: 73.3094
% ALKALI AS NA2O: 0.1824

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59027

Date Rec'd 09/27/93

Date Sampled 09/24/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.
1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

COAL FEEDER
PM 10

GRINDABILITY MOISTURE = 2.89%

DATE REPORTED: 10/08/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	13.71	10.24	33.31	42.74	11112	2.13
Dry Basis	-----	11.87	38.60	49.53	12877	2.47
M-A-Free					14611	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2230	2610
SOFTENING	2360	2640
HEMISPHERICAL	2415	2660
FINAL	2500	2695

HARDGROVE GRINDABILITY INDEX : 53

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 59027

Date Rec'd 09/27/93

Date Sampled 09/24/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID: COAL FEEDER
PM 10

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

DATE REPORTED: 10/08/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.87
HYDROGEN	4.95
CARBON	72.00
NITROGEN	1.56
SULFUR	2.47
OXYGEN	7.15
CHLORINE	0.03

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	49.20
ALUMINUM OXIDE (AL2O3)	25.60
TITANIUM DIOXIDE (TIO2)	1.16
CALCIUM OXIDE (CAO)	1.70
POTASSIUM OXIDE (K2O)	2.12
MAGNESIUM OXIDE (MGO)	0.84
SODIUM OXIDE (NA2O)	0.32
PHOSPHORUS PENTOXIDE (P2O5)	0.28
FERRIC OXIDE (FE2O3)	15.10
SULFUR TRIOXIDE (SO3)	0.93
UNDETERMINED	2.75

BASE/ACID RATIO: 0.2643
LBS OF ASH/MILLION BTU: 9.22
SLAG VISCOSITY: 2620 DEG F. T250 POISE
FOULING INDEX: 0.0846 TYPE: LOW
SLAGGING INDEX: 0.6528 TYPE: MEDIUM
SILICA VALUE: 73.6086
% ALKALI AS NA2O: 0.2058

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62226

Date Rec'd 12/08/93

Date Sampled 12/07/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

STACK TEST
#1
LIFAC DEMONSTRATION

DATE REPORTED: 12/16/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.65	9.73	32.96	44.66	11356	2.32
Dry Basis	-----	11.14	37.73	51.13	13001	2.66
M-A-Free					14631	

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62226

Date Rec'd 12/08/93

Date Sampled 12/07/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:

TCF KAISER ENGINEERING
GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN.: MR. JIM HERVOL

STACK TEST
#1
LIFAC DEMONSTRATION

DATE REPORTED: 12/16/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.14
HYDROGEN	4.80
CARBON	73.32
NITROGEN	1.59
SULFUR	2.66
OXYGEN	6.49

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62227

Date Rec'd 12/08/93

Date Sampled 12/07/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

STACK TEST
#2
LIFAC DEMONSTRATION

DATE REPORTED: 12/16/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.51	9.88	33.65	43.96	11367	2.24
Dry Basis	-----	11.29	38.46	50.25	12992	2.56
M-A-Free					14645	

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62227

Date Rec'd 12/08/93

Date Sampled 12/07/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:

CF KAISER ENGINEERING
GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN.: MR. JIM HERVOL

STACK TEST
#2
LIFAC DEMONSTRATION

DATE REPORTED: 12/16/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.29
HYDROGEN	4.88
CARBON	72.87
NITROGEN	1.49
SULFUR	2.56
OXYGEN	6.91

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62228

Date Rec'd 12/08/93

Date Sampled 12/07/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

STACK TEST
#3
LIFAC DEMONSTRATION

DATE REPORTED: 12/16/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.62	10.01	33.63	43.74	11334	2.337
Dry Basis	-----	11.45	38.49	50.06	12971	2.67
M-A-Free					14648	

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62228

Date Rec'd 12/08/93

Date Sampled 12/07/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:

:CF KAISER ENGINEERING
GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN.: MR. JIM HERVOL

STACK TEST
#3
LIFAC DEMONSTRATION

DATE REPORTED: 12/16/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.45
HYDROGEN	4.85
CARBON	73.31
NITROGEN	1.44
SULFUR	2.67
OXYGEN	6.28

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62229

Date Rec'd 12/08/93

Date Sampled 12/07/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

STACK TEST
#4
LIFAC DEMONSTRATION

DATE REPORTED: 12/16/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.18	9.55	33.21	45.06	11505	2.06
Dry Basis	-----	10.87	37.82	51.31	13101	2.35
M-A-Free					14699	

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62229

Date Rec'd 12/08/93

Date Sampled 12/07/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:

STACK TEST
#4
LIFAC DEMONSTRATION

DATE REPORTED: 12/16/93

:CF KAISER ENGINEERING
: GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN.: MR. JIM HERVOL

ULTIMATE ANALYSIS OF COAL % DRY BASIS

ASH	10.87
HYDROGEN	4.82
CARBON	73.62
NITROGEN	1.43
SULFUR	2.35
OXYGEN	6.91

Respectfully Submitted,

BRETT A. STOCK

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Lab. No. 62322

Date Rec'd 12/08/93

Date Sampled 12/07/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

LIFAC DEMONSTRATION
PROJ. NO. 91001
CHAIN OF CUSTODY RECORD #5353
DAILY COMPOSITE 12/07/93
LAB-GENERATED COMPOSITE

ARSENIC (As) = 12.1 ug/g DRY COAL BASIS
FLUORINE (F) = 48.3 ug/g DRY COAL BASIS
CHLORINE = 0.04% DRY BASIS
GRINDABILITY MOISTURE = 2.23%
DATE REPORTED: 12/30/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.49	9.79	XXXX	XXXX	11390	2.24
Dry Basis	-----	11.19	XXXX	XXXX	13016	2.56
M-A-Free					14656	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2165	2525
SOFTENING	2275	2535
HEMISPHERICAL	2385	2545
FINAL	2460	2555

HARDGROVE GRINDABILITY INDEX( ) : 50

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62322

Date Rec'd 12/08/93

Date Sampled 12/07/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:
LIFAC DEMONSTRATION
PROJ. NO. 91001
CHAIN OF CUSTODY RECORD #5353

DAILY COMPOSITE 12/07/93
LAB-GENERATED COMPOSITE

DATE REPORTED: 12/30/93

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN.: MR. JIM HERVOL

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	47.72
ALUMINUM OXIDE (AL2O3)	23.68
TITANIUM DIOXIDE (TIO2)	0.99
CALCIUM OXIDE (CAO)	1.57
POTASSIUM OXIDE (K2O)	1.67
MAGNESIUM OXIDE (MGO)	0.72
SODIUM OXIDE (NA2O)	0.44
PHOSPHORUS PENTOXIDE (P2O5)	0.29
FERRIC OXIDE (FE2O3)	21.89
SULFUR TRIOXIDE (SO3)	1.03
UNDETERMINED	0.00

BASE/ACID RATIO: 0.3631
LBS OF ASH/MILLION BTU: 8.60
SLAG VISCOSITY: 2460 DEG F. T250 POISE
FOULING INDEX: 0.1588 TYPE: LOW
SLAGGING INDEX: 0.9295 TYPE: MEDIUM
SILICA VALUE: 66.3717
% ALKALI AS NA2O: 0.1736

Respectfully Submitted,

BRETT A. STOCK

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Lab. No 62273

Date Rec'd 12/09/93

Date Sampled 12/08/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.
1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

STACK TEST
#1
LIFAC DEMONSTRATION

DATE REPORTED: 12/20/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.53	9.71	34.59	43.17	11431	2.26%
Dry Basis	-----	11.10	39.55	49.35	13069	2.56%
M-A-Free					14701	

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62273

Date Rec'd. 12/09/93

Date Sampled 12/08/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:

STACK TEST
#1
LIFAC DEMONSTRATION

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN.: MR. JIM HERVOL

DATE REPORTED: 12/21/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.10
HYDROGEN	4.95
CARBON	73.10
NITROGEN	1.48
SULFUR	2.56
OXYGEN	6.81

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62274

Date Rec'd 12/09/93

Date Sampled 12/08/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

STACK TEST
#2
LIFAC DEMONSTRATION

DATE REPORTED: 12/20/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.76	9.75	34.36	43.13	11373	2.18
Dry Basis	-----	11.18	39.38	49.44	13037	2.50
M-A-Free					14678	

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62274

Date Rec'd 12/09/93

Date Sampled 12/08/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:

STACK TEST
#2
LIFAC DEMONSTRATION

:CF KAISER ENGINEERING
1 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN.: MR. JIM HERVOL

DATE REPORTED: 12/21/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	11.18
HYDROGEN	4.88
CARBON	73.30
NITROGEN	1.46
SULFUR	2.50
OXYGEN	6.68

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Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62275

Date Rec'd 12/09/93

Date Sampled 12/08/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.
1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

STACK TEST
#3
LIFAC DEMONSTRATION

DATE REPORTED: 12/20/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.96	9.34	33.62	44.08	11440	2.10
Dry Basis	-----	10.73	38.63	50.64	13143	2.41
M-A-Free					14723	

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Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62275

Date Rec'd 12/09/93

Date Sampled 12/08/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:

STACK TEST
#3
LIFAC DEMONSTRATION

[CF KAISER ENGINEERING
1 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN.: MR. JIM HERVOL

DATE REPORTED: 12/21/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	10.73
HYDROGEN	4.88
CARBON	74.02
NITROGEN	1.48
SULFUR	2.41
OXYGEN	6.48

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62276

Date Rec'd 12/09/93

Date Sampled 12/08/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.
1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

STACK TEST
#4
LIFAC DEMONSTRATION

DATE REPORTED: 12/20/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.97	9.33	33.06	44.64	11423	2.03
Dry Basis	-----	10.72	37.99	51.29	13125	2.33
M-A-Free					14701	

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62276

Date Rec'd 12/09/93

Date Sampled 12/08/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID:

STACK TEST
#4
LIFAC DEMONSTRATION

CF KAISER ENGINEERING
GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN.: MR. JIM HERVOL

DATE REPORTED: 12/21/93

ULTIMATE ANALYSIS OF COAL	% DRY BASIS
ASH	10.72
HYDROGEN	4.85
CARBON	74.40
NITROGEN	1.51
SULFUR	2.33
OXYGEN	6.19

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62323

Date Rec'd 12/09/93

Date Sampled 12/08/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

ICF KAISER ENGINEERING
4 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN: MR. JIM HERVOL

SAMPLE IDENTIFICATION

LIFAC DEMONSTRATION
PROJ. NO. 91001
CHAIN OF CUSTODY RECORD #5355
DAILY COMPOSITE 12/08/93
LAB-GENERATED COMPOSITE

ARSENIC (As) = 13.0 ug/g DRY COAL BASIS
FLUORINE (F) = 45.8 ug/g DRY COAL BASIS
CHLORINE = 0.04% DRY BASIS
GRINDABILITY MOISTURE = 2.11
DATE REPORTED: 12/30/93

	% Moisture	% Ash	% Volatile	% Fixed Carbon	B.T.U./LB.	% Sulfur
As Rec'd.	12.81	9.53	XXXX	XXXX	11417	2.14
Dry Basis	-----	10.93	XXXX	XXXX	13094	2.45
M-A-Free					14701	

FREE SWELLING INDEX : XXXX

ASH FUSION TEMPERATURES (DEG F)	REDUCING	OXIDIZING
INITIAL	2175	2550
SOFTENING	2310	2575
HEMISPHERICAL	2410	2600
FINAL	2490	2620

HARDGROVE GRINDABILITY INDEX( ) : 51

NOTE: XXXX INDICATES ANALYSIS WAS NOT PERFORMED

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

Lab. No. 62323

Date Rec'd 12/09/93

Date Sampled 12/08/93

Sampled By CLIENT

STANDARD LABORATORIES, INC.

1530 N. CULLEN AVENUE
EVANSVILLE, IN 47715

SAMPLE ID: LIFAC DEMONSTRATION
PROJ. NO. 91001
CHAIN OF CUSTODY RECORD #5355

DAILY COMPOSITE 12/08/93
LAB-GENERATED COMPOSITE

DATE REPORTED: 12/30/93

TCF KAISER ENGINEERING
1 GATEWAY CENTER
PITTSBURGH, PA 15222-1207
ATTN.: MR. JIM HERVOL

MINERAL ANALYSIS OF ASH	% IGNITED BASIS
SILICON DIOXIDE (SIO2)	49.17
ALUMINUM OXIDE (AL2O3)	23.86
TITANIUM DIOXIDE (TIO2)	0.96
CALCIUM OXIDE (CAO)	1.67
POTASSIUM OXIDE (K2O)	1.61
MAGNESIUM OXIDE (MGO)	0.63
SODIUM OXIDE (NA2O)	0.47
PHOSPHORUS PENTOXIDE (P2O5)	0.27
FERRIC OXIDE (FE2O3)	20.28
SULFUR TRIOXIDE (SO3)	1.07
UNDETERMINED	0.00

BASE/ACID RATIO: 0.3333
LBS OF ASH/MILLION BTU: 8.35
SLAG VISCOSITY: 2490 DEG F: T250 POISE
FOULING INDEX: 0.1573 TYPE: LOW
SLAGGING INDEX: 0.8166 TYPE: MEDIUM
SILICA VALUE: 68.5307
% ALKALI AS NA2O: 0.1692

FOR YOUR PROTECTION THIS DOCUMENT HAS BEEN PRINTED ON CONTROLLED PAPER STOCK. NOT VALID IF ALTERED.

