Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP-42 Section Number: 1.3

Reference Number: 64

Title: Field Chemical Emissions Monitoring Project: Site 13 Emissions Monitoring

EPRI Project RP3177-1

Radian Corporation

February 1993

DIL (1)

64

EPRI

Preliminary Draft

FIELD CHEMICAL EMISSIONS MONITORING PROJECT:

SITES 13 EMISSIONS MONITORING

EPRI Project RP3177-1

February 1993

Prepared by:
Radian Corporation
P.O. Box 201088
8501 North Mopac Boulevard
Austin, Texas 78759

Prepared For:

Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, California 94304

Formaldehyde c	8.4	8.40E-06	1.26E-03
Lead	8.2	8.20E-06	1.23E-03
Manganese	8.0	8.00E-06	1.20E-03
Mercury	0.23	2.30E-07	3.44E-05
Molybdenum b	6.5	6.50E-06	9.73E-04
Nickel	1,860	1.86E-03	2.78E-01
Phosphorous b	39	3.90E-05	5.84E-03
Selenium b	0.65	6.50E-07	9.73E-05
Toluene	5.3	5.30E-06	7.94E-04
Vanadium	353	3.53E-04	5.29E-02

a Page 3-17, Boiler Outlet - Baseline data.

b Pollutant not detected in all sampling runs. See page 3-9.

c Detection limit values for two runs used in developing EF. See page 3-9.

d Detection limit values for two runs used in developing EF. See page 3-9.

e Detection limit values for one run used to develop EF.

PM, FILTERABLE EMISSION FACTORS

Emission Factor (lb/MMBtu) a	Emission Factor (lb/1000 gal)
0.049	7.34E+00

a Page 3-17, Boiler Outlet - Baseline data.

TEST REPORT TITLE:

FIELD CHEMICAL EMISSIONS MONITORING PROJECT: SITE 13 EMISSIONS MONITORING.
RADIAN CORPORATION, AUSTIN, TEXAS. FEBRUARY, 1993.

OIL EF DATABASE REFERENCE NO.	1
FILENAME	SITE13.WK1
FACILITY:	EPRI SITE 13

PROCESS DATA

Oil Type a	No. 6
Boiler configuration a	Wall-fired (normal)
SCC	10100401
Control device 1 a	none
Control device 2	
Data Quality	B
Process Parameters a	350 MW
Test methods b	EPA, or EPA-approved, test methods
Number of test runs c	3
Fuel Heating Value (Btu/lb) a	19,000 p. 3-6
Oil density (lb/gal) d	7.88
Fuel Heating Value (Btu/gal)	149,720
Fuel Heating Value (Btu/1000 gal)	149,720,000
Fuel Heating Value (MMBtu/1000 gal)	149.72

a Page 2-1
b Appendix A, Table A-1
c Page 3-9
d Appendix A of Ap-42, residual oil density.

EMISSION FACTORS

Pollutant	Emission Factor (lb/10^12 Btu) a	Emission Factor (lb/MMBtu)	Emission Factor (lb/1000 gal)
Arsenic	7.2	7.20E-06	1.08E-03
Barium	24	2.40E-05	3.59E-03
Benzene	1.4	1.40E-06	2.10E-04
Beryllium b	0.26	2.60E-07	3.89E-05
Cadmium	14	1.40E-05	2.10E-03
Chloride	1,120	1.12E-03	1.68E-01
Chromium	9.1	9.10E-06	1.36E-03
Cobalt	101	1.01E-04	1.51E-02
Copper	16	1.60E-05	2.40E-03
Fluoride	44	4.40E-05	6.59E-03

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FIELD CHEMICAL EMISSIONS MONITORING PROJECT: SITE 13 EMISSIONS REPORT

PRELIMINARY DRAFT REPORT

Prepared for:

Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, California 94303

Prepared by:

Radian Corporation
P.O. Box 201088
8501 North Mopac Boulevard
Austin, Texas 78759

12 February 1993

EPRI
Electric Power
Research Institute Leadership in Science and Technology

February 12, 1993

Mr. William H. Maxwell, P.E. (MD13)
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

Dear Mr. Maxwell:

In response to the Clean Air Act Amendments of 1990, the Electric Power Research Institute (EPRI) initiated the PISCES (Power Plant Integrated Systems: Chemical Emissions Studies) program to better characterize the source, distribution, and fate of trace elements from utility fossil-fuel-fired power plants. As part of the PISCES program, the Field Chemical Emissions Monitoring (FCEM) program has sampled extensively at a number of utility sites, encompassing a range of fuels, boiler configurations, and particulate, SO_2, and NO_X control technologies. EPRI is actively pursuing additional FCEM sampling programs, with at least 24 sites either completed or planned.

This site report presents a preliminary summary of data gathered during a sampling program conducted at one of the FCEM sampling programs - Site 13. Site 13 consists of a boiler burning No. 6 fuel oil. No air pollution control equipment was available to control emissions from the boiler; however, a pilot-scale pulse-jet fabric filter treating a small fraction of the flue gas from this unit was also tested. Two sets of measurements were conducted - one with all burners in service (Baseline configuration) and a second set with some burners taken out-of-service to control NO_X emissions (Low-NO_X configuration). **It should be noted that the results presented in this report are considered PRELIMINARY.** The results are believed to be essentially correct except as noted. As additional data from other sites are collected and evaluated, however, EPRI may conduct verification tests at this site. If this is done, the new data will be made available to the Environmental Protection Agency (EPA).

The primary objective of this report is to transmit the preliminary results from Site 13 to the EPA for use in evaluating select trace chemical emissions from fossil-fuel-fired steam generating plants. In addition to the raw data in the Appendix, the report provides an assessment of the trace metals material balances, discusses the data quality, identifies suspect data, and offers possible explanations for the questionable data. Because the discussion only focuses

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PRELIMINARY DO NOT CITE OR QUOTE

upon the suspect or invalidated data, please keep in mind that most of the data meet the standards of quality established for this study. This report does not compare the results from Site 13 with the results from previous utility sites. Generic conclusions and recommendations were not drawn concerning the effectiveness of a pulse-jet fabric filter system as a potential control technology for trace elements; however, removal efficiencies were calculated where possible. Nor does this site report attempt to address the environmental and health risk impacts associated with the trace chemical emissions.

In the earlier PISCES FCEM sites (the first five sites from Group 1 delivered to EPA in October and December 1992), the mercury measurements in flue gas were believed to be biased low due to incomplete recovery of mercury from the impinger solution prior to analysis. A review of the laboratory analysis records indicated that the correct analytical procedures were followed during the Site 13 test program. The mercury concentrations in the flue gas were either below or slightly above the reporting limits in each of the sample trains.

EPRI hopes that this site report is of assistance to the EPA in evaluating utility trace chemical emissions as well as the associated health risk impacts.

Sincerely,

Paul Chu
Manager, Toxic Substances Control
Environment Division

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Section 1

INTRODUCTION

This report summarizes data gathered during a sampling program sponsored by the Electric Power Research Institute (EPRI). The data have been prepared to be suitable for the Environmental Protection Agency to use in their study of emissions from fossil-fuel-fired power plants, as mandated by the Clean Air Act Amendments (CAAA) of 1990.

Stack emissions were measured from a wall-fired, twin-furnace boiler burning No. 6 fuel oil. Samples were collected during March and April of 1991. A pilot-scale pulse-jet fabric filter (PJFF) treating a small fraction of the flue gas from this unit was also tested during the same period. Tests were conducted in two series: one series during normal operation, and another during experimental low-NO_x operation. The results presented in this report are preliminary. At present, we believe them to be correct; however, as we obtain information from other sites, samples will be occasionally reanalyzed to obtain additional information. We have also resampled plants when the initial results do not appear to be reasonable indicators of process performance.

The project examined the fates of numerous substances found in the process streams at the host site. All of the analytical data generated during the project appear in the appendices. The body of the report presents information about the fuel and flue gas stream compositions. Stack gas emissions are presented both as concentrations and as unit-energy emission factors.