Respectfully Submitted,

BRETT A. STOCK

APPENDIX G

PARTICULATE MATTER ANALYTICAL DATA, FIELD DATA SHEETS AND EQUIPMENT CALIBRATION DATA - PARAMETRIC TESTS

LIFAC NA DEMONSTRATION PROJECT
RICHMOND POWER AND LIGHT
WHITEWATER VALLEY GENERATING UNIT #2

PARAMETRIC AND OPTIMIZATION TESTS
ENVIRONMENTAL MONITORING REPORT

ICF KAISER ENGINEERS, INC.
PITTSBURGH, PENNSYLVANIA

MOSTARDI-PLATT ASSOCIATES, INC.

M5

Project/Project Number: Richmond Power & Light / 33810

Date: 10.6.93 Analyst: I. Peysakhov

Description 9.23.93	Initial Weight	Final Weight	Net Weight Gain
Test # 1 S004			
Filter # 2092	0.7751	0.8260	0.0509
Acetone Wash # 1701-1705 140 ml	7.7017	7.7610	0.0593
Acetone Blank			0.0007
Total Weight			0.1095
Test # 2 S005			
Filter # 2253	0.7666	0.8111	0.0445
Acetone Wash # 1441-1445 170 ml	7.7586	7.8092	0.0506
Acetone Blank			0.0008
Total Weight			0.0943
Test # 3 S006			
Filter # 2209	0.7871	0.8516	0.0645
Acetone Wash # 1421-1425 200 ml	7.6996	7.7565	0.0569
Acetone Blank			0.0010
Total Weight			0.1204
Test #			
Filter #			
Acetone Wash # ml			
Acetone Blank			
Total Weight			
Blank			
Acetone Wash # 1616-1620 100 ml	7.7024	7.7029	0.0005

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CAS 10/7/93

MOSTARDI-PLATT ASSOCIATES, INC.

M5

Project/Project Number: Richmond Power & light / 33810

Date: 10.6.93 Analyst: I. Peysakhov

Description 9.24.93	Initial Weight	Final Weight	Net Weight Gain
Test # 1 5008			
Filter # 2047	0.8017	0.8715	0.0698
Acetone Wash # 1641-1645 130 ml	7.7208	7.7720	0.0512
Acetone Blank			0.0006
Total Weight			0.1204
Test # 2 5009			
Filter # 2165	0.7869	0.9386	0.1517
Acetone Wash # 1611-1615 190 ml	7.6620	7.7451	0.0831
Acetone Blank			0.000
Total Weight			0.2338
Test # 3 5010			
Filter # 2238	0.7883	0.8579	0.0696
Acetone Wash # 1696-1700 210 ml	7.7264	7.8008	0.0744
Acetone Blank			0.0010
Total Weight			0.1430
Test #			
Filter #			
Acetone Wash # ml			
Acetone Blank			
Total Weight			
Blank			
Acetone Wash # 1616-1620 100 ml	7.7024	7.7029	0.0005

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MAS 10/7/93

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 1 (M5)

COMPANY RICHMOND POWER AND LIGHT
PLANT RICHMOND, IN
TEST LOCATION UNIT NOS. 1 AND 2 STACK
CLIENT ICF KAISER ENGINEERS
OPERATOR DJN
DATE SEPTEMBER 23, 1993
CONTROL BOX E-19 POT. NO. E-19
METER NO. E-19
METER CALIBRATION FACTOR 1.002
PITOT ID NO. NA
PITOT TUBE COEFFICIENT 0.830
PORT LENGTH 24 in.
PORT SIZE 6 in.
PORT TYPE FLANGE
IMPINGER H_2O: SILICA GEL:
FINAL 318.5 ml/gm FINAL WT. gm
INITIAL 200.0 ml/gm INITIAL WT. 207.0 gm
GAIN 118.5 ml/gm WT. GAIN 12 gm
TOTAL H_2O COLLECTED
DESCRIPTION OF IMPINGER H_2O
SILICA GEL EXHAUSTED ?
IMPINGERS RECOVERED BY
SILICA GEL WEIGHED BY

COMMENTS & NOTES:

THIMBLE NO. TARE WT.
FILTER NO. 2092 TARE WT. 0.7751
BAROMETRIC PRESSURE in. Hg 28.77
FLUE PRESSURE in. H_2O -0.125
FLUE PRESSURE in. Hg ABS. 28.76
PROBE LENGTH 6.5 ft.
PROBE LINER MATERIAL 316 STAINLESS STEEL
NOZZLE IDENTIFICATION NO. NA
CALIBRATED NOZZLE DIAMETER 0.300 in.
LEAK CHECK PRE 0.016 POST 0.015 @ 10/10 in. Hg
DUCT SHAPE CIRCULAR DIAMETER 12'4"
DUCT AREA 119.47 sq. ft. L W
TEST LENGTH 60 min.
MINUTES PER POINT 5
TOTAL NUMBER OF TRAVERSE POINTS 12
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 14.0
O_2 4.2

PITOT LEAK CHECK: PRE OK POST OK
ΔH@ 1.704
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? Y N
What value do you want to use? F = 9,780 F_c = 1,800 Other =
Circle to indicate "Yes" or add other value if not given.

144

FIELD TEST DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT RICHMOND POWER AND LIGHT

TEST RUN NO. 1 (M5)

TEST LOCATION UNIT NOS. 1 AND 2 STACK DATE SEPTEMBER 23, 1993 PAGE 1 OF 1

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	5.28 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	1.31 Meter Rate cfm	Pump Vacuum in. Hg	X5 Notes	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	0.31	0.557	0910	75.233	1.64	225	63	63	0.75	4	3.75	248	241	FULL
2	0.30	0.548	0915	78.90	1.58	225	65	63	0.73	4	3.65 78.98	247	240	ICED
3	0.27	0.520	0920	82.65	1.43	224	67	64	0.70	4	3.50 82.63	247	237	≤68°
			0925	86.13							86.13			
		1.625			4.65	674	385							
2-1	0.28	0.529	0929	86.13	1.48	224	66	64	0.71	4	3.65	245	241	
2	0.28	0.529	0934	89.62	1.48	224	72	65	0.71	4	3.55 89.68	246	241	
3	0.27	0.520	0939	93.20	1.43	223	73	66	0.70	4	3.50 93.23	247	245	
			0944	96.73							96.73			
		1.578			4.39	671	406							
3-1	0.29	0.539	0947	96.73	1.53	226	72	67	0.72	4	3.60	245	242	
2	0.28	0.529	0952	100.30	1.48	226	76	68	0.71	4	3.55 100.33	245	241	
3	0.26	0.510	0957	103.84	1.37	224	77	68	0.68	4	3.40 103.88	246	243	
			1002	107.28							107.28			
		1.578			4.38	676	428							
4-1	0.29	0.539	1005	107.28	1.53	224	77	69	0.72	4	3.60	246	241	
2	0.28	0.529	1010	110.84	1.48	225	78	70	0.71	4	3.55 110.88	246	240	
3	0.25	0.500	1016	114.44	1.32	225	79	71	0.67	4	3.35 114.43	248	241	
			1020	117.783							117.78			
		1.568			4.33	674	444							
		0.529		42.550	1.48	224.6	69.3							

Form No. 1026 (Rev. 3/92)

Mostardi-Platt Associates, Inc.

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 2 (M6)

COMPANY RICHMOND POWER AND LIGHT
PLANT RICHMOND, IN
TEST LOCATION UNIT NOS. 1 AND 2 STACK
CLIENT ICF KAISER ENGINEERS
OPERATOR DJN
DATE SEPTEMBER 23, 1993
CONTROL BOX E-19 POT. NO. E-19
METER NO. E-19
METER CALIBRATION FACTOR 1.002
PITOT ID NO. N/A
PITOT TUBE COEFFICIENT 0.83
PORT LENGTH 24 in.
PORT SIZE 6 in.
PORT TYPE FLANGE

IMPINGER H_2O: SILICA GEL:
FINAL 318.0 ml/gm FINAL WT. gm
INITIAL 200.0 ml/gm INITIAL WT. 227.5 gm
GAIN 118.0 ml/gm WT. GAIN 14 gm
TOTAL H_2O COLLECTED
DESCRIPTION OF IMPINGER H_2O
SILICA GEL EXHAUSTED ?
IMPINGERS RECOVERED BY
SILICA GEL WEIGHED BY

COMMENTS & NOTES:

THIMBLE NO. TARE WT.
FILTER NO. 2253 TARE WT. 0.7660
BAROMETRIC PRESSURE in. Hg 28.77
FLUE PRESSURE in. H_2O -0.125
FLUE PRESSURE in. Hg ABS. 28.76
PROBE LENGTH 6.5 ft.
PROBE LINER MATERIAL 316 STAINLESS STEEL
NOZZLE IDENTIFICATION NO. N/A
CALIBRATED NOZZLE DIAMETER 0.300 in.
LEAK CHECK PRE 0.013 POST 0.010 @ 10/10 in. Hg
DUCT SHAPE CIRCULAR DIAMETER 12' 4"
DUCT AREA 119.47 sq. ft. L W
TEST LENGTH 60 min.
MINUTES PER POINT 5
TOTAL NUMBER OF TRAVERSE POINTS 12
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 14.0
O_2 4.2

PITOT LEAK CHECK: PRE OK POST OK
ΔH@ 1.704
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? Y ☐ N ☐
What value do you want to use? F = 9,780 F_c = 1,800 Other =
Circle to indicate "Yes" or add other value if not given.

146.

FIELD TEST DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT RICHMOND POWER AND LIGHT

TEST RUN NO. 2 (M5)

TEST LOCATION UNIT NOS 1 AND 2 STACK DATE SEPTEMBER 23, 1993 PAGE 1 OF 1

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	5.08 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	1.32 Meter Rate cfm	Pump Vacuum in. Hg	X5 Notes		Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	0.29	0.539	11:00	18.099	1.47	226	70	68	0.71	4	3.55		250	244	FULL
2	0.27	0.520	11.05	21.62	1.37	225	71	68	0.69	4	3.45	21.64	244	243	ICED
3	0.23	0.480	11:10	26.15	1.17	224	73	68	0.63	3	3.15	26.09	245	240	≤68°
			11:15	28.24								28.24			
		1.539			4.01	675	418								
2-1	0.27	0.520	1117	28.24	1.37	225	71	68	0.69	4	3.45		244	243	
2	0.26	0.510	1122	31.65	1.32	225	76	69	0.67	4	3.35	31.69	244	245	
3	0.23	0.480	1127	35.00	1.17	224	76	69	0.63	2	3.15	35.04	245	244	
			1132	38.19								38.19			
		1.510			3.86	674	428								
3-1	0.26	0.510	1134	38.19	1.32	225	77	69	0.67	4	3.35		245	243	
2	0.25	0.500	1139	41.55	1.27	225	77	70	0.66	4	3.30	41.64	244	244	
3	0.23	0.480	1144	44.85	1.17	224	78	70	0.63	2	3.15	44.84	245	243	
			1149	47.99								47.99			
		1.490			3.76	674	441								
4-1	0.26	0.510	1151	47.99	1.32	225	74	71	0.67	4	3.35		245	240	
2	0.25	0.500	1156	51.40	1.27	225	79	72	0.66	3	3.30	51.34	245	241	
3	0.23	0.480	1201	54.65	1.17	224	80	72	0.63	2	3.15	54.64	244	241	
			1206	57.794								57.79			
		1.490			3.76	674	448								
		0.602		39.695	1.78	224.75	77.3								

A. Cole 09 23 93
12:17

Form No. 1026 (Rev. 3/92)

Mostardi-Platt Associates, Inc.

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 3 (M5)

OMPANY RICHMOND POWER AND LIGHT
LANT RICHMOND, IN
EST LOCATION UNIT NOS. 1 AND 2 STACK
LIENT ILF KAISER ENGINEERS
PERATOR DJN
ATE SEPTEMBER 23, 1993
ONTROL BOX E-19 POT. NO. E-19
ETER NO. E-19
ETER CALIBRATION FACTOR 1.002
ITOT ID NO. NA
ITOT TUBE COEFFICIENT 0.83
ORT LENGTH 24 in.
ORT SIZE 6 in.
ORT TYPE FLANGE
MPINGER H_2O: SILICA GEL:
INAL ml/gm FINAL WT. gm
NITIAL 200.0 ml/gm INITIAL WT. 215.8 gm
AIN 115 ml/gm WT. GAIN 15 gm
OTAL H_2O COLLECTED
ESCRIPTION OF IMPINGER H_2O
ILICA GEL EXHAUSTED ?
MPINGERS RECOVERED BY
ILICA GEL WEIGHED BY

OMMENTS & NOTES:

THIMBLE NO. TARE WT.
FILTER NO. 2209 TARE WT. 0.7811
BAROMETRIC PRESSURE in. Hg 28.77
FLUE PRESSURE in. H_2O -0.125
FLUE PRESSURE in. Hg ABS. 28.76
PROBE LENGTH 6.5 ft.
PROBE LINER MATERIAL 316 STAINLESS STEEL
NOZZLE IDENTIFICATION NO. NA
CALIBRATED NOZZLE DIAMETER 0.300 in.
LEAK CHECK PRE 0.010 POST 0.011 @ 8/8 in. Hg
DUCT SHAPE CIRCULAR DIAMETER 12' 4"
DUCT AREA 119.47 sq. ft. L W
TEST LENGTH 60 min.
MINUTES PER POINT 5
TOTAL NUMBER OF TRAVERSE POINTS 12
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 14.0
O_2 4.0

PITOT LEAK CHECK: PRE OK POST OK
ΔH@ 1.704
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? Y ☐ N ☐
What value do you want to use? F = 9,780 F_c = 1,800 Other =
Circle to indicate "Yes" or add other value if not given.

140

FIELD TEST DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT PIEDMONT POWER AND LIGHT

TEST RUN NO. 3

TEST LOCATION UNIT NOS. 1 AND 2 STACK

DATE SEPTEMBER 23, 1993 PAGE 1 OF 1

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	5.18 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	1.34 Meter Rate cfm	Pump Vacuum in. Hg	X5 Notes		Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	0.28	0.529	1255	58.405	1.45	227	69	69	0.71	4	3.55		250	238	FULLY
2	0.27	0.520	1300	61.90	1.40	227	71	69	0.70	4	3.50	61.96	250	240	ICED
3	0.22	0.469	1305	65.43	1.14	227	73	69	0.63	4	3.15	65.46	250	243	68°
			1310	68.61								68.61			
		1.518			3.99	681	420								
2-1	0.28	0.529	1313	68.61	1.45	226	74	70	0.71	4	3.55		249	244	
2	0.25	0.500	1318	72.16	1.30	226	76	70	0.67	4	3.35	72.16	248	243	
3	0.22	0.469	1323	75.52	1.14	226	78	70	0.63	4	3.15	75.51	250	240	
			1328	78.85								78.66			
		1.498			3.89	677	438								
3-1	0.27	0.520	1333	78.85	1.40	228	77	72	0.70	4	3.60		248	236	
2	0.26	0.510	1338	82.10	1.36	228	78	71	0.68	4	3.40	82.16	250	245	
3	0.30	0.548	1343	86.26	1.55	227	79	71	0.73	4	3.65	86.56	250	229	
			1348	89.21								89.21			
		1.578			4.30	683	419								
4-1	0.25	0.500	1401	89.21	1.30	223	77	72	0.67	4	3.35		248	240	
2	0.23	0.480	1406	92.69	1.19	226	78	72	0.61	4	3.20	92.56	249	245	
3	0.21	0.458	1411	95.19	1.09	225	80	73	0.61	3	3.05	95.76	249	247	
			1416	98.813								98.81			
		1.438			3.58	612	462								
		0.503		40.408	1.31	226.2	73.25								

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 1 (MS)

OMPANY RICHMOND POWER AND LIGHT
LANT RICHMOND, IN
EST LOCATION UNIT NOS. 1 AND 2 STACK
LIENT ICF KAISER ENGINEERS
PERATOR DJN
ATE SEPTEMBER 24, 1993
ONTROL BOX E-19 POT. NO. E-19
ETER NO. E-19
ETER CALIBRATION FACTOR 1.002
ITOT ID NO. N/A
ITOT TUBE COEFFICIENT .83
ORT LENGTH 24 in.
ORT SIZE 6 in.
ORT TYPE FLANGE
MPINGER H_2O: SILICA GEL:
INAL 322 ml/gm FINAL WT. gm
NITIAL 200.0 ml/gm INITIAL WT. 213.6 gm
AIN 122 ml/gm WT. GAIN 13 gm
OTAL H_2O COLLECTED
ESCRIPTION OF IMPINGER H_2O
ILICA GEL EXHAUSTED ?
MPINGERS RECOVERED BY
ILICA GEL WEIGHED BY

OMMENTS & NOTES:

THIMBLE NO. TARE WT.
FILTER NO. 2047 TARE WT. 0.8017
BAROMETRIC PRESSURE in. Hg 28.96
FLUE PRESSURE in. H_2O -.125
FLUE PRESSURE in. Hg ABS. 28.95
PROBE LENGTH 6.5 ft.
PROBE LINER MATERIAL 316 STAINLESS STEEL
NOZZLE IDENTIFICATION NO. N/A
CALIBRATED NOZZLE DIAMETER 0.300 in.
LEAK CHECK PRE 0.005 POST 0.003 @ 10"/8 in. Hg
DUCT SHAPE CIRCULAR DIAMETER 12'4"
DUCT AREA 119.47 sq. ft. L W
TEST LENGTH 60 min.
MINUTES PER POINT 5
TOTAL NUMBER OF TRAVERSE POINTS 12
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 12.5
O_2 6.5

PITOT LEAK CHECK: PRE OK POST OK
ΔH@ 1.704
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? Y ☐ N ☐
What value do you want to use? F = 9,780 F_c = 1,800 Other =
Circle to indicate "Yes" or add other value if not given.

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FIELD TEST DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT: RICHMOND POWER AND LIGHT

TEST RUN NO. 1 (MS)

TEST LOCATION STACK

DATE SEPTEMBER 24, 1993 PAGE 1 OF 1

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	4.96 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	1.28 Meter Rate cfm	Pump Vacuum in. Hg	X5 Notes	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	0.24	0.490	0810	32.372	1.19	223	52	52	0.63	4	3.15	243	238	FULLY
2	0.24	0.490	0818	36.49	1.19	223	54	52	0.63	4	3.15 35.82	245	240	IMED
3	0.22	0.469	0820	38.65	1.09	223	57	53	0.60	4	3.00 38.67	245	241	668°
			0825	41.67							41.67			
		1.449			3.47	669	320							
2-1	0.25	0.500	0828	41.67	1.24	223	56	53	0.64	4	3.20	244	245	
2	0.25	0.500	0833	44.85	1.24	224	58	54	0.64	4	3.20 44.87	243	245	
3	0.23	0.480	0838	48.09	1.14	223	60	54	0.61	4	3.05 48.07	241	241	
			0843	51.12							51.12			
		1.480			3.62	670	335							
3-1	0.26	0.510	0846	51.12	1.29	223	62	56	0.66	4	3.26	241	241	
2	0.26	0.510	0851	54.40	1.29	224	63	57	0.65	4	3.25 54.37	241	240	
3	0.23	0.480	0856	57.60	1.09	224	65	58	0.61	4	3.06 57.62	245	240	
			0901	60.67							60.67			
		1.50			3.67	671	361							
4-1	0.26	0.510	0903	60.67	1.29	224	64	59	0.65	4	3.25	241	241	
2	0.26	0.510	0908	63.91	1.29	224	66	59	0.65	4	3.25 63.92	246	240	
3	0.24	0.490	0913	67.20	1.19	223	66	60	0.63	4	3.15 67.17	247	240	
			0918	70.323							70.32			
		1.61			3.77	671	374							
		0.495		37.961	1.21	223.4	57.9							

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 2(MS)

OMPANY RICHMOND POWER AND LIGHT
LANT RICHMOND IN
EST LOCATION UNIT NOS. 1 AND 2 STACK
LIENT ICF KAISER ENGINEERS
PERATOR DJN
ATE SEPTEMBER 24, 1993
ONTROL BOX E-19 POT. NO. E-19
ETER NO. E-19
ETER CALIBRATION FACTOR 1.002
ITOT ID NO. N/A
ITOT TUBE COEFFICIENT 0.83
ORT LENGTH 24 in.
ORT SIZE 6 in.
ORT TYPE FLANGE

MPINGER H_2O: SILICA GEL:
INAL 317 ml/gm FINAL WT. gm
NITIAL 200.0 ml/gm INITIAL WT. 220.9 gm
AIN 117 ml/gm WT. GAIN 17 gm
OTAL H_2O COLLECTED
ESCRIPTION OF IMPINGER H_2O
ILICA GEL EXHAUSTED ?
MPINGERS RECOVERED BY
ILICA GEL WEIGHED BY

OMMENTS & NOTES:

THIMBLE NO. TARE WT.
FILTER NO. 2165 TARE WT. 0.7869
BAROMETRIC PRESSURE in. Hg 28.96
FLUE PRESSURE in. H_2O -0.125
FLUE PRESSURE in. Hg ABS. 28.95
PROBE LENGTH 6.5 ft.
PROBE LINER MATERIAL 316 STAINLESS STEEL
NOZZLE IDENTIFICATION NO. N/A
CALIBRATED NOZZLE DIAMETER 0.300 in.
LEAK CHECK PRE 0.013 POST 0.016 @ 8/7 in. Hg
DUCT SHAPE CIRCULAR DIAMETER 12'4"
DUCT AREA 119.47 sq. ft. L W
TEST LENGTH 60 min.
MINUTES PER POINT 5
TOTAL NUMBER OF TRAVERSE POINTS 12
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 13.0
O_2 7.0

PITOT LEAK CHECK: PRE OK POST OK
ΔH@ 1.704
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? Y ☐ N ☐
What value do you want to use? F = 9,780 F_c = 1,800 Other =
Circle to indicate "Yes" or add other value if not given.

Alan B. Avila IDEM 9/24/92

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FIELD TEST DATA SHEET FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT RICHMOND POWER AND LIGHT

TEST RUN NO. 2 (M5)

TEST LOCATION STACK DATE SEPTEMBER 24, 1993 PAGE 1 OF 1

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	6.4 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	1.31 Meter Rate cfm	Pump Vacuum in. Hg	X5 Notes		Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	0.26	0.510	0980	70.690	1.33	225	60	58	0.67	3	3.35		241	239	FULLY
2	0.26	0.510	0985	73.91	1.33	225	61	58	0.67	3	3.35	73.94	243	238	ICED
3	0.23	0.480	1000	77.30	1.13	224	62	58	0.63	3	3.15	77.29	246	240	≤68°
			1005	80.44								80.44			
		1.600			3.84	674	380								
2-1	0.25	0.500	1007	80.44	1.28	225	64	58	0.66	3	3.30		244	240	
2	0.26	0.510	1012	83.70	1.33	225	61	59	0.67	3	3.35	83.74	243	238	
3	0.24	0.490	1017	87.00	1.23	224	66	59	0.64	3	3.20	87.09	245	238	
			1022	90.29								90.29			
		1.500			3.84	674	370								
3-1	0.25	0.500	1025	90.29	1.28	224	63	59	0.66	3	3.30		241	240	
2	0.25	0.500	1030	93.67	1.28	225	65	59	0.66	3	3.30	93.69	241	280	
3	0.23	0.480	1035	96.89	1.18	224	66	59	0.63	3	3.15	96.89	243	242	
			1040	100.04								100.04			
		1.480			3.74	673	370								
4-1	0.25	0.500	1042	100.04	1.28	225	64	59	0.66	3	3.30		242	243	
2	0.24	0.490	1047	103.45	1.23	225	64	59	0.64	2	3.20	103.34	241	241	
3	0.23	0.480	1052	106.64	1.18	224	66	59	0.63	2	3.15	106.54	242	241	
			1067	109.69								109.69			
		1.47			3.69	674	370								
		0.496		89.109	1.26	224.6	61.1								

ABC 9-24-93

Form No. 1026 [Rev. 3/92]

Mostardi-Platt Associates, Inc.

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 3 (MS)

OMPANY RICHMOND POWER AND LIGHT
LANT RICHMOND, IN
EST LOCATION UNIT NOS. 1 AND 2 STACK
LIENT ICF KAISER ENGINEERS
PERATOR DJN
ATE SEPTEMBER 24, 1993
ONTROL BOX E-19 POT. NO. E-19
ETER NO. E-19
ETER CALIBRATION FACTOR 1.002
TOT ID NO. N/A
TOT TUBE COEFFICIENT 0.83
ORT LENGTH 24 in.
ORT SIZE 6 in.
ORT TYPE FLANGE

IPINGER H_2O: SILICA GEL:
INAL 328 ml/gm FINAL WT. gm
NITIAL 200.0 ml/gm INITIAL WT. 213.5 gm
AIN 128 ml/gm WT. GAIN 16 gm
OTAL H_2O COLLECTED
ESCRIPTION OF IMPINGER H_2O
ILICA GEL EXHAUSTED ?
IPINGERS RECOVERED BY
ILICA GEL WEIGHED BY

OMMENTS & NOTES:

THIMBLE NO. TARE WT.
FILTER NO. 2238 TARE WT. 0.7883
BAROMETRIC PRESSURE in. Hg 28.96
FLUE PRESSURE in. H_2O -0.125
FLUE PRESSURE in. Hg ABS. 28.95
PROBE LENGTH 6.5 ft.
PROBE LINER MATERIAL 316 STAINLESS STEEL
NOZZLE IDENTIFICATION NO. N/A
CALIBRATED NOZZLE DIAMETER 0.300 in.
LEAK CHECK PRE 0.015 POST 0.003 @ 7/8 in. Hg
DUCT SHAPE CIRCULAR DIAMETER 12' 4"
DUCT AREA 119.47 sq. ft. L W
TEST LENGTH 60 min.
MINUTES PER POINT 5
TOTAL NUMBER OF TRAVERSE POINTS 12
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 13.6
O_2 7.0

PITOT LEAK CHECK: PRE OK POST OK
ΔH@ 1.704
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? Y ☐ N ☐
What value do you want to use? F = 9,780 F_c = 1,800 Other = _____
Circle to indicate "Yes" or add other value if not given.