The results reported in this document are of generally good quality and meet the objectives of the FCEM study. They provide a more accurate and comprehensive characterization of a power plant system than is often found in the published literature. The samples on which the reported results are based were collected and analyzed carefully using accepted and appropriate sampling and analytical methods. The sampling and analytical results were subjected to an extensive QA/QC evaluation (Appendix H). In this report, data of satisfactory quality are simply reported and not extensively discussed. The focus of the discussions is on results that are questionable, uncertain, or known to be of poor quality.

This report is one of a series being produced under the Field Chemical Emissions Monitoring (FCEM) project (RP 3177-1) sponsored by EPRI. The objective of this project is to measure selected inorganic and organic substances in the process and discharge streams of power plants. Table 1-1 lists the substances of interest to the program. Data on additional substances detected by the analytical methods employed appear in the

Table 1-1

FCEM Substances

Elements	Organic Compounds
Arsenic	Benzene
Barium	Toluene
Beryllium	Formaldehyde
Cadmium	Polycyclic Organic Matter (POM)[a]
Chlorine (as chloride)	
Chromium	
Cobalt	
Copper	
Fluorine (as fluoride)	
Lead	
Manganese	
Mercury	
Molybdenum	
Nickel	
Phosphorus	
Selenium	
Vanadium	

[a]Also referred to as semivolatile organic compounds. Includes polynuclear aromatic hydrocarbons (PAHs).

appendices. By characterizing all streams of interest, information about the control and fates of these substances can be developed.

The plants studied during the FCEM project were chosen to reflect a cross section of the existing technologies for controlling air emissions. They were not chosen to represent "typical" fossil-fuel-fired power plant operation per se, nor should the solid or aqueous waste treatment systems used or discharge levels achieved be deemed representative of the industry as a whole.

The technical approach used at each plant is to employ "standard" sampling and analytical procedures to the extent possible. In other words, this is not a methods development or research program designed to measure extremely low levels of emissions. The target reporting level for the selected substances was established at 20 $\mu g/Nm^3$ in the stack gas stream. (As the FCEM program has progressed, lower reporting levels have been sought for some substances to provide more information.) The sampling protocol is to obtain three sets of samples for the chemical analysis of each process stream. The results are presented both by individual run and averaged with a 95% confidence interval about the mean to demonstrate the combined process, sampling, and analytical variability.

Section 2 of this report briefly describes the plant and sample locations. Section 3 presents the results of the chemical analyses of the fuel oil and the three gas streams sampled at the plant. Section 4 discusses the results in terms of both analytical and engineering considerations. Section 5 shows example calculations, and a glossary is provided in Section 6. The appendices contain information on the sampling and analytical methods employed, stream concentrations, measured and calculated stream flows, particulate measurement results, QA/QC information, and blank correction data.

Section 2

SITE DESCRIPTION

Facility Information

The Site 13 power plant began operating in 1959. A 350-MW (gross) oil-fired steam electric generating unit is located at this site. A No. 6 fuel oil containing approximately 0.3% sulfur was fired during the test period. No air pollution control equipment was on the unit to control emissions from the boiler; however, a pilot-scale pulse-jet fabric filter, treating a small fraction of the flue gas from the host unit, was located at the site during the test period. Figure 2-1 is a process flow diagram of the plant.

Steam is generated in a Babcock and Wilcox face-fired, balanced-draft, twin-furnace steam-generating boiler. As illustrated in Figure 2-2, the twin-furnace design results in two totally separate combustion zones. The heat recovery systems in each furnace are different, one furnace being the "reheat" side and the other being the "superheat" side. The superheat furnace provides steam to the high-pressure turbine, and the reheat furnace provides steam to the intermediate and low-pressure turbines.

Each furnace contains a total of 16 burners located on the front wall of the firebox. The burner numbering system used at Site 13 is shown in Figure 2-3. All burner tips in the reheat furnace were 12-hole modified Peabody design. These modified burner tips were installed approximately one year before FCEM testing. These same burner tips were also being used in the top two rows (60 and 70 rows) in the superheat furnace. The bottom two rows were using six-hole burner tips supplied by Electric Power Technologies, Inc. Both types of burner tips are a dual-fluid, hollow-cone design with a spray angle of approximately 75 degrees. Each burner requires steam to atomize the fuel oil with the total steam flow rate for atomization estimated to be 1.2% of the main steam flow rate.

A detached vertical plate located in each furnace divides the compartment in half; eight burners are on each side of the plate. Limited mixing of the flue gas from each side of the plate can occur in the combustion zone. The flue gas from each side of the furnace has a greater potential to mix after leaving the combustion zone. Also, there are three points at which the flue gas from each furnace can combine: a common flue gas recirculation header, a common air preheater header, and a common plenum just before the boiler outlet flue gas sampling locations. These common mixing regions are illustrated in Figure 2-2. Gas concentration data for O_2, CO, and NO at the economizer indicated that the flue gas was still not completely mixed.

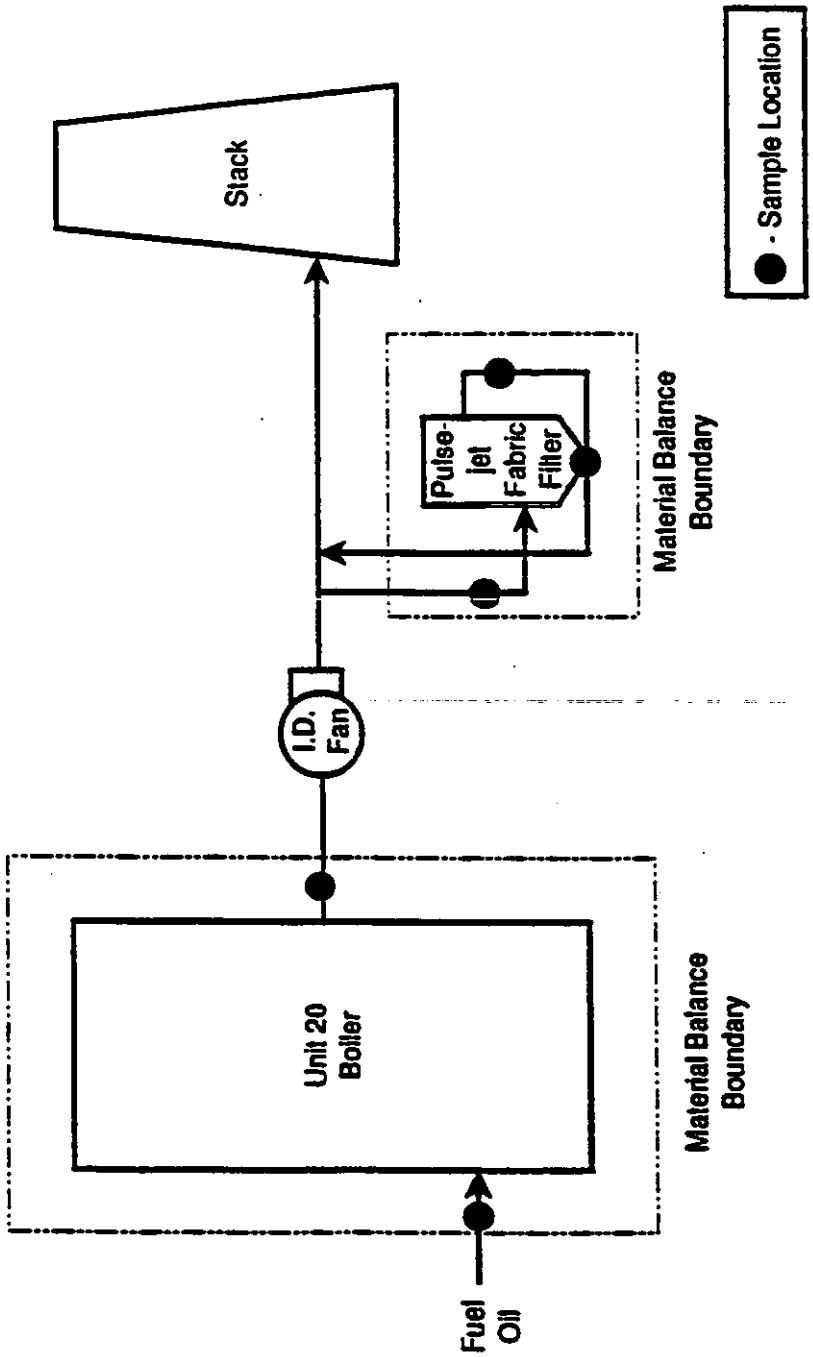

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Figure 2-1. Process Flow Diagram and Sampling Locations for Site 13