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FIELD TEST DATA SHEET FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT RICHMOND POWER AND LIGHT

TEST RUN NO. 3 (M5)

TEST LOCATION STALK

DATE SEPTEMBER 21, 1993 PAGE 1 OF 1

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	5.03 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	1.50 Meter Rate cfm	Pump Vacuum in. Hg	Notes ×5 ×3		Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	0.27	0.520	1200	10.028	1.36	227	62	60	0.68	4	3.4		246	244	FULLY
1-2	0.27	0.520	1205	13.42	1.36	227	64	61	0.68	4	~~3.4~~ ~~2.04~~	13.43	248	242	ICED
			1208	15.477							~~16.43~~	16.47			68
1-2	0.27	0.520	1240	15.477	1.36	228	65	62	0.68	4	1.36				
1-3	0.23	0.480	1242	16.81	1.16	226	66	63	0.62	4	3.10	16.83	245	246	
		2.040	1247	19.93	6.24	908	502					19.93	244	247	
2-1	0.26	0.510	1250	19.93	1.31	225	66	63	0.66	4	3.3		240	247	
2	0.25	0.500	1255	23.23	1.26	227	71	64	0.65	4	3.25	23.23	243	248	
3	0.26	0.500	1300	26.60	1.26	227	74	65	0.65	4	3.25	26.48	244	244	
			1305	29.73								29.73			
		1.510			3.83	679	403								
3-1	0.27	0.520	1309	29.73	1.36	225	69	66	0.68	4	3.40		242	242	
2	0.27	0.520	1314	33.10	1.36	226	75	67	0.68	4	3.40	33.13	242	245	
3	0.25	0.500	1319	36.60	1.26	226	76	67	0.65	4	3.25	36.63	245	247	
			1324	39.78								39.78			
		1.510			3.98	677	420								
4-1	0.23	0.480	1339	39.78	1.16	225	74	69	0.62	4	3.10		241	248	
2	0.22	0.469	1344	42.90	1.11	225	77	71	0.61	4	3.05	42.88	243	244	
3	0.18	0.424	1349	45.63	0.90	222	78	71	0.55	4	2.75	45.93	243	248	
			1354	48.683								48.68			
		1.313			3.17	672	440								
		0.497		38.666	1.75	225.8	67.9								

CALIBRATION PROCEDURES

PITOT TUBES

The pitot tubes used during this test program are fabricated according to the specification described and illustrated in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1 through 5 as published in the Federal Register, Volume 42, No. 160; hereafter referred to by the appropriate method number. The pitot tubes comply with the alignment specifications in Method 2, Section 4; and the pitot tube assemblies are in compliance with specifications in the same section.

Pitot tube assemblies are calibrated in accordance with Method 2, Section 4, against a standard hemispherical pitot utilizing a wind tunnel meeting the specification in Method 2, Section 4.1.2.

NOZZLES

The nozzles are measured according to Method 5, Section 5.1.

TEMPERATURE SENSING DEVICES

The potentiometer and thermocouples are calibrated against a mercury thermometer in a calibration well. Alternatively, readings are checked utilizing a NBS traceable millivolt source.

DRY GAS METERS

The test meters are calibrated according to Method 5, Section 5.3 and "Procedures for Calibrating and Using Dry Gas Volume Meters as Calibration Standards" by P.R. Westlin and R.T. Shigehara, March 10, 1978.

ANALYTICAL BALANCE

The accuracy of the analytical balance is checked with Class S, Stainless Steel Type 303 weights manufactured by F. Hopken and Son, Jersey City, New Jersey.

Dry Gas Meter No.	E-19	Date:	20-Sep-93
Standard Meter No.	677187	Calibrated By:	M.Simmons
Standard Meter (Yr)	1.0005	Barametric Pressure :	29.40

Run Number		Orifice Setting in H20 Chg (H)	Standard Meter Gas Volume Vr	Dry Meter Gas Volume Vd	Standard Meter Temp. F tr	Dry Gas Meter Inlet Temp. F tdi	Dry Gas Meter Outlet Temp. F tdo	Dry Gas Meter Avg. Temp. F td	Time Min.	Time Sec.	Y	Chg (H@)
Final			89.666	24.571	66	73	70					
Initial			83.028	17.844	66	74	69					
Difference	1	0.25	6.638	6.727	66	73.5	69.5	71.5	22	52	0.997	1.659
Final			99.336	34.346	67	76	72					
Initial			89.853	24.763	66	72	70					
Difference	2	0.55	9.483	9.583	66.5	74	71	72.5	22	45	1.003	1.771
Final			113.824	48.963	68	76	72					
Initial			99.488	34.499	68	75	72					
Difference	3	0.75	14.336	14.464	68	75.5	72	73.75	28	27	1.001	1.863
Final			82.887	17.771	66	75	69					
Initial			70.520	5.340	64	71	68					
Difference		0.95	12.367	12.431	65	73	68.5	70.75	21	57	1.003	1.881
Final			27.225	62.457	68	80	74					
Initial			13.974	49.120	68	75	72					
Difference	5	1.30	13.251	13.337	68	77.5	73	75.25	20	24	1.002	1.797
Final			40.590	75.842	70	82	75					
Initial			27.813	63.026	68	80	74					
Difference	6	2.00	12.777	12.816	69	81	74.5	77.75	15	42	1.003	1.708
									Average		1.002	1.704

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 9/17/93 Thermocouple Number E-19

Ambient temperature 68 °F Barometric pressure 29.35 in. Hg

Calibrator M. Sim Reference: mercury-in-glass ASTM-1F

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Temperature difference,[c] %
.397		50	52	~~.401~~ .392
1.52		100	101	.196
2.646		150	150	0.0
3.819		200	202	.303
4.964		250	254	.563
6.092		300	303	.395
7.205		350	353	.370
8.314		~~350~~ 400	401	.116
9.43		450	450	0.0
10.56		500	502	.208
11.702		550	552	.198
12.854		600	601	.094
14.013		650	652	.180
15.178		700	701	.086
17.523		800	800	0.0
19.883		900	899	.079
22.251		1000	1000	0.0
24.618		1100	1101	.064
26.975		1200	1200	0.0

[a] Every (50°F) for each reference point.

[b] Type of calibration system used.

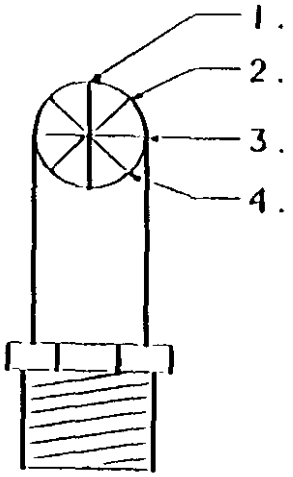
[c] $\left[\frac{(\text{ref temp, °F} + 460) - (\text{test thermom temp, °F} + 460)}{\text{ref temp, °F} + 460}\right] 100 \leq 1.5\%$

NOZZLE CALIBRATION

Company RP&L

Date Sept 17

Analyst MP



Nominal Diameter	.150	.175	.200	.225	.250	.275	.300	.375	.500	Other
MEASURED 1.					.254	.275	.300			
2.					.255	.275	.300			
3.					.255	.274	.300			
4.					.255	.275	.300			
Measured Average					.255	.275	.300			

DWG - AN

MOSTARDI-PLATT ASSOCIATES, INC.

TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) ✓ no

α_1 = 2 ° (<10°), α_2 = 0 ° (<10°)

β_1 = 0 ° (<5°), β_2 = 0 ° (<5°)

γ = 0 °, θ = 0 °, A = .9065 (in.)

z = A sin γ = 0 (in.); (<0.125 in.)

w = A sin θ = 0 (in.); (<0.03125 in.)

P_A = .4532 (in.), P_B = .4532 (in.), D_t = 2.95 (in.)

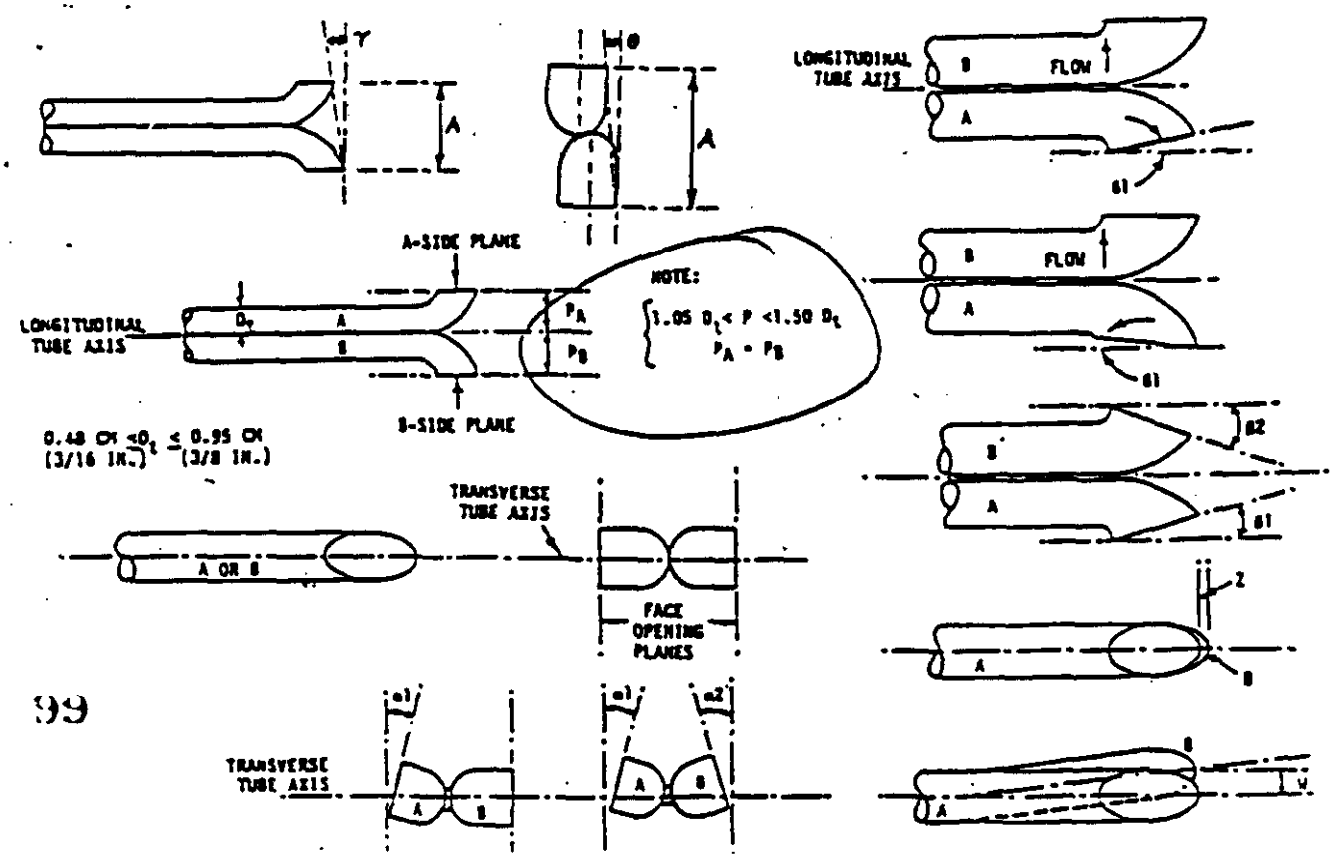
Comments: Stainless steel Detached 12"

Calibrated 1-30-92 $\overline{C_p}$ (A) = 0.830

$\overline{C_p}$ (B) = 0.830

Calibration required? _____ yes _____ no

PITOT TUBE # 1m DATE 1-22-92 NAME [illegible]



mostardi-platt associates.

PITOT TUBE CALIBRATION DATA

Calibration pitot tube: type STAND HEMI size (OD) .250 ID number S-1

Type S pitot tube ID number TM $C_{p(std)}$ = 0.99

Calibration: date 1-29-92 performed by DB/SB

A-Side Calibration

Δp_{std}, (in.) H_2O	Δp_s, (in.) H_2O	$C_{p(S)}$ [a]	DEV.[b]
.320	.450	.835	
.670	.950	.831	
1.53	2.19	.827	
2.35	3.35	.829	
3.60	5.14	.829	
Average		0.830	

B-Side Calibration

Δp_{std}, (in.) H_2O	Δp_s, (in.) H_2O	$C_{p(S)}$ [a]	DEV.[b]
.240	.340	.832	
.660	.930	.834	
1.25	1.77	.832	
2.30	3.30	.826	
3.60	5.20	.824	
Average		0.830	

[a] $C_{p(S)} = C_{p(std)} \sqrt{\frac{\Delta p_{std}}{\Delta p_s}}$ = _____

[b] DEV = $C_{p(S)} - \bar{C}_p$, (must be ≤ 0.01)

$\bar{C}_p(A) - \bar{C}_p(B)$ = _____ (must be ≤ 0.01).

M and R BALANCE SERVICE, INC.

Illinois Registration No. 1119

3614 N. Oriole Avenue Chicago, Illinois 60634 (312) 625-9444

CERTIFICATE OF CALIBRATION

Submitted for MOSTARDI-PLATT ASSOC. *Completion Date* 5/5/93

Make	*Model No.*	*Serial No.*
OHAUS SCALE CO.	GT-4000	3597
OHAUS SCALE CO.	B-1500	10227
OHAUS SCALE CO.	TS4KS	2091
A & D BALANCE CO.	FW-15	01593
TORBAL	EA-1	168491
SARTORIOUS BALANCE CO.	A210S	37110004

The above balances meet or exceed the National Bureau of Standards Specifications

WEIGHT CERTIFICATION. 1 mg. TO 100 g. NIST. 737/229825 REF. MIL. SPEC. CAL. SYSTEM REQUIREMENT
200 g. TO 5 Kg. NIST. 6.6/152622 MIL. STD. 45662A
IL. TEST # 92-261 NIST. 38127

Serviceman, Michael J. Fitzpatrick
(Illinois Registration No. 1119)

APPENDIX H

PARTICULATE MATTER ANALYTICAL DATA, FIELD DATA SHEETS AND EQUIPMENT CALIBRATION DATA - OPTIMIZATION TESTS

LIFAC NA DEMONSTRATION PROJECT
RICHMOND POWER AND LIGHT
WHITEWATER VALLEY GENERATING UNIT #2

PARAMETRIC AND OPTIMIZATION TESTS
ENVIRONMENTAL MONITORING REPORT

ICF KAISER ENGINEERS, INC.
PITTSBURGH, PENNSYLVANIA

MOSTARDI-PLATT ASSOCIATES, INC.