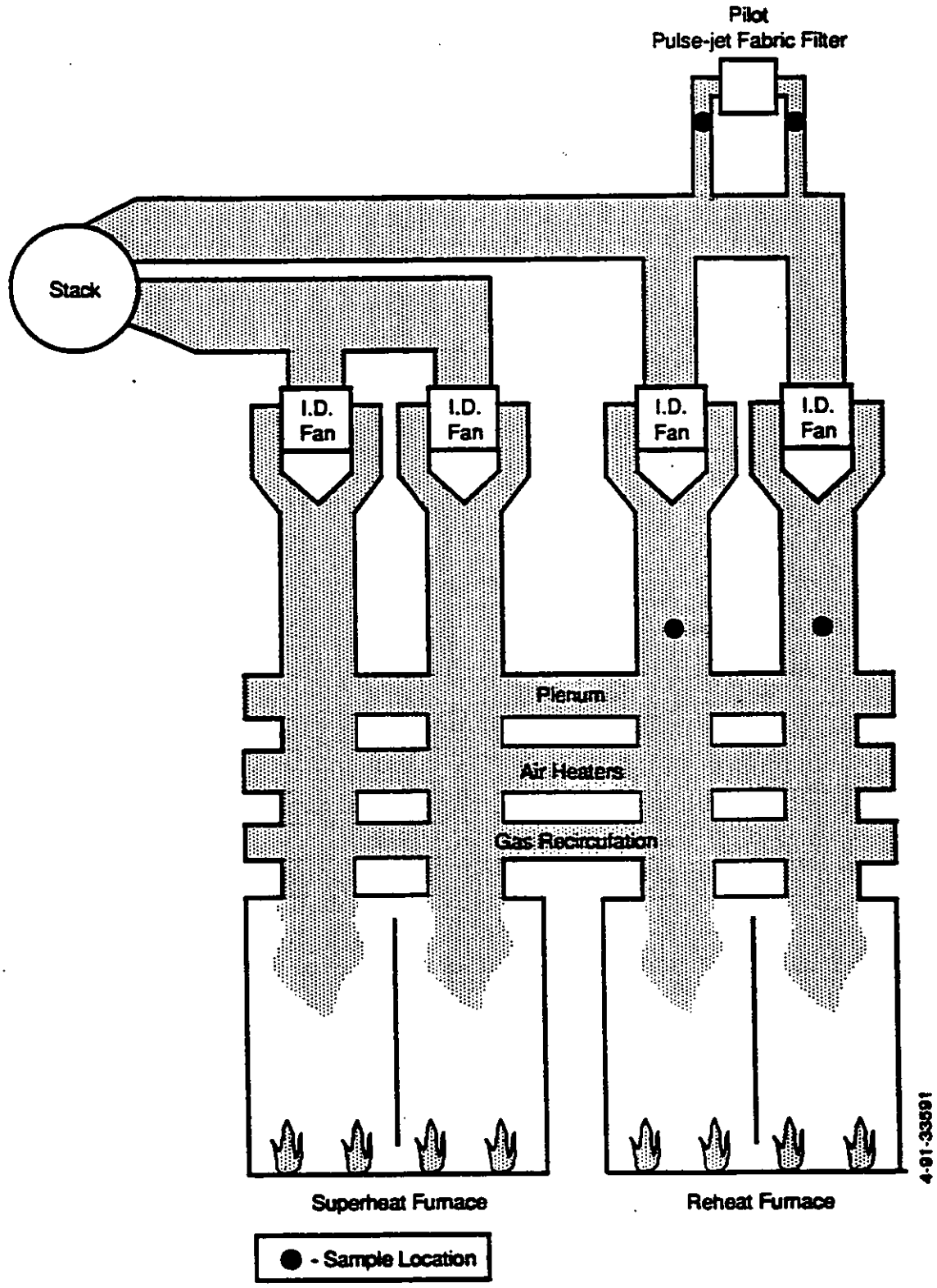

Figure 2-2. Flue Gas Flow Path for Site 13

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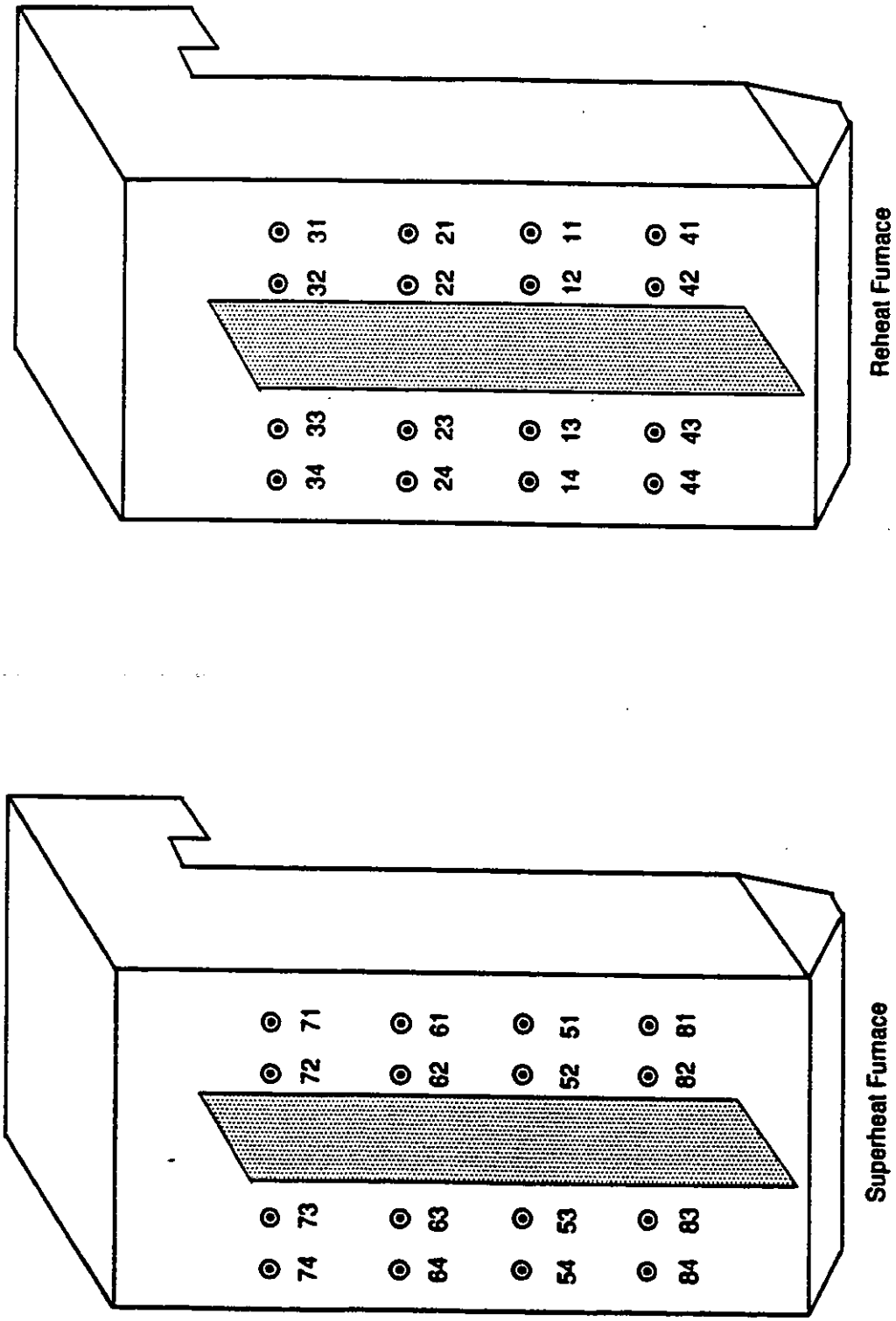

Figure 2-3. Site 13 Furnace Illustration Showing Burner Locations

Pulse-Jet Fabric Filter

The pilot-scale pulse-jet fabric filter is a 1-2 MW equivalent unit. The system, supplied by Howden Environmental Systems Inc., is designed for a flue gas flow rate of 5,000 acfm. A flue gas slipstream from the south reheat furnace duct is used for testing the pilot system. Figure 2-4 illustrates the pilot system.

The filter housing has 48 bags, each 20 feet in length, arranged in three concentric rings within a square enclosure. The bags are constructed of Ryton needled felt on a Ryton scrim. Each oval bag is supported on a 14-wire, mild steel cage and has a filtering surface area of approximately 26 ft^2. The bags were precoated with limestone during installation to improve filtration and protect the surface of the fabric. At the design flue gas flow rate, the unit will operate at an air-to-cloth ratio of 4.0 $acfm/ft^2$. The bags are cleaned by means of a rotating cleaning manifold, which supplies low-pressure air (12 psi) to the bags. The cleaning system was designed to start automatically when the pressure drop across the bags reaches a set point. However, because of the low inlet particulate loadings, the cleaning sequence triggered only infrequently (one to three times per day) so that the period between cleanings was much longer than the flue gas sampling times; therefore, the cleaning cycle was inactivated during flue gas sampling at the fabric filter to avoid sampling under nonrepresentative conditions. The bags were cleaned manually each day immediately prior to the flue gas sampling.

Low-NO_x Configuration

During the second series of test runs, NO_x emissions were reduced by removing various burners from service in each furnace and optimizing the amount of excess air. The burners were removed from service by shutting off the oil and atomizing steam flow to the desired burner. The air slide, which controls the combustion air to the burner, was left open. This procedure had two effects that ultimately contributed to reduced NO_x formation.

First, the remaining burners in service had to fire additional fuel to maintain a consistent unit load. Or stated another way, the fuel that would have normally been fired in the burners removed from service was distributed among the burners remaining in service. The amount of combustion air available to each burner would remain about the same whether the burner was in service or not. This creates localized regions in the furnace that are fuel rich (less combustion air) and, hence, less atmospheric nitrogen is present to promote NO_x formation in the primary combustion zone.

Second, the combustion air not used by the burners that were out of service would simulate an overfire air configuration, resulting essentially in staged combustion. The lower temperatures in the second combustion stage result in reduced NO_x formation.

The daily average NO_x reduction was defined by using the baseline concentration of NO, the primary component of NO_x, which was measured each day before the boiler operation was modified. The daily average reductions in NO_x for the four days of the low-

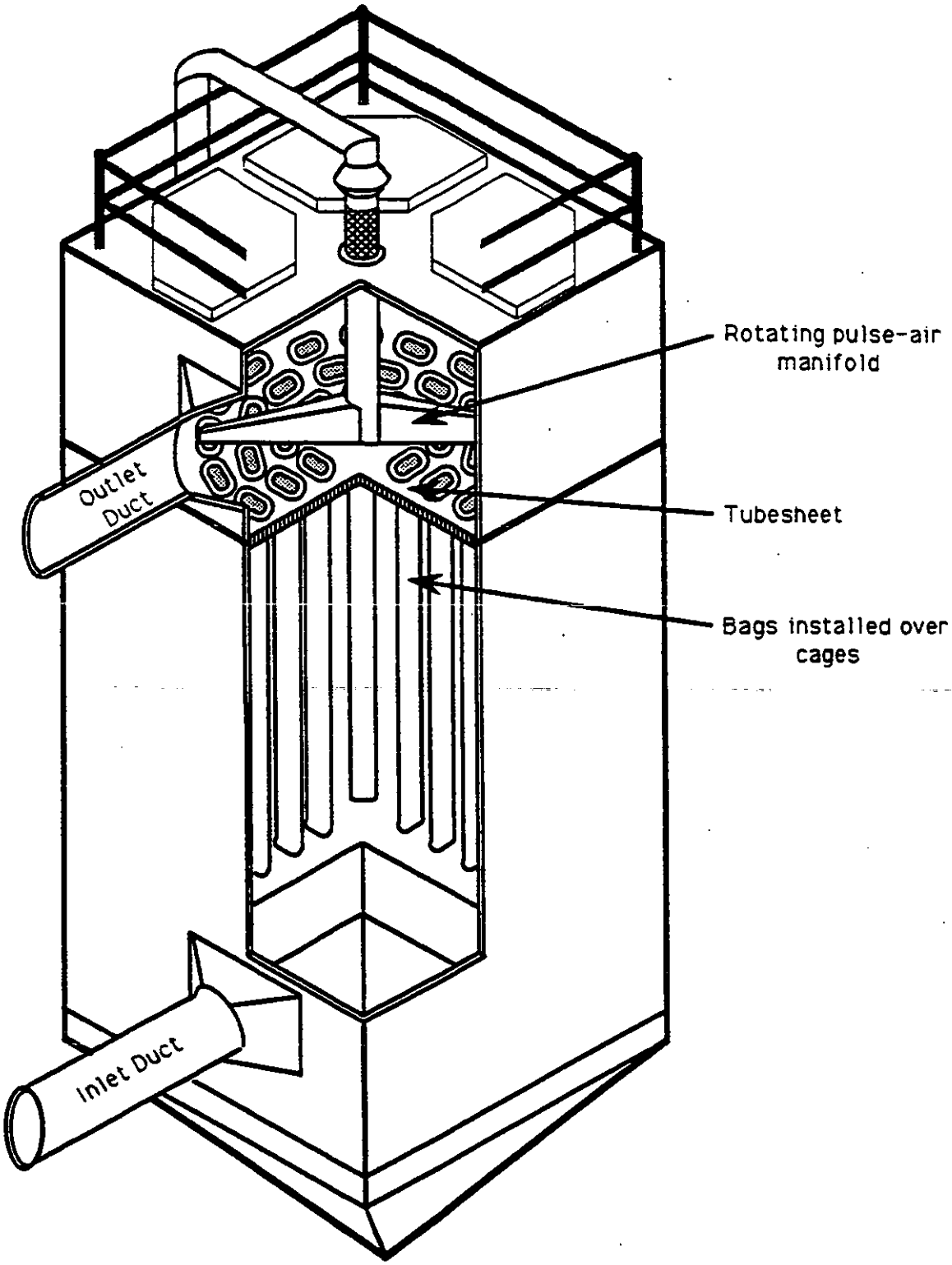

Figure 2-4. Pilot-Scale Pulse-Jet Fabric Filter at Site 13

NO_x test period were 24%, 19%, 22%, and 16%, respectively. Typically, four or five of the 32 burners were removed from service during the test periods.

Sampling Locations

Samples were collected at seven locations at Site 13. Two feed streams were sampled: the fuel oil and the condensate of the steam used to atomize the fuel in the burners. Three discharge streams were sampled: the boiler outlet gas, the fabric filter outlet gas, and the solids collected by the fabric filter. One intermediate stream was sampled: the inlet flue gas to the pulse-jet fabric filter. In addition, a grab sample of the limestone used to precoat the filter bags was collected. Process sampling locations are noted in Figures 2-1 and 2-2. A brief description of each sampling point follows below:

- Fuel oil samples were collected from a sample tap located on the main fuel oil supply header.