Project/Project Number: ICF Kaiser / Richmond P&L 34907

Date: 12.13.93 Analyst: Dino J. Santelli / E.V.

Description Unit 2 Outlet	Initial Weight	Final Weight	Net Weight Gain
Test # 1 12.7.93			
Filter # 2371	0.7907	1.0790	0.2883
Acetone Wash # 2151-55 120 ml	7.6548	7.7071	0.0523
Acetone Blank			— 0 —
Total Weight			0.3406
Test # 2 12.7.93			
Filter # 2364	0.7805	1.1371	0.3566
Acetone Wash # 2096-2100 125 ml	7.7168	7.8371	0.1203
Acetone Blank			— 0 —
Total Weight			0.4769
Test # 3 12.7.93			
Filter # 2365	0.7874	1.0299	0.2425
Acetone Wash # 2126-2130 105 ml	7.6939	7.7277	0.0338
Acetone Blank			— 0 —
Total Weight			0.2763
Test #			
Filter #			
Acetone Wash # ml			
Acetone Blank			
Total Weight			
Blank			
Acetone Wash # 2121-25 100 ml	7.6868	7.6868	0.0000

f:\data\lab\M5.frm

CAS 12/13/93

MOSTARDI-PLATT ASSOCIATES, INC.

Project/Project Number: ICF Kaiser/Richmond P & L 34907

Date: 12 - 13 - 93 Analyst: Dino J. Santelli / E.V.

Description Unit 2 Outlet	Initial Weight	Final Weight	Net Weight Gain
Test # 4 12 . 8 . 93			
Filter # 2275	0.7607	0.9857	0.2250
Acetone Wash # 2081-85 210 ml	7.7574	7.8130	0.0556
Acetone Blank			— 0 —
Total Weight			0.2806
Test # 5 12 . 8 . 93			
Filter # 2391	0.7882	1.1364	0.3482
Acetone Wash # 2111-2115 170 ml	7.6917	7.7758	0.0841
Acetone Blank			— 0 —
Total Weight			0.4323
Test # 6 12 . 8 . 93			
Filter # 2421	0.7835	0.9159	0.1324
Acetone Wash # 2091-2095 105 ml	7.6962	7.7229	0.0267
Acetone Blank			— 0 —
Total Weight			0.1591
Test #			
Filter #			
Acetone Wash # ml			
Acetone Blank			
Total Weight			
Blank			
Acetone Wash # 2121-25 100 ml	7.6868	7.6868	0.0000

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CAS 12/13/93

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 1

COMPANY Richmond Power & Light
PLANT White Water Valley Station
TEST LOCATION UNIT 2 outlet duct
CLIENT RP&L
OPERATOR S BURTON
DATE 12-7-93
CONTROL BOX E-22 POT. NO. E-27
METER NO. E-22
METER CALIBRATION FACTOR .989
PITOT ID NO. 112 B
PITOT TUBE COEFFICIENT .842
PORT LENGTH 27 in.
PORT SIZE 6 in.
PORT TYPE FLANGE
IMPINGER H_2O: SILICA GEL:
FINAL 316 ml/gm FINAL WT. 219.4 gm
INITIAL 200 ml/gm INITIAL WT. 210.5 gm
GAIN 116 ml/gm WT. GAIN gm
TOTAL H_2O COLLECTED
DESCRIPTION OF IMPINGER H_2O
SILICA GEL EXHAUSTED ?
IMPINGERS RECOVERED BY
SILICA GEL WEIGHED BY

COMMENTS & NOTES:

THIMBLE NO. 111 TARE WT. N/A
FILTER NO. 2371 TARE WT. 0.7907
BAROMETRIC PRESSURE in. Hg 29.35
FLUE PRESSURE in. H_2O +.625
FLUE PRESSURE in. Hg ABS. 29.40
PROBE LENGTH 12.5 ft.
PROBE LINER MATERIAL 316 S.S.
NOZZLE IDENTIFICATION NO. N/A
CALIBRATED NOZZLE DIAMETER .242 in.
LEAK CHECK PRE .016 POST .020 @ 12/10 in. Hg
DUCT SHAPE rectangular DIAMETER
DUCT AREA 84 sq. ft. L 10.5 W 8
TEST LENGTH 64 min.
MINUTES PER POINT 2
TOTAL NUMBER OF TRAVERSE POINTS 32
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 13.3
O_2 5.9

PITOT LEAK CHECK: PRE OK POST OK
ΔH@ 1.99
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? Y N
What value do you want to use? F = 9,780 F_c = 1,800 Other =
Circle to indicate "Yes" or add other value if not given.

Form No. 1053 [Rev. 3/92]

Mostardi-Platt Associates, Inc.

FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT RP&L - White Water Valley

TEST RUN NO. 1

TEST LOCATION Unit 2 OUTLET DUCT DATE 12-7-93 PAGE 1 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.41 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.822 Meter Rate cfm	Pump Vacuum in. Hg	X Z Notes	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	.54	.735	930	17.710	1.30	247	40	38	.604	2.0		263	263	
-2	.54	.735	932	18.945	1.30	247	43	38	.604	2.0	18.918	[illegible]	259	
-3	.63	.794	934	20.135	1.52	248	44	39	.652	2.0	20.126	261	263	Fully
-4	.65	.806	936	21.420	1.57	248	44	39	.663	2.0	21.425	262	264	
-5	.65	.806	938	22.742	1.57	249	46	40	.663	2.0	22.750	263	261	Kea
-6	.75	.866	940	24.100	1.81	249	48	41	.712	2.0	24.076	262	259	
-7	.78	.883	942	25.582	1.88	249	49	41	.726	3.0	25.500	261	261	
-8	.74	.860	944	26.930	1.78	249	50	41	.707	3.0	26.952	262	259	68°
		.811	946	28.370	1.59	248.3	46				28.366			
2-1	.50	.707	950	28.370	1.21	249	51	43	.581	2.0		261	260	
-2	.52	.721	952	29.600	1.25	248	51	43	.593	3.0	29.528	[illegible]	259	
-3	.63	.794	954	30.762	1.52	249	52	44	.652	3.0	30.714	258	26	
-4	.69	.831	956	32.028	1.66	249	52	44	.683	3.0	32.019	261	257	
-5	.68	.825	958	33.409	1.64	249	52	44	.678	3.0	33.385	262	258	
-6	.71	.843	1000	34.732	1.71	249	53	44	.693	3.0	34.741	261	259	
-7	.69	.831	1002	36.132	1.66	249	53	43	.683	3.0	36.126	259	261	
-8	.76	.872	1004	37.487	1.83	249	53	43	.717	3.0	37.492	258	260	
		.803	1006	38.931	1.56	248.9	47.8				38.925			

ELE ST TA EI
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT RKE White Dairy 10-110

TEST RUN NO. 4

TEST LOCATION UNI [illegible] Duct

DATE 12-7-93 PAGE 2 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.41 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.822 Meter Rate cfm	Pump Vacuum in. Hg	x 2 Notes	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
3-1	.48	.693	1010	38.931	1.16	248	51	43	.570	3.0		25[illegible]	26	
-2	.48	.693	1012	40.100	1.16	248	51	43	.570	3.0	40.064	262	262	
-3	.72	.849	1014	41.200	1.74	249	52	43	.697	3.0	41.204	260	26[illegible]	full
-4	.62	.787	1016	42.609	1.49	249	52	43	.647	3.0	42.597	259	262	
-5	.59	.768	1018	43.902	1.42	250	52	43	.631	3.0	43.893	261	258	(0.1)
-6	.63	.794	1020	45.162	1.52	250	52	43	.652	3.0	45.156	249	25[illegible]	
-7	.63	.794	1022	46.503	1.52	250	53	44	.652	3.0	46.461	253	255	
-8	.59	.768	1024	47.775	1.42	250	53	44	.631	3.0	47.765	25[illegible]	25[illegible]	=6'
		.768	1026	49.075	1.43	[illegible]	47.6				49.028			
4-1	.71	.843	1028	49.075	1.71	249	53	44	.693	3.0		25[illegible]	26[illegible]	
-2	.70	.837	1030	50.425	1.69	249	54	44	.688	3.0	50.413	[illegible]	[illegible]	
-3	.70	.837	1032	51.796	1.69	250	54	44	.658	3.0	51.788	26[illegible]	26[illegible]	
-4	.63	.794	1034	53.159	1.52	250	55	44	.652	3.0	53.164	261	25[illegible]	
-5	.54	.735	1036	54.500	1.30	250	55	44	.604	3.0	54.469	260	26[illegible]	
-6	.48	.693	1038	55.700	1.16	250	53	44	.569	3.0	55.677	259	249	
-7	.32	.566	1040	56.812	.771	244	53	44	.465	3.0	56.8[illegible]6	247	25[illegible]	
-8	.33	.574	1042	57.748	.795	245	52	44	.472	3.0	57.740	249	252	
		.735	1044	58.761	1.[illegible]	248.4	48.9				58.690			
	AVG	.779		41.054	1.48	248.7	46.7							

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 2

COMPANY Richmond Power & Light
PLANT White Water Valley Station
TEST LOCATION UNIT 2 OUTLET DUCT
CLIENT RP&L
OPERATOR S. BURTON
DATE 12-7-93
CONTROL BOX E-22 POT. NO. E-22
METER NO. E-22
METER CALIBRATION FACTOR .989
PITOT ID NO. 112 B
PITOT TUBE COEFFICIENT .842
PORT LENGTH 27 in.
PORT SIZE 6 in.
PORT TYPE FLANGE
IMPINGER H_2O: SILICA GEL:
FINAL 314 ml/gm FINAL WT. 244.5 gm
INITIAL 200 ml/gm INITIAL WT. 232.6 gm
GAIN ml/gm WT. GAIN gm
TOTAL H_2O COLLECTED
DESCRIPTION OF IMPINGER H_2O
SILICA GEL EXHAUSTED ?
IMPINGERS RECOVERED BY
SILICA GEL WEIGHED BY

COMMENTS & NOTES: Soot Blow during this run !!

THIMBLE NO. N/A TARE WT. N/A
FILTER NO. 2364 TARE WT.
BAROMETRIC PRESSURE in. Hg 29.35
FLUE PRESSURE in. H_2O +.625
FLUE PRESSURE in. Hg ABS. 29.40
PROBE LENGTH 12.5 ft.
PROBE LINER MATERIAL 316 S.S.
NOZZLE IDENTIFICATION NO. N/A
CALIBRATED NOZZLE DIAMETER .242 in.
LEAK CHECK PRE .017 POST .015 @ 12/10 in. Hg
DUCT SHAPE rectangular DIAMETER
DUCT AREA 84 sq. ft. L 10.5 W 8
TEST LENGTH 64 min.
MINUTES PER POINT 2
TOTAL NUMBER OF TRAVERSE POINTS 32
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 13.3
O_2 5.7

PITOT LEAK CHECK: PRE √OK POST √OK
ΔH@ 1.991
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? Y ☐ N ☐
What value do you want to use? F = 9,780 F_c = 1,800 Other =
Circle to indicate "Yes" or add other value if not given.

FIELD TEST DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT KPSL - White Water Lake Station

TEST RUN NO. 2

TEST LOCATION UNIT 2 OUT 1 DUC DATE 12-7-93 PAGE 1 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.41 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.822 Meter Rate cfm	Pump Vacuum in. Hg	X 2 Notes	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	.51	.714	1205	68.771	1.23	251	44	41	.587	2.0		261	260	
-2	.57	.755	1207	69.940	1.37	252	45	41	.621	2.0	69.945	259	25[illegible]	
-3	.69	.831	120[illegible]	71.172	1.66	252	46	41	.683	2.0	71.186	26[illegible]	26[illegible]	[illegible]
-4	.83	.911	121[illegible]	72.600	2.00	253	48	41	.749	2.0	72.552	262	258	
-5	.75	.866	1213	74.050	1.81	253	48	41	.712	2.0	74.050	259	252	[illegible]
-6	.85	.922	1215	75.500	2.05	253	51	42	.758	2.0	75.474	260	25[illegible]	
-7	.69	.831	1217	76.943	1.66	252	51	42	.683	2.0	76.990	25[illegible]	25[illegible]	[illegible]
8	.77	.877	1219	78.132	1.86	252	52	43	.721	2.0	78.356	259	25[illegible]	
			1221	79.804							79.799			
2-1	.45	.671	1225	79.804	1.08	253	51	43	.551	3.0		26[illegible]	26[illegible]	
-2	.45	.671	1227	80.896	1.08	252	51	43	.551	3.0	80.902	2[illegible]	26[illegible]	
-3	.77	.877	1229	82.056	1.86	252	53	44	.721	3.0	82.004	2[illegible]	26[illegible]	
-4	.77	.877	123[illegible]	82.439	1.86	253	53	44	.721	3.0	83.447	260	259	
-5	.78	.883	1233	84.898	1.88	253	55	44	.726	3.0	84.859	26[illegible]	26[illegible]	
-6	.80	.894	1235	86.352	1.93	253	55	44	.735	3.0	86.341	261	[illegible]	
-7	.76	.872	1237	87.825	1.83	253	55	44	.717	3.0	87.811	260	25[illegible]	
8	.75	.866	12[illegible]9	89.263	1.81	253	55	44	.712	3.0	89.244	25[illegible]	[illegible]	
			1[illegible]	90.680							90.668			

Form No. 1026 [Rev. 3/92]

Mostardi-Platt Associates, Inc.

FIELD DATA SHEET FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT RPR - White Water Valley Station

TEST RUN NO. 2

TEST LOCATION UNIT 2 OUTLET DUCT DATE 12-7-93 PAGE 2 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.41 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.822 Meter Rate cfm	Pump Vacuum in. Hg	X 2 Notes 90.668	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
3-1	.46	.678	1243	90.680	1.11	252	53	45	.558	3.0		259	26[illegible]	
-2	.46	.678	1245	91.769	1.11	252	53	45	.558	3.0	91.783	258	262	
-3	.73	.854	1247	92.916	1.76	251	54	46	.702	3.0	92.899	257	26[illegible]	full
-4	.69	.831	1249	94.300	1.66	252	54	46	.683	3.0	94.304	261	264	
-5	.71	.843	1251	95.682	1.71	252	55	47	.693	3.0	95.670	259	263	leak
-6	.65	.806	1253	97.095	1.57	252	55	47	.663	3.0	97.055	261	262	
-7	.56	.748	1255	98.396	1.35	251	56	47	.615	3.0	98.380	259	261	[illegible]
-8	.52	.721	1257	99.600	1.25	251	56	47	.593	3.0	99.610	258	260	
			1259	100.804							100.796			
4-1	.71	.843	1301	100.804	1.71	252	55	47	.693	3.0		259	26[illegible]	
-2	.69	.831	1303	102.201	1.66	252	55	47	.683	3.0	102.181	[illegible]	26[illegible]	
-3	.70	.837	1305	103.623	1.69	251	56	47	.688	3.0	103.547	262	26[illegible]	
-4	.65	.806	1307	104.853	1.57	251	56	47	.663	3.0	104.922	262	26[illegible]	
-5	.57	.755	1309	106.362	1.37	252	56	47	.621	3.0	106.247	264	262	
-6	.48	.693	1311	107.492	1.16	251	58	49	.569	3.0	107.488	262	261	
-7	.42	.648	1313	108.620	1.01	251	59	49	.533	3.0	108.627	263	260	
-8	.36	.600	1315	109.704	.868	251	60	50	.493	3.0	109.692	264	260	
			1317	110.685							110.678			
	AVG			41.914										

Form No. 1026 (Rev. 3/92)

Mostardi-Platt Associates, Inc.

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 3

COMPANY Richmond Power & Light
PLANT White Water Valley Station
TEST LOCATION UNIT 2 OUTLET DUCT
CLIENT RP&L
OPERATOR S. BURTON
DATE 12-7-93
CONTROL BOX E-22 POT. NO. E-22
METER NO. E-22
METER CALIBRATION FACTOR .989
PITOT ID NO. 112B
PITOT TUBE COEFFICIENT .812
PORT LENGTH 27 in.
PORT SIZE 6 in.
PORT TYPE FLANGE
IMPINGER H_2O: SILICA GEL:
FINAL 321 ml/gm FINAL WT. 237.5 gm
INITIAL 200 ml/gm INITIAL WT. 224.7 gm
GAIN 121 ml/gm WT. GAIN gm
TOTAL H_2O COLLECTED
DESCRIPTION OF IMPINGER H_2O
SILICA GEL EXHAUSTED ?
IMPINGERS RECOVERED BY
SILICA GEL WEIGHED BY

COMMENTS & NOTES:

THIMBLE NO. N/A TARE WT. N/A
FILTER NO. 2365 TARE WT.
BAROMETRIC PRESSURE in. Hg 29.35
FLUE PRESSURE in. H_2O +.625
FLUE PRESSURE in. Hg ABS. 29.40
PROBE LENGTH 12.5 ft.
PROBE LINER MATERIAL 316 S.S.
NOZZLE IDENTIFICATION NO. N/A
CALIBRATED NOZZLE DIAMETER .242 in.
LEAK CHECK PRE .016 POST .012 @ 10/10 in. Hg
DUCT SHAPE rectangular DIAMETER
DUCT AREA 84 sq. ft. L 10.5 W 8
TEST LENGTH 64 min.
MINUTES PER POINT 2
TOTAL NUMBER OF TRAVERSE POINTS 32
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 13.4
O_2 5.6

PITOT LEAK CHECK: PRE ✓OK POST ✓OK
ΔH@ 1.991
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? Y ☒ N ☐
What value do you want to use? F = 9,780 F_c = 1,800 Other =
Circle to indicate "Yes" or add other value if not given.

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FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT Rial - Whitewater Valley

TEST RUN NO. 3

TEST LOCATION UNIT 2 OUTLET DUCT DATE 12-7-93 PAGE 1 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.41 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.822 Meter Rate cfm	Pump Vacuum in. Hg	X 2 Notes	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	.52	.721	1420	11.627	1.25	249	47	45	.593	2.0		261	262	
-2	.58	.762	1422	12.812	1.40	249	48	45	.626	2.0	12.813	25[illegible]	262	
-3	.73	.854	1424	14.109	1.76	249	49	45	.702	3.0	14.065	26[illegible]	262	fully
-4	.75	.866	1426	15.492	1.81	249	49	45	.712	3.0	15.470	259	26[illegible]	
-5	.84	.917	1428	16.912	2.02	249	50	45	.753	3.0	16.894	261	25[illegible]	1(ea)
-6	.84	.917	1430	18.395	2.02	249	51	45	.753	3.0	18.401	262	258	
-1	.78	.883	1432	19.892	1.88	249	52	46	.726	3.0	19.907	263	261	65[illegible]
8	.73	.854	1434	21.369	1.76	249	52	46	.702	3.0	21.359	261	262	
		.847	1436	22.773	1.74	249					22.764			
2-1	.55	.742	1439	22.773	1.33	249	54	47	.610	3.0		2[illegible]	261	
-2	.59	.768	1441	23.975	1.42	249	56	47	.631	3.0	23.983	2[illegible]8	261	
-3	.77	.877	1443	25.245	1.86	249	58	48	.721	3.0	25.246	259	260	
-4	.70	.837	1446	26.714	1.69	249	58	48	.688	3.0	26.688	26[illegible]	259	
-5	.72	.849	1447	28.106	1.74	249	59	45	.697	4.0	28.064	260	26[illegible]	
-6	.77	.877	1449	29.462	1.86	250	60	50	.721	4.0	29.459	261	26[illegible]	
-1	.72	.849	[illegible]	30.906	1.74	250	61	51	.697	4.0	30.902	262	265	
8	.76	.872	1453	32.310	1.83	255	6[illegible]	52	.717	4.0	32.297	26[illegible]	26[illegible]	
			1455	33.760							33.730			

Form No. 1026 (Rev. 3/92)

Mostardi-Platt Associates, Inc.

TEST DATA SET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT RP&L - White Water Valley

TEST RUN NO. 3

TEST LOCATION UNIT 2 OUTLET DUCT DATE 12-7-93 PAGE 2 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.41 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.822 Meter Rate cfm	Pump Vacuum in. Hg	X 2 Notes	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
3-1	.48	.693	1500	33.760	1.16	250	58	50	.569	4.0		261	264	
-2	.58	.762	1502	34.721	1.40	250	60	51	.626	4.0	34.730	260	264	
-3	.69	.831	1504	35.989	1.66	250	61	52	.683	4.0	35.982	255	266	Full
-4	.72	.849	1506	37.416	1.74	250	61	52	.697	4.0	37.348	256	261	
-5	.69	.831	1508	38.809	1.66	250	62	52	.683	4.0	38.743	256	257	Leak
-6	.64	.800	1510	40.116	1.54	250	62	53	.658	4.0	40.109	258	257	
-7	.62	.787	1512	41.500	1.49	250	62	53	.647	4.0	41.424	261	257	≤65°
-8	.50	.707	1514	42.700	1.21	250	62	53	.581	4.0	42.718	262	256	
		.783	1516	43.891	1.48	250	56.5				43.880			
3-1	.72	.849	1520	43.891	1.74	251	61	52	.697	4.0		261	254	
-2	.70	.837	1522	45.286	1.69	251	62	53	.688	4.0	45.275	263	253	
-3	.69	.831	1524	46.668	1.66	250	62	54	.683	4.0	46.650	263	252	
-4	.65	.806	1526	48.126	1.57	251	63	55	.663	4.0	48.016	264	251	
-5	.62	.787	1528	49.340	1.49	251	63	55	.647	4.0	49.341	264	251	
-6	.53	.728	1530	50.642	1.28	251	63	55	.598	4.0	50.635	265	250	
-7	.49	.700	1532	51.850	1.18	250	63	55	.575	4.0	51.832	264	256	
-8	.49	.700	1534	52.980	1.18	250	63	55	.575	4.0	52.983	262	251	
			1536	54.139		250.6	58.4				54.133			

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 1

COMPANY Richmond Power & Light
PLANT White Water Valley Station
TEST LOCATION UNIT 2 OUTLET DUCT
CLIENT RP&L
OPERATOR S. BURTON
DATE 12-8-93
CONTROL BOX E-22 POT. NO. E-22
METER NO. E-22
METER CALIBRATION FACTOR .989
PITOT ID NO. 112 B
PITOT TUBE COEFFICIENT .842
PORT LENGTH 27 in.
PORT SIZE 6 in.
PORT TYPE FLANGE
IMPINGER H_2O: SILICA GEL:
FINAL 310 ml/gm FINAL WT. 255.9 gm
INITIAL 200 ml/gm INITIAL WT. 246.8 gm
GAIN 110 ml/gm WT. GAIN gm
TOTAL H_2O COLLECTED
DESCRIPTION OF IMPINGER H_2O
SILICA GEL EXHAUSTED ?
IMPINGERS RECOVERED BY
SILICA GEL WEIGHED BY

COMMENTS & NOTES:

THIMBLE NO. N/A TARE WT. N/A
FILTER NO. 2275 TARE WT.
BAROMETRIC PRESSURE in. Hg 29.27
FLUE PRESSURE in. H_2O +.625
FLUE PRESSURE in. Hg ABS. 29.32
PROBE LENGTH 12.5 ft.
PROBE LINER MATERIAL 316 S.S.
NOZZLE IDENTIFICATION NO. N/A
CALIBRATED NOZZLE DIAMETER .242 in.
LEAK CHECK PRE .012 POST .019 @ 10/8 in. Hg
DUCT SHAPE rectangular DIAMETER
DUCT AREA 84 sq. ft. L 126" W 96"
TEST LENGTH 64 min. 10.5' 8
MINUTES PER POINT 2
TOTAL NUMBER OF TRAVERSE POINTS 32
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 13.55
O_2 5.63

PITOT LEAK CHECK: PRE OK POST ✓
ΔH@ 1.991
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? Y ☒ N ☐
What value do you want to use? F = 9,780 F_c = 1,800 Other =
Circle to indicate "Yes" or add other value if not given.

FIELD TEST DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT Richmond Power & Light

TEST RUN NO. 1

TEST LOCATION UNIT 2 OUTLET DUCT DATE 12-8-93 PAGE 1 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.4 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.815 Meter Rate cfm	Pump Vacuum in. Hg	x 2 Notes	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	.49	.700	845	79.017	1.18	252	37	35	.571	3.0		254	261	
-2	.52	.721	847	80.165	1.25	252	37	34	.588	3.0	80.158	251	262	
-3	.62	.787	849	81.362	1.49	252	37	34	.642	3.0	81.333	252	267	Full
-4	.64	.800	851	82.654	1.54	252	41	35	.652	3.0	82.616	254	261	
-5	.67	.819	853	83.926	1.61	253	42	35	.667	3.0	83.920	256	262	Kwd
-6	.71	.843	855	85.300	1.70	253	44	36	.687	3.0	85.254	257	263	
-7	.62	.787	857	86.645	1.49	253	44	36	.641	3.0	86.627	257	263	Ed
-8	.53	.728	859	87.930	1.27	253	45	36	.593	3.0	87.910	262	264	
			901	89.126							89.097			
2-1	.47	.686	906	89.126	1.13	252	43	36	.559	3.0		254	264	
-2	.47	.686	905	90.236	1.13	252	43	37	.559	3.0	90.214	256	266	
-3	.68	.825	910	91.362	1.63	252	44	37	.672	3.0	91.332	256	267	
-4	.71	.843	912	92.685	1.70	252	44	37	.687	3.0	92.676	261	267	
-5	.74	.860	914	94.068	1.78	252	44	37	.701	3.0	94.049	262	268	
-6	.73	.866	916	95.462	1.80	252	45	37	.706	4.0	95.451	261	263	
-7	.74	.860	918	96.860	1.78	252	47	38	.701	4.0	96.863	258	261	
-8	.74	.860	920	98.273	1.78	252	47	38	.701	4.0	98.265	259	255	
			922	99.692							99.667			

FIELD TEST DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT Richmond Power & Light