- Boiler outlet flue gas samples were collected from ports atop the two horizontal ducts, rectangular in cross section, exiting the reheat furnace. The ports were located downstream of the common plenum, as shown in Figure 2-2. Impactor samples were collected exclusively from the north (left in Figure 2-2) reheat duct, and all other samples were collected exclusively from the south reheat duct. Velocity profiles were also taken from the two superheat ducts, although no samples were collected from these ducts.

- Fabric filter inlet flue gas samples were collected from ports in a vertical, 18-inch diameter circular duct entering the fabric filter.

- Fabric filter outlet samples were collected from ports in the vertical, 18-inch diameter circular duct exiting the pulse-jet fabric filter.

- Samples of the solids collected by the fabric filter were obtained through a man-way at the bottom of the filter hopper. The hopper was evacuated at the beginning of the test period and solids were allowed to build up in the hopper throughout the entire baseline testing period. Solids were sampled from the hopper the morning of March 30. Three individual grab samples were submitted for analysis.

- Samples of the limestone used to precoat the filter bags were taken from one of the 50-pound bags available on site.

- Samples of the condensate of the steam used to atomize the fuel were collected from the main steam sample line in the plant water treatment lab.

Sample collection, sample pretreatment, and chemical analysis procedures are summarized in Appendix A. Table 2-1 presents an overview of the types of analyses performed on these samples.

Table 2-1

Process Stream Analyses

Stream	Metals	Anions	Volatile Organic Compounds	Semivolatile Organic Compounds	Aldehydes
Fuel Oil	✓	✓			
Limestone	✓	✓			
PJFF Collected Fly Ash	✓	✓			
Boiler Outlet Gas	✓	✓	✓	✓	✓
PJFF Inlet Gas	✓	✓	✓	✓	✓
PJFF Outlet Gas	✓	✓	✓	✓	✓
Steam Condensate	✓	✓			

Section 3

RESULTS

This section summarizes the results of the oil characterization and gas stream analyses. Detailed data appear in Appendices B through E. Multiple analytical methods were employed for some samples to obtain quantifiable measurements. The methods selected for use in this report are presented in Appendices B and D (baseline and low-NO_x, respectively). Appendices C and E present the results using alternate analytical methods. Analytical methods are summarized in Appendix A.

Sampling Schedule

Site 13 was sampled in late March and early April 1991. To obtain samples for the analytes in Table 1-1, five sampling trains were used to sample the boiler outlet, the fabric filter inlet, and the fabric filter outlet flue gas streams. The multi-metals and semivolatile trains required full traversing of the ducts. The other three trains (VOST, anions, and aldehydes) were sampled at single points. It was not possible to complete all five trains on three successive days. Figure 3-1 presents the actual schedule for baseline testing, showing when the various gas train measurements were conducted. Figure 3-2 shows the corresponding schedule for low-NO_x testing. The inlet and outlet of the fabric filter were not sampled during low-NO_x testing. To our knowledge, there is no reason to suspect that operation of the plant during any test day was irregular and would, therefore, have resulted in a nonrepresentative data set.

Data Treatment

Several conventions were developed for treating the test data and developing average concentrations of substances in the various streams.

To determine the total gas concentration for each run, both the solid and vapor phase contributions were considered. However, the absence of reportable concentrations in either (or both) phase(s) required that conventions be developed for dealing with these data and formulating emission factors. These conventions are summarized below.

For each substance, there are three possible combinations of vapor and solid phase concentrations in the emitted gas stream. These are:

Case 1: The concentrations in both the solid and vapor phases are above the reporting limits.

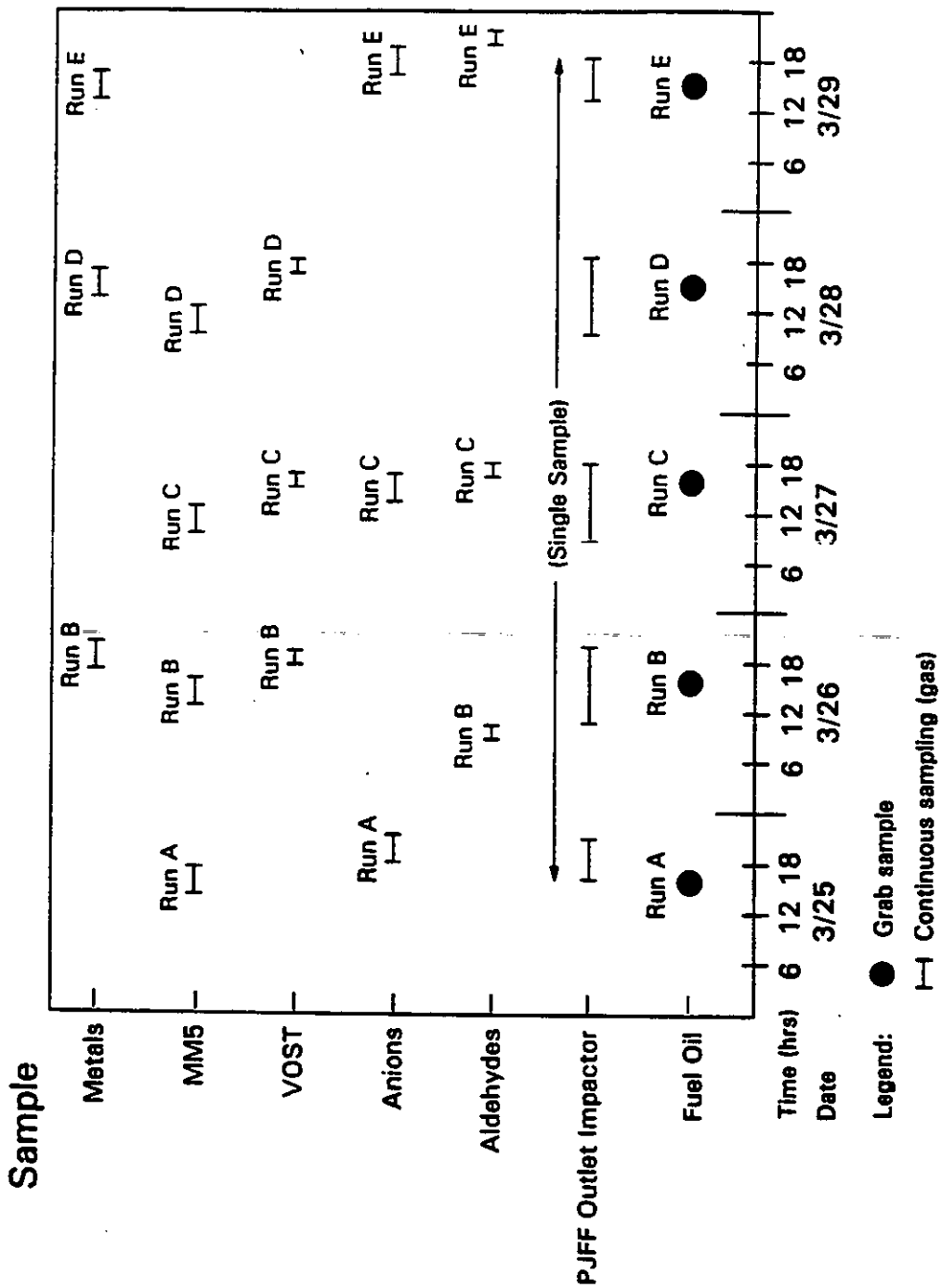

Figure 3-1. Summary of Flue Gas and Fuel Oil Samples Collected During Baseline Testing at Site 13