TEST RUN NO. 1

TEST LOCATION UNIT 2 OUTLET DUCT DATE 12-8-93 PAGE 2 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.4 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.815 Meter Rate cfm	Pump Vacuum in. Hg	X 2 Notes 99.667	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
3-1	.42	.648	925	99.692	1.01	253	45	39	.528	3.0		261	263	
-2	.47	.686	927	100.745	1.13	253	47	39	.559	3.0	100.723	259	264	
-3	.63	.794	929	101.847	1.51	253	49	40	.647	3.0	101.840	258	264	fully
-4	.62	.787	931	103.146	1.49	253	50	41	.642	4.0	103.134	257	261	
-5	.64	.800	933	104.426	1.54	253	50	41	.652	4.0	104.417	261	263	iced
-6	.72	.849	935	105.742	1.73	252	52	42	.692	4.0	105.721	262	263	
-7	.73	.854	937	107.136	1.75	252	52	42	.696	4.0	107.104	261	250	≤61°
-8	.54	.735	939	108.506	1.30	252	52	44	.599	4.0	108.497	260	255	
			941	109.732							109.695			
4-1	.52	.721	943	109.732	1.25	253	50	44	.588	4.0		251	247	
-2	.61	.781	945	110.840	1.46	254	55	45	.637	4.0	110.870	252	248	
-3	.67	.819	947	112.168	1.61	254	55	45	.667	4.0	112.143	252	249	
-4	.62	.787	949	113.501	1.49	254	57	46	.642	4.0	113.477	254	251	
-5	.63	.794	951	114.787	1.51	254	56	47	.647	4.0	114.760	254	253	
-6	.53	.728	953	116.075	1.27	254	60	48	.593	4.0	116.054	255	253	
-7	.53	.728	955	117.238	1.27	254	60	48	.593	3.0	117.241			
-8	.26	.510	957	118.436	.624	254	58	48	.416	3.0	118.427			
			959	119.365						3.0	119.258			

[Rev. 3/92]

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 2

COMPANY Richmond Power & Light
PLANT Whitewater Valley Station
TEST LOCATION UNIT 2 OUTLET DUCT
CLIENT RP&L
OPERATOR S. BURTON
DATE 12-8-93
CONTROL BOX E-22 POT. NO. E-22
METER NO. E-22
METER CALIBRATION FACTOR .989
PITOT ID NO. 112 B
PITOT TUBE COEFFICIENT .842
PORT LENGTH 27 in.
PORT SIZE 6 in.
PORT TYPE FLANGE

IMPINGER H_2O: SILICA GEL:
FINAL 204 ml/gm FINAL WT. 239.3 gm
INITIAL 200 ml/gm INITIAL WT. 226.9 gm
GAIN 104 ml/gm WT. GAIN _____ gm
TOTAL H_2O COLLECTED _____
DESCRIPTION OF IMPINGER H_2O _____
SILICA GEL EXHAUSTED ? _____
IMPINGERS RECOVERED BY _____
SILICA GEL WEIGHED BY _____

COMMENTS & NOTES:

Soot Blow!! during this run

THIMBLE NO. N/A TARE WT. N/A
FILTER NO. 2391 TARE WT. _____
BAROMETRIC PRESSURE in. Hg 29.27
FLUE PRESSURE in. H_2O +.625
FLUE PRESSURE in. Hg ABS. 29.32
PROBE LENGTH 12.5 ft.
PROBE LINER MATERIAL 316.SS
NOZZLE IDENTIFICATION NO. N/A
CALIBRATED NOZZLE DIAMETER .242 in.
LEAK CHECK PRE .018 POST .012 @ 8/7 in. Hg
DUCT SHAPE rectangular DIAMETER _____
DUCT AREA 84 sq. ft. L 126" W 96"
TEST LENGTH 64 min.
MINUTES PER POINT 2
TOTAL NUMBER OF TRAVERSE POINTS 32
GAS ANALYSIS (ORSAT/FYRITE): _____
CO_2 13.8
O_2 5.3

PITOT LEAK CHECK: PRE ✓OK POST ✓OK
ΔH@ 1.991
SAMPLES REMOVED FROM SITE BY _____

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? ~~Y~~ N ☐
What value do you want to use? F = 9,780 F_c = 1,800 Other = _____
Circle to indicate "Yes" or add other value if not given.

FIELD TEST DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT Richmond Power & Light

TEST RUN NO. 2

TEST LOCATION UNIT 2 OUTLET DUCT DATE 12-8-93 PAGE 1 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.4 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.815 Meter Rate cfm	Pump Vacuum in. Hg	x 2 Notes	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	.52	.721	1045	20.492	1.25	261	51	48	.588	3.0		249	254	
-2	.56	.748	1047	21.682	1.34	259	53	49	.610	3.0	21.667	251	256	
-3	.67	.819	1049	22.906	1.61	259	54	49	.667	3.0	22.887	253	256	full
-4	.83	.911	1051	24.235	1.99	259	56	50	.743	3.0	24.221	254	257	
-5	.96	.927	1053	25.723	2.06	259	57	50	.756	4.0	25.706	261	261	(ice)
-6	.79	.889	1055	27.210	1.90	258	58	50	.724	4.0	27.218	262	262	
-7	.62	.787	1057	28.679	1.49	258	60	50	.642	4.0	28.667	261	25-	≤65°
-8	.62	.787	1059	29.962	1.49	258	60	51	.642	4.0	29.950	260	257	
			1101	31.245							31.234			
2-1	.47	.686	1103	31.245	1.13	259	59	51	.559	3.0		251	261	
-2	.56	.748	1105	32.382	1.31	259	60	52	.610	3.0	32.351	256	262	
-3	.62	.787	1107	33.582	1.49	260	60	52	.642	3.0	33.571	257	262	
-4	.62	.787	1109	34.906	1.49	258	60	52	.642	4.0	34.854	261	259	
-5	.74	.860	1111	36.122	1.78	258	59	52	.701	4.0	36.138	262	257	
-6	.75	.866	1113	37.540	1.80	258	59	52	.706	4.0	37.540	261	257	
-7	.71	.843	1115	38.992	1.70	258	59	52	.687	4.0	38.952	259	257	
-8	.69	.831	1117	40.362	1.66	258	59	52	.677	4.0	40.325	259	257	
			1119	41.664							41.679			

FIELD DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT Richmond Power & Light

TEST RUN NO. 2

TEST LOCATION UNIT 2 OUTLET DUCT DATE 12-8-93 PAGE 2 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.4 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.815 Meter Rate cfm	Pump Vacuum in. Hg	X 2 Notes 41.679	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
3-1	.43	.656	1121	41.664	1.03	255	58	52	.534	3.0		249	253	
-2	.56	.748	1123	42.769	1.34	255	58	52	.610	3.0	42.748	251	253	
-3	.62	.787	1125	44.024	1.49	254	58	52	.642	3.0	43.968	251	255	full
-4	.62	.787	1127	45.281	1.49	254	59	51	.642	3.0	45.251	250	262	
-5	.63	.794	1129	46.582	1.51	254	59	51	.647	3.0	46.535	249	262	(C.P.)
-6	.61	.781	1131	47.860	1.46	253	58	51	.637	4.0	47.829	255	261	
1	.53	.728	1133	49.100	1.27	253	58	51	.593	4.0	49.102	257	261	
-8	.51	.714	1135	50.306	1.22	253	58	51	.582	4.0	50.289	257	260	±65°
			1137	51.596							51.453			
4-1	.64	.800	1139	51.596	1.54	252	55	52	.652	4.0		253	261	
-2	.72	.849	1141	52.806	1.73	251	59	52	.692	4.0	52.757	255	262	
-3	.68	.825	1143	54.162	1.63	250	59	52	.672	4.0	54.140	261	262	
-4	.62	.787	1145	55.500	1.49	249	60	52	.642	4.0	55.484	262	259	
-5	.54	.735	1147	56.800	1.30	250	61	53	.599	4.0	56.767	258	251	
-6	.43	.656	1149	57.932	1.03	249	61	53	.534	4.0	57.965	261	256	
-7	.32	.566	1151	58.935	.768	249	60	53	.461	3.0	59.034	260	258	
-8	.22	.469	1153	59.998	.528	249	61	53	.382	3.0	59.956	260	249	
			1155	60.806							60.721			
	AVG			40.314										

MOSTARDI-PLATT ASSOCIATES, INC.

TEST SUPPORT DATA

TEST RUN NO. 3

COMPANY Richmond Power & Light
PLANT Whitewater Valley Station
TEST LOCATION UNIT 2 OUTLET DUCT
CLIENT RP&L
OPERATOR S. BURTON
DATE 12-8-93
CONTROL BOX E-22 POT. NO. E-22
METER NO. E-22
METER CALIBRATION FACTOR .989
PITOT ID NO. 112B
PITOT TUBE COEFFICIENT .842
PORT LENGTH 27 in.
PORT SIZE 6 in.
PORT TYPE FLANGE
IMPINGER H_2O: SILICA GEL:
FINAL 321 ml/gm FINAL WT. 231.4 gm
INITIAL 200 ml/gm INITIAL WT. 221.1 gm
GAIN 121 ml/gm WT. GAIN gm
TOTAL H_2O COLLECTED
DESCRIPTION OF IMPINGER H_2O
SILICA GEL EXHAUSTED ?
IMPINGERS RECOVERED BY
SILICA GEL WEIGHED BY

COMMENTS & NOTES:

THIMBLE NO. N/A TARE WT. N/A
FILTER NO. 2421 TARE WT.
BAROMETRIC PRESSURE in. Hg 29.27
FLUE PRESSURE in. H_2O +.625
FLUE PRESSURE in. Hg ABS. 29.32
PROBE LENGTH 12.5 ft.
PROBE LINER MATERIAL 316 S.S.
NOZZLE IDENTIFICATION NO. N/A
CALIBRATED NOZZLE DIAMETER .242 in.
LEAK CHECK PRE .018 POST .011 @ 10/8 in. Hg
DUCT SHAPE rect DIAMETER
DUCT AREA 84 sq. ft. L 126" W 96"
TEST LENGTH 64 min.
MINUTES PER POINT 2
TOTAL NUMBER OF TRAVERSE POINTS 32
GAS ANALYSIS (ORSAT/FYRITE):
CO_2 13.9
O_2 5.2

PITOT LEAK CHECK: PRE ✓OK POST ✓OK
ΔH@ 1.991
SAMPLES REMOVED FROM SITE BY

For computer data entry: Supervisor, please complete.
Do you want to enter a fuel analysis? ~~Y ☐~~ N ☐
What value do you want to use? F = 9,780 F_c = 1,800 Other = _____
Circle to indicate "Yes" or add other value if not given.

FIELD DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT Richmond Power & Light

TEST RUN NO. 3

TEST LOCATION UNIT 2 OUTLET DUCT DATE 12-8-93 PAGE 1 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.4 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.815 Meter Rate cfm	Pump Vacuum in. Hg	X 2 Notes	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
1-1	.52	.721	1300	64.100	1.25	253	48	45	.588	3.0		261	262	
-2	.58	.762	1302	65.306	1.39	253	48	45	.621	3.0	65.275	259	259	
-3	.65	.806	1304	66.512	1.56	253	49	46	.657	3.0	66.516	260	261	Full
-4	.72	.849	1306	67.820	1.73	253	50	46	.692	3.0	67.830	262	261	
-5	.72	.849	1308	69.200	1.73	253	52	47	.692	3.0	69.213	263	262	
-6	.76	.872	1310	70.625	1.82	252	52	46	.711	3.0	70.597	2[illegible]	265	100
-7	.73	.854	1312	72.136	1.75	253	55	48	.696	3.0	72.018	2[illegible]	[illegible]	
8	.56	.748	1314	73.400	1.34	252	[illegible]	48	.610	3.0	73.411	[illegible]	264	68
			1316	74.700							74.6[illegible]			
2-1	.52	.721	1318	74.700	1.25	255	53	47	.588	3.0		254	261	
-2	.52	.721	1320	75.800	1.25	255	53	47	.588	3.0	75.806	255	26[illegible]	
-3	.67	.819	1322	76.970	1.61	254	53	47	.667	3.0	76.982	260	26[illegible]	
-4	.74	.860	1324	78.330	1.78	254	53	47	.701	3.0	78.316	261	26[illegible]	
5	.71	.843	1326	79.745	1.70	253	53	47	.687	4.0	79.718	262	256	
-6	.75	.866	1328	81.100	1.80	253	53	47	.706	4.0	81.091	262	257	
-7	.70	.837	1330	82.500	1.68	253	54	47	.682	4.0	82.503	263	263	
-8	.56	.748	1332	83.892	1.34	253	54	48	.610	4.0	83.867	26[illegible]	2[illegible]	
			1334	85.107							85.087			

TEST DATA SHEET
FOR ISOKINETIC SAMPLING

MOSTARDI-PLATT ASSOCIATES, INC.