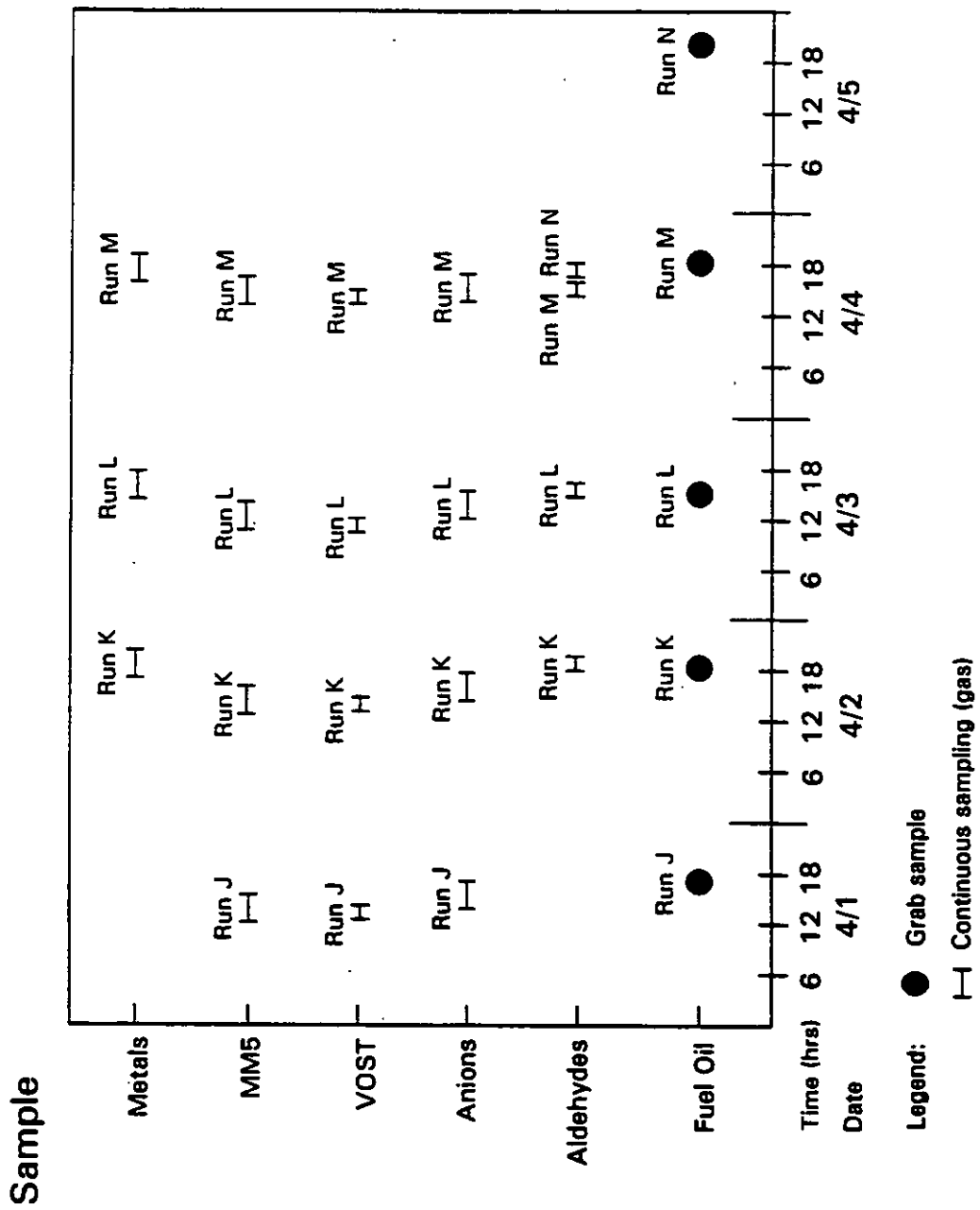

Figure 3-2. Summary of Flue Gas and Fuel Oil Samples Collected During Low-NO_x Testing at Site 13

Case 2: The concentrations in both the solid and vapor phases are below the reporting limits.

Case 3: The concentration in one phase is above the reporting limit, and the concentration in the other phase is below the reporting limit.

For those constituents of interest, other than mercury, HCl, and HF, the stack gas stream data from oil-fired power plants have indicated that most of the material is present in the solid phase and that only a minor fraction is generally found in the vapor phase. Thus, the following conventions were selected for defining total gas stream concentrations:

Case 1: The total concentration is the sum of the concentrations in the vapor and solid phases.

For example, the total nickel concentration in the boiler outlet gas (baseline) is calculated as follows for Run D:

Ni in solid phase = 2,230 $\mu g/Nm^3$

Ni in vapor phase = 48 $\mu g/Nm^3$

Total Ni in boiler outlet gas = 2,278 $\mu g/Nm^3$

Case 2: The total concentration is considered to be below the reporting limit in the solid phase.

For example, the beryllium concentration in the boiler outlet gas (baseline) is calculated as follows for Run B:

Be in solid phase = NR(0.28 $\mu g/Nm^3$)

Be in vapor phase = NR(0.56 $\mu g/Nm^3$)

where NR(0.56) indicates that the analytical result was below the reporting limit of 0.56 $\mu g/Nm^3$ (see footnote in Table 3-1 for additional details)

Total Be in boiler outlet gas = NR(0.28 $\mu g/Nm^3$)

Case 3: The total concentration is considered to be the level measured above the reporting limit, regardless of which phase this represents.

For example, the selenium concentration in the boiler outlet gas (low NO_x) is calculated as follows for Run M:

Se in solid phase = NR(0.27 $\mu g/Nm^3$)

Se in vapor phase = 1.7 $\mu g/Nm^3$

Total Se in boiler outlet gas = 1.7 $\mu g/Nm^3$

The above conventions are also in agreement with guidance provided by EPA (Technical Implementation Document for EPA's Boiler and Furnace Regulations, U.S. Environmental Protection Agency, Office of Solid Waste, Washington, D.C., March 1992).

Testing at several sites has indicated that mercury, HCl, and HF are present primarily in the vapor phase. For Case 2, then, the total concentration in the gas stream is considered to be the reporting limit in the vapor phase. For Cases 1 and 3, the methodologies are unchanged from those described above.

The following criteria were used when averaging the results of multiple samples:

- When all values for a given variable were above the method reporting limit, the mean concentration was calculated as the true arithmetic mean.

- For results that include values both above and below the reporting limit, one-half of the reporting limit was used to calculate the mean. For example:

Analytical Values	Calculation	Mean Value
10, 12, NR(8)	(10+12+[8/2])/3	8.7

By convention, the calculated mean was not allowed to be smaller than the largest reporting limit value. In the following example, using one-half the reporting limit value would yield a calculated value of 2.8, which is less than the highest reporting level obtained, so the reported mean is NR(4).

Analytical Values	Mean Value
5, NR(4), NR(3)	NR(4)

- When all analytical results for a given variable are less than the reporting limit, the reported mean is the largest reporting limit. The bias estimate is one-half of the reporting level, and no confidence interval is reported.

- Questionable analytical data were excluded from all summary calculations, including results that indicate a sampling bias, analytical interference, or the presence of organic compounds known to be laboratory contaminants.

Fuel Oil

Table 3-1 presents the results of analyses of the fuel oil for the samples collected during baseline operation; and Table 3-2 presents the results for the samples collected during low-NO_x operation. The sample runs correspond to the sample dates shown in Figures 3-1 and 3-2. Appendix A presents the analytical method reported for each combination

Table 3-1

Site 13 Fuel Oil Composition - Baseline (mg/kg unless noted)

Substance	Run A	Run B	Run C	Run D	Run E	Mean	95% CI[a] About Mean
Oil Flow Rate (lb/hr)						156,000	14,700
Ash (%)	0.11	0.070	0.060	0.010	0.040	0.058	0.046
Heating Value (Btu/lb)	19,000	19,000	19,000	19,000	19,000	19,000	41
Sulfur (%)	0.30		0.29	0.30	0.25	0.29	0.038
Arsenic	0.11	0.12	0.14	0.13	0.15	0.13	0.019
Barium	NR(4.1)[b]	NR(4.2)	NR(4.0)	NR(3.6)	5.9	NR(4.2)	--
Beryllium	NR(0.010)	NR(0.010)	NR(0.010)	NR(0.010)	NR(0.010)	NR(0.010)	--
Cadmium	NR(0.50)	NR(0.35)	NR(0.44)	NR(0.46)	NR(0.53)	NR(0.53)	--
Chloride	12	18	15	15	16	15	2.7
Chromium	0.28	0.33	0.42	1.0	1.4	0.69	0.63
Cobalt	2.2	2.3	2.2	2.3	2.3	2.3	0.055
Copper	13	9.4	8.8	7.0	9.2	9.4	2.5
Fluoride	12	6.0	8.0	11	7.0	8.8	3.2
Lead	NR(0.10)	0.52	1.3	20	1.4	4.6	10
Manganese	0.16	0.095	0.098	0.095	0.13	0.11	0.034
Mercury	NR(0.04)	NR(0.03)	NR(0.03)	NR(0.03)	NR(0.04)	NR(0.04)	--
Molybdenum	NR(0.25)	0.17	NR(0.22)	NR(0.21)	NR(0.25)	NR(0.25)	--
Nickel	39	44	37	38	37	39	3.4
Phosphorus	0.36	0.48	0.46	0.45	0.44	0.44	0.057
Selenium	NR(0.078)	NR(0.084)	NR(0.081)	NR(0.072)	NR(0.090)	NR(0.090)	--
Vanadium	5.2	6.2	5.7	5.9	6.8	6.0	0.75

[a] CI = Confidence interval.

[b] NR = Below reporting limit; the reporting limit is shown in parentheses. The "reporting limit" is the concentration below which results are not routinely reported. The default reporting limit is set at a concentration representing an upper tolerance for the method detection limit (MDL). As described in Appendix B to 40 CFR 136, the MDL is a value calculated from a series of measurements made at a particular point in time under a particular set of conditions; it is not an intrinsic characteristic of a method. Thus, for a given method, the numerical value of the MDL will vary somewhat each determination. Likewise, MDLs would be expected to vary somewhat among instruments, among analysts, and among laboratories using the same method. Thus, the reporting limit, as the upper tolerance for the MDL, represents a laboratory-specific value below which the MDL would be expected to fall for any determination in that particular laboratory, regardless of instrument, analyst, etc.

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Table 3-2

Site 13 Fuel Oil Composition - Low NO_x (mg/kg unless noted)

Substance	Run J	Run K	Run L	Run M	Run N	Mean	95% CI[a] About Mean
Oil Flow Rate (lb/hr)						163,000	7,410
Ash (%)	0.020	0.020	0.010	0.070		0.030	0.043
Heating Value (Btu/lb)	19,000	19,000	19,000	18,900		19,000	103
Sulfur (%)	0.25	0.25	0.25	0.27		0.26	0.016
Arsenic	0.13	0.092	0.095	0.12	0.11	0.11	0.019
Barium	NR(3.5)[b]	4.4	NR(2.5)	NR(3.5)	NR(3.0)	NR(3.5)	--
Beryllium	NR(0.010)	NR(0.010)	NR(0.010)	NR(0.010)	NR(0.010)	NR(0.010)	--
Cadmium	NR(0.41)	NR(0.25)	NR(0.28)	NR(0.36)	NR(0.30)	NR(0.41)	--
Chloride	16	16	19	21	23	19	3.8
Chromium	0.28	0.24	0.24	0.18	0.53	0.29	0.17
Cobalt	2.2	2.0	1.7	2.2	2.4	2.1	0.31
Copper	8.0	6.7	8.1	6.5	9.7	7.8	1.6
Fluoride	7.0	6.0	6.0	7.0		6.5	0.92
Lead	0.59	1.0	0.19	1.1	2.5	1.1	1.1
Manganese	0.087	0.071	0.082	0.075	0.092	0.081	0.010
Mercury	NR(0.03)	NR(0.01)	NR(0.02)	0.03	NR(0.02)	NR(0.03)	--
Molybdenum	NR(0.19)	NR(0.12)	NR(0.14)	NR(0.17)	NR(0.14)	NR(0.19)	--
Nickel	35	40	29	39	38	36	5.2
Phosphorus	0.45	0.66	0.69	0.65		0.61	0.17
Selenium	NR(0.068)	NR(0.073)	NR(0.054)	NR(0.066)	0.075	NR(0.073)	--
Vanadium	6.6	5.8	6.0	5.9	5.6	6.0	0.46

[a]CI = Confidence interval.

[b]NR = Below reporting limit. Laboratory reporting limit is shown in parentheses.

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of substance and stream. Selection of the values reported here was based on our judgment of the best method for each matrix (i.e., typically the lowest reporting limit, avoiding known matrix interferences). For each substance, a mean was calculated, along with the 95% confidence interval about the mean. The confidence interval is the range about the calculated mean in which there is a 95% probability that the true mean lies. For example, it can be said, with a 95% certainty, that the true mean arsenic concentration in the fuel oil during baseline operation is between 0.11 and 0.15 mg/kg, according to the five results presented in Table 3-1. The calculation of this confidence interval is discussed in Section 5. Most of the substances in the table were analyzed by Instrumental Neutron Activation Analysis (INAA). Beryllium and lead were analyzed using Graphite Furnace Atomic Absorption Spectroscopy (GFAAS). The fluoride concentration in the fuel oil was measured using an Ion Selective Electrode (ISE). Mercury was analyzed using both Double Gold Amalgamation (DGA) followed by Cold Vapor Atomic Absorption Spectroscopy (CVAAS) and INAA. Mercury was initially detected using CVAAS at concentrations of 0.1 to 0.4 mg/kg. Using INAA, mercury was detected in only one of ten samples at 0.03 mg/kg. Subsequent re-analysis of selected samples by CVAAS indicates that the INAA values are correct.

Boiler Outlet Gas

Table 3-3 summarizes the concentration measurements made for the gas exiting the boiler during baseline operation. Table 3-4 presents concentration measurements made during low-NO_x operation. In addition to the substances shown in these two tables, organic compounds listed in Table 1-1 were also analyzed; however, none were present in concentrations above laboratory reporting limits. The results for the individual compounds appear in Appendices B and D. The trace element and anion data in this table are presented for both the solid and vapor phase fractions. Many of the vapor phase concentrations are less than five times the reporting limit. All results have been field blank corrected to account for significant background levels on the particulate filter and in the impinger solutions. Refer to Appendix I for blank correction data.

Process problems were encountered during the first day of testing on March 25. The unit was operated at reduced load due to problems with one of the four induced draft fans. The north superheat induced draft fan was out of service during the day. With only three induced draft fans in service, maximum load was approximately 280 MW. This resulted in an abnormal flue gas distribution through the outlet ducts as well as higher-than-normal flue gas temperatures in the south reheat duct. This also resulted in a higher flow rate through the pulse-jet fabric filter due to the flue gas flow controller's inability to compensate for changes in gas temperature. This problem was rectified by adjusting the controller set point to the correct flue gas flow rate.

There were other minor fluctuations in baseline operation during each day of testing except for March 29. These fluctuations, however, were probably no more significant than the day-to-day variability of the unit operation. This variability was due to changes in individual burner performance, fuel oil quality, operating personnel, and a number of other parameters.