PROJECT Richmond Power & Light

TEST RUN NO. 3

TEST LOCATION UNIT 2 OUTLET DUCT DATE 12-8-93 PAGE 2 OF 2

Port-Point No.	Velocity Head (P) in. H_2O	$\sqrt{P}$	Clock Time 24 hr.	Meter Volume (Vm) ft^3	2.4 Orifice (H) in. H_2O	Stack Temp. (t_s) °F	Meter Temp. (t_m) Inlet °F	Meter Temp. (t_m) Outlet °F	.815 Meter Rate cfm	Pump Vacuum in. Hg	x2 Notes 85.087	Probe Temp. °F	Filter Holder Temp. °F	Impgr. Outlet Temp. °F
3-1	.47	.686	1336	85.109	1.13	254	53	47	.559	3.0		267	255	
-2	.53	.728	1338	86.200	1.27	254	53	47	.593	3.0	86.204	266	256	
-3	.58	.762	1340	87.409	1.39	253	55	48	.621	3.0	87.391	264	256	full
-4	.62	.787	1342	88.650	1.49	252	55	48	.642	3.0	88.632	261	258	
-5	.64	.800	1344	89.919	1.54	252	56	48	.652	3.0	89.915	262	256	(cod)
-6	.66	.812	1346	91.250	1.58	252	56	48	.662	3.0	91.219	264	261	
-7	.62	.787	1348	92.600	1.49	152	56	48	.642	3.0	92.543	266	262	<68
-8	.53	.728	1350	93.901	1.27	253	57	48	.593	3.0	93.826	263	262	
			1352	95.136							95.013			
4-1	.49	.700	1354	95.136	1.18	253	55	47	.571	3.0		265		
-2	.63	.794	1356	96.150	1.51	253	55	[illegible]	.513	3.0	96.154	266		
-3	.63	.794	1358	97.206	1.51	253	55	47	.513	3.0	97.181	266		
-4	.71	.843	1400	98.236	1.70	252	56	47	.687	3.0	98.207	267		
5	.74	.860	1402	99.602	1.78	253	56	47	.701	3.0	99.581	267		
-6	.58	.762	1404	100.943	1.39	253	57	47	.621	3.0	100.983	265		
-7	.36	.600	1406	102.209	.864	253	57	48	.489	3.0	102.225	259		
8	.36	.600	1408	103.196	.864	253	57	48	.489	3.0	103.203	260		
			1410	104.172							104.181			
	AVG			(410.072)										

Form No. 1026 [Rev. 3/92]

Mostardi-Platt Associates, Inc.

PITOT TRAVERSE DATA

Project Richmond Power & Light - White Water Valley

Location UNIT 2 OUTLET DUCT

Date 12-7-93 Test No. 1 Time 7:40 - 8:00

NULL POINT

Point No.	ΔP	√ΔP	t_s	α	Point No.	ΔP	√ΔP	t_s	α
1-1	.52		249	0	3-1	.49		249	3
-2	.56		250	5	-2	.49		250	6
-3	.51		250	6	-3	.64		250	8
-4	.73		250	6	-4	.71		250	9
-5	.76		250	10	-5	.78		250	12
-6	.74		250	5	-6	.78		250	14
-7	.71		250	358	-7	.59		250	10
-8	.64		249	350	-8	.50		251	0
				10° 2°					62
				44					
2-1	.62		250	1	4-1	.42		251	0
-2	.59		250	6	-2	.47		251	3
-3	.66		250	5	-3	.64		250	6
-4	.74		250	8	-4	.69		250	7
-5	.73		250	3	-5	.71		250	9
-6	.71		250	0	-6	.73		250	9
-7	.64		250	352	-7	.48		250	7
-8	.52		250	350	-8	.51		250	10
				10° 8°					51
				38					
							AVERAGE α =		6.1°

P_{bar} 29.35 "Hg Static .625 "H_2O P_g ____ "Hg P_s 29.40 Hg Pitot ID 211A C_p .829

0.44 x ____ %CO_2 = ____ t_s ____ °F T ____ °R Flue Area ____ ft^2

0.32 x ____ %O_2 = + ____ Duct Dimensions ____

0.28 x ____ %N_2 = + ____ B_{ws} .11 1 - B_{ws} ____ $\sqrt{\Delta P}$ ____

(____ Md x ____ 1-Bws) + (18 x ____ Bws) = ____ (Mw)

v_s = 85.49 x ____ Cp x $\sqrt{\frac{(\quad)T}{\text{Ms x Ps}}}$ x ____ $\sqrt{\Delta P}$ = ____ ft/sec(Vs)

Q_{acfm} = ____ Vs x ____ Flue Area x 60 = ____ acfm

Q_{dscfm} = 17.647 x ACFM x $\frac{Ps}{Ts}$ x (1-Bws) = ____ DSC FM

Pre-test leak check ✓ "H_2O

Post-test leak check ✓ "H_2O

Data Taken By S. Burton

PITOT TRAVERSE DATA

Project Richmond Power & Light Whitewater Valley

Location UNIT 2 OUTLET DUCT

Date 12-8-93 Test No. 2 Time 1620-1642

NULL POINT

Point No.	ΔP	√ΔP	t_s	α	Point No.	ΔP	√ΔP	t_s	α
1-1	.51		253	3	3-1	.47		255	5
-2	.57		253	6	-2	.49		255	5
-3	.62		254	6	-3	.66		255	4
-4	.73		254	6	-4	.69		254	7
-5	.78		254	8	-5	.78		254	11
-6	.74		254	4	-6	.74		254	11
-7	.72		254	0	-7	.54		254	8
-8	.63		254	348	-8	54		253	+7
				+12°					58
				45°					
2-1	.59		254	0	4-1	.44		253	3
-2	.61		254	4	-2	.51		253	2
-3	.68		254	8	-3	.66		253	6
-4	.77		254	11	-4	.69		253	8
-5	.81		254	4	-5	.74		252	8
-6	.73		254	358/2	-6	.74		252	9
-7	.69		254	351/9°	-7	.53		252	9
-8	.52		254	356	-8	.41		252	+9
				+ 4°2					53
				42					
							AVERAGE α =		6.2°

P_{bar} 29.27 "Hg Static +.625 "H_2O P_s _____ "Hg P_s 29.32 "Hg Pitot ID 211A C_p .829

0.44 x _____ %CO_2 = _____ t_s _____ °F T _____ °R Flue Area _____ ft^2

0.32 x _____ %O_2 = + _____ Duct Dimensions _____

0.28 x _____ %N_2 = + _____ B_{ws} .11 1 - B_{ws} _____ $\sqrt{\Delta P}$ _____

(_____ Md x _____ 1-Bws) + (18 x _____ Bws) = _____ (Mw)

$$v_s = 85.49 \times ____ Cp \times \sqrt{\frac{(\quad)T}{____ Ms \times ____ Ps}} \times ____ \sqrt{\Delta P} = ____ \text{ ft/sec(Vs)}$$

Q_{acfm} = _____ Vs x _____ Flue Area x 60 = _____ acfm

Q_{dscfm} = 17.647 x ACFM x $\frac{Ps}{Ts}$ x (1-Bws) = _____ DSC FM

Pre-test leak check ✓ "H_2O

Post-test leak check ✓ "H_2O

Data Taken By S. BURTON

CALIBRATION PROCEDURES

PITOT TUBES

The pitot tubes used during this test program are fabricated according to the specification described and illustrated in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1 through 5 as published in the Federal Register, Volume 42, No. 160; hereafter referred to by the appropriate method number. The pitot tubes comply with the alignment specifications in Method 2, Section 4; and the pitot tube assemblies are in compliance with specifications in the same section.

Pitot tube assemblies are calibrated in accordance with Method 2, Section 4, against a standard hemispherical pitot utilizing a wind tunnel meeting the specification in Method 2, Section 4.1.2.

NOZZLES

The nozzles are measured according to Method 5, Section 5.1.

TEMPERATURE SENSING DEVICES

The potentiometer and thermocouples are calibrated against a mercury thermometer in a calibration well. Alternatively, readings are checked utilizing a NBS traceable millivolt source.

DRY GAS METERS

The test meters are calibrated according to Method 5, Section 5.3 and "Procedures for Calibrating and Using Dry Gas Volume Meters as Calibration Standards" by P.R. Westlin and R.T. Shigehara, March 10, 1978.

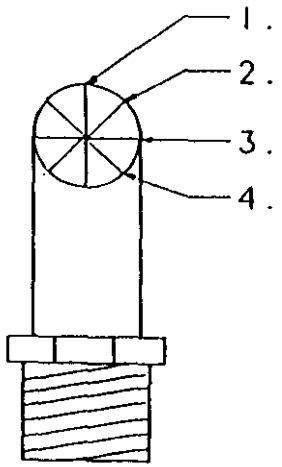
ANALYTICAL BALANCE

The accuracy of the analytical balance is checked with Class S, Stainless Steel Type 303 weights manufactured by F. Hopken and Son, Jersey City, New Jersey.

NOZZLE CALIBRATION

Company Richmond P+L

Date 12/7/93



Analyst _____

Nominal Diameter	.150	.175	.200	.220	.250	.275	.300	.375	.500	Other
MEASURED 1.										
2.										
3.										
4.										
Measured Average			0.196		0.242					

MOSTARDI-PLATT
ASSOCIATES, INC.

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 11/1/93 Thermocouple Number E-22

Ambient temperature 64 °F Barometric pressure 28.94 in. Hg

Calibrator M.P.S. Reference: mercury-in-glass ASTM-1F

other

Reference point number*	Source* (specify)	Reference thermometer temperature, °F	Thermocouple potentiometer temperature, °F	Temperature difference,* %
0.397	MILLIVOLT	50	49	.196
1.52	POTENTIOMETER	100	98	.357
2.66		150	150	0.0
3.819		200	201	.152
4.964		250	251	.141
6.092		300	300	0.0
7.205		350	350	0.0
8.314		400	399	.116
9.43		450	450	0.0
10.56		500	501	.104
11.702		550	552	.198
12.854		600	601	.09~~0~~
14.013		650	651	.090
15.178		700	702	.172
17.523		800	800	0.0
19.883		900	902	.147
22.251		1000	1001	.068
24.618		1100	1102	.128
26.975		1200	1203	.181

*Every (50°F) for each reference point.

*Type of calibration system used.

$$\left[\frac{(\text{ref temp, °F} + 460) - (\text{test thermom temp, °F} + 460)}{\text{ref temp, °F} + 460}\right] 100 \leq 1.5\%$$

Dry Gas Meter No.	E-22	Date:	03-Dec-93
Standard Meter No.	677191	Calibrated By:	M.Simmons
Standard Meter (Yr)	1.0021	Barametric Pressure :	29.21

Run Number		Orifice Setting in H20 Chg (H)	Standard Meter Gas Volume Vr	Dry Meter Gas Volume Vd	Standard Meter Temp. F tr	Dry Gas Meter Inlet Temp. F tdi	Dry Gas Meter Outlet Temp. F tdo	Dry Gas Meter Avg. Temp. F td	Time Min.	Time Sec.	Y	Chg (H@)
Final			11.447	44.599	64	67	64					
Inital			6.372	39.450	63	63	63					
Difference	1	0.17	5.075	6.149	63.5	65	63.5	64.25	21	30	0.987	1.730
Final			16.582	49.798	64	71	67					
Inital			11.531	44.664	64	67	64					
Difference	2	0.40	5.051	5.134	64	69	65.5	67.25	15	0	0.989	1.992
Final			26.957	60.374	64	76	71					
Inital			16.697	49.908	65	71	67					
Difference	3	0.69	10.260	10.466	64.5	73.5	69	71.25	22	30	0.991	1.864
Final			37.639	71.281	66	77	72					
Inital			27.185	60.611	65	76	71					
Difference		0.87	10.454	10.670	65.5	76.5	71.5	74	20	30	0.993	1.876
Final			47.849	81.762	68	80	74					
Inital			38.003	71.652	66	77	72					
Difference	5	1.20	9.846	10.110	67	78.5	73	75.75	17	0	0.987	2.011
Final			71.637	15.810	63	71	63					
Inital			60.815	4.896	63	65	58					
Difference	6	2.00	10.822	10.914	63	68	60.5	64.25	16	0	0.989	2.474
									Average		0.989	1.991

MOSTARDI-PLATT ASSOCIATES, INC.

Environmental Consultants

Analytical Balance Calibration Form

Identification: Torbal Model EA-1, Serial No. 168491
Classification of standard weights: Class S calibrated 11/6/92

Date	Time	~~100.0003~~ 99.9999 g	2.0001 g	0.5002 g	Analyst
11. 22. 93	14:20	100.0002	2.0000	0.5005	E. V.
11. 23. 93	11:40	100.0002	2.0000	0.5005	E. V.
11/24/93	7:45	100.0000	2.0000	0.5004	DJS
11/26/93	7:50	100.0002	2.0000	0.5006	DJS
11. 29. 93	10:10	100.0003	2.0000	0.5004	E. V.
11/29/93	12:00	100.0003	2.0000	0.5005	DJS
11/29/93	1430	100.0003	2.0000	0.5005	DJS
11. 30. 93	12:00	100.0003	2.0000	0.5005	E. V.
12. 2. 93	14:00	100.0003	2.0000	0.5004	E. V.
12-3-93	8:15	100.0002	2.0000	0.5004	DJS
12-3-93	1265	100.0002	2.0000	0.5004	DJS
12. 3. 93	3:30.	100.0002	2.0000	0.5005	I. P.
12. 6. 93	8:10	100.0002	2.0000	0.5003	E. V.
12. 6. 93	2:35	100.0002	2.0000	0.5005	I. P.
12. 7. 93	11:00	100.0001	2.0000	0.5005	E. V.
12. 9. 93	9:00	100.0003	2.0000	0.5005	E. V.
12. 10. 93	9:45	100.0003	2.0000	0.5005	I. P.
12-13-93	7:40	100.0003	2.0000	0.5005	DJS
12-13-93	9:15	100.0001	2.0000	0.5005	I. P.
12. 14. 93	1:50	100.0001	2.0000	0.5005	I. P.
12-15-93	1145	100.0002	2.0000	0.5005	DJS

Note: Each weight must be within 0.5 mg of the mass obtained after calibration on ~~11/6/92~~ 11/9/93 to continue analysis.