Table 3-3

Boiler Outlet Gas Composition - Baseline ($\mu g/Nm^3$ unless noted)

	Solid Phase					Vapor Phase						
Substance	Run A	Run B	Run C	Run D	Run E	Run A	Run B	Run C	Run D	Run E	Mean	95% CI[a] About Mean
Gas Flow (dscfm)		767,000		789,000	795,000						784,000	36,600
Gas Flow (Nm^3/hr)		1,230,000		1,270,000	1,280,000						1,260,000	59,000
Particulate (lb/hr)		122		166	149						145	55
Particulate (mg/Nm^3)		44.7		59.3	52.7						52	18
Arsenic		7.0		8.1	8.0		NR(1.1)[b]		NR(0.66)	NR(0.74)	7.7	1.6
Barium		23		29	26		NR(4.7)		NR(4.2)	NR(4.5)	26	8.3
Benzene		--		--	--		2.0[d]	1.5	1.1		1.5	1.1
Beryllium		NR(0.28)		NR(0.12)	NR(0.24)		NR(0.56)		NR(0.51)	NR(0.90)	NR(0.28)	--
Cadmium		5.8@		2.4@	37		NR(0.47)		NR(0.42)	NR(0.45)	15	48
Chloride	46@		46@		27[c]	841		1,100		1,510	1,190	810
Chromium		8.7		11	9.5		NR(4.7)		NR(4.2)	NR(4.5)	9.7	3.0
Cobalt		90		130	103		NR(2.8)		NR(4.2)	NR(4.5)	108	51
Copper		14@		14	13		NR(5.6)		10@	NR(5.3)	17	15
Fluoride					NR(7.5)	82@		25@		34@	47	76
Formaldehyde		--		--	--		NR(8.9)[c]	NR(9.0)[c]		10[c]@	NR(9.0)	--
Lead		8.1		11	6.9		NR(1.4)		NR(1.3)	NR(1.4)	8.7	5.6
Manganese		7.7		9.1	8.6		NR(4.7)		NR(4.2)	NR(4.5)	8.5	1.7
Mercury		0.091@		0.13[c]	0.17[c]		0.18@		0.14@	NR(0.088)	0.24	0.15
Molybdenum		NR(6.9)[c]		NR(6.2)[c]	NR(6.0)[c]		NR(23)		NR(21)	NR(23)	NR(6.9)	--
Nickel		1,720		2,230	1,939		NR(9.4)		48	NR(5.3)	1,980	700
Phosphorus	NR(36)		NR(42)		NR(39)	NR(123)		NR(134)		NR(149)	NR(42)	--
Selenium		NR(0.69)		NR(0.62)	NR(0.60)		NR(1.4)		NR(1.3)	NR(1.3)	NR(0.69)	--
Toluene		--		--	--		12[d]	2.5	1.6		5.4	14
Vanadium		321		431	377		NR(5.6)		NR(8.3)	NR(3.7)	380	140

@ = Concentration is less than five times the laboratory reporting limit.
[a]CI = Confidence interval.
[b]Concentration below laboratory reporting limits, shown in parentheses.
[c]Blank correction is greater than 50% of the measured concentration.
[d]20L VOST sample lost; result is based on 5L sample volume.

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Table 3-4

Boiler Outlet Gas Composition - Low NO_x ($\mu g/Nm^3$ unless noted)

Substance	Solid Phase Run J	Solid Phase Run K	Solid Phase Run L	Solid Phase Run M	Vapor Phase Run J	Vapor Phase Run K	Vapor Phase Run L	Vapor Phase Run M	Vapor Phase Run N	Combined Mean	95% CI[a] About Mean
Gas Flow (dscfm)	842,000	801,000	821,000	807,000						818,000	28,800
Gas Flow (Nm^3/hr)	1,360,000	1,290,000	1,320,000	1,300,000						1,320,000	46,400
Particulate (lb/hr)		99	128	118						115	37
Particulate (mg/Nm^3)		34.7	44.0	41.3						40	12
Arsenic		3.6	4.6	3.9		NR(0.61)[b]	NR(0.93)	NR(1.0)		4.0	1.3
Barium		12	11	8.6		NR(4.2)	NR(3.9)	NR(4.3)		11	4.9
Benzene					NR(0.51)	1.4	1.3	1.5		1.1	0.89
Beryllium		NR(0.11)	NR(0.21)	NR(0.22)		NR(0.84)	NR(0.47)	NR(0.51)		NR(0.22)	--
Cadmium		1.9@	32	NR(0.22)[c]		NR(0.42)	NR(0.39)	NR(0.43)		11	44
Chloride		138	398	NR(1.8)[c]	3,323	3,095	2,430	2,011		2,850	950
Chromium		3.3@	3.7@	2.6@		NR(4.2)	NR(1.5)	NR(1.8)		3.2	1.4
Cobalt		73	78	71		NR(2.6)	NR(1.5)	NR(4.3)		74	8.7
Copper		8.5@	9.1@	7.4@		NR(5.3)	NR(3.1)	NR(5.1)		8.4	2.2
Fluoride			NR(6.9)	NR(7.3)	21@	11@	14@	12@		14	6.8
Formaldehyde						NR(7.0)[c]	NR(6.9)[c]	NR(7.3)[c]	NR(7.4)[c]	NR(7.4)	--
Lead		3.3	4.3	7.5		NR(1.3)	NR(1.2)	NR(1.3)		5.0	5.5
Manganese		4.7@	5.4	5.1@		NR(4.2)	NR(3.9)	NR(4.3)		5.1	0.84
Mercury		0.11	0.14	0.13		0.088@	NR(0.076)	0.068@		0.18	0.080
Molybdenum		NR(5.5)[c]	NR(5.2)[c]	NR(5.4)[c]		NR(7.6)	NR(19)	NR(22)		NR(5.5)	--
Nickel		1435	1553	1417		NR(5.3)	NR(7.8)	NR(8.7)		1,470	180
Phosphorus		NR(29)	NR(36)	NR(38)		NR(114)	NR(120)	NR(120)		NR(38)	--
Selenium		0.65@	1.2@	NR(0.27)[c]		1.7@	1.9@	1.7@		2.4	1.7
Toluene					2.8	3.3	1.8	2.3		2.5	1.0
Vanadium		194	201	173		NR(5.3)	NR(3.1)	NR(3.6)		189	36

@ - Concentration is less than five times the laboratory reporting limit.
[a] CI = Confidence interval.
[b] Concentration below laboratory reporting limits, shown in parentheses.
[c] Blank correction is greater than 50% of the measured concentration.

PRELIMINARY

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Reduction in NO_x emissions was accomplished by removing various burners from service in each furnace and optimizing the amount of excess air. Three of the burners that were consistently removed from service during the low-NO_x testing, burners 33, 34, and 72 (see Figure 2-3), exhibited poor combustion characteristics relative to the other burners. These burners in effect may have biased the baseline NO_x levels high due to their poor performance. It was readily apparent that the maximum NO_x reduction could not be achieved by leaving these burners in service and removing burners at other locations.

The resulting NO_x reduction is illustrated in Figure 3-3 for each test day. The values plotted in the figure are: 1) the daily average reduction for each sample location in the boiler, 2) the average of these four locations, and 3) the composite sample average. The composite sample is a combination of all four locations mixed and analyzed as one sample. The composite sample should be approximately the same value as the average of the four independent sample locations. The daily average reduction is calculated by using the baseline NO_x concentrations measured each day prior to modifying the boiler operation to reduce NO_x emissions. As indicated in the figure, the daily average NO_x reductions for the April 1-4 test period were 24%, 19%, 22%, and 16%, respectively. The NO_x reduction for the south side of the reheat furnace was less than the other three sections of the unit boiler except for testing on April 4 when an additional burner was removed from service on this side of the furnace.

On April 2, the unit was operated at a normal full load of 340 MW. Five burners were removed from service. As during the previous day burners 72 and 74 were removed from service in the superheat furnace, and burners 33 and 34 were removed from service in the reheat furnace. However, the superheat furnace was smoking more relative to the previous day's operation, and burner 84 appeared to be contributing significantly to the problem. Therefore, it was removed from service, also. Due to the sample locations being on the reheat side of the furnace, removing this burner on the superheat side from service probably had negligible impact on the samples collected. In addition to having an extra burner out of service, the recirculation gas flow rate was reduced shortly after testing began due to the gas recirculation fan outlet temperature exceeding its recommended maximum limit.

No problems were encountered on April 3. The unit was operated at the normal full load of 345 MW with four burners removed from service. Burners 33, 34, 72, and 74 were again removed from service.

One potential problem that was identified early in the low-NO_x testing was the unsymmetrical pattern of the burners removed from service. Specifically, the burners removed from service in the reheat furnace 33 and 34) were both on the north side. This resulted in the north side of the reheat furnace operating with the desired overfire air configuration. However, with no burners removed from service on the south side of the reheat furnace, this side was firing fuel-rich with no direct source of overfire air introduced within the combustion zone. As alluded to earlier, the flue gas was not completely mixed as it exited each side of the furnace. This observation was based on CEM gas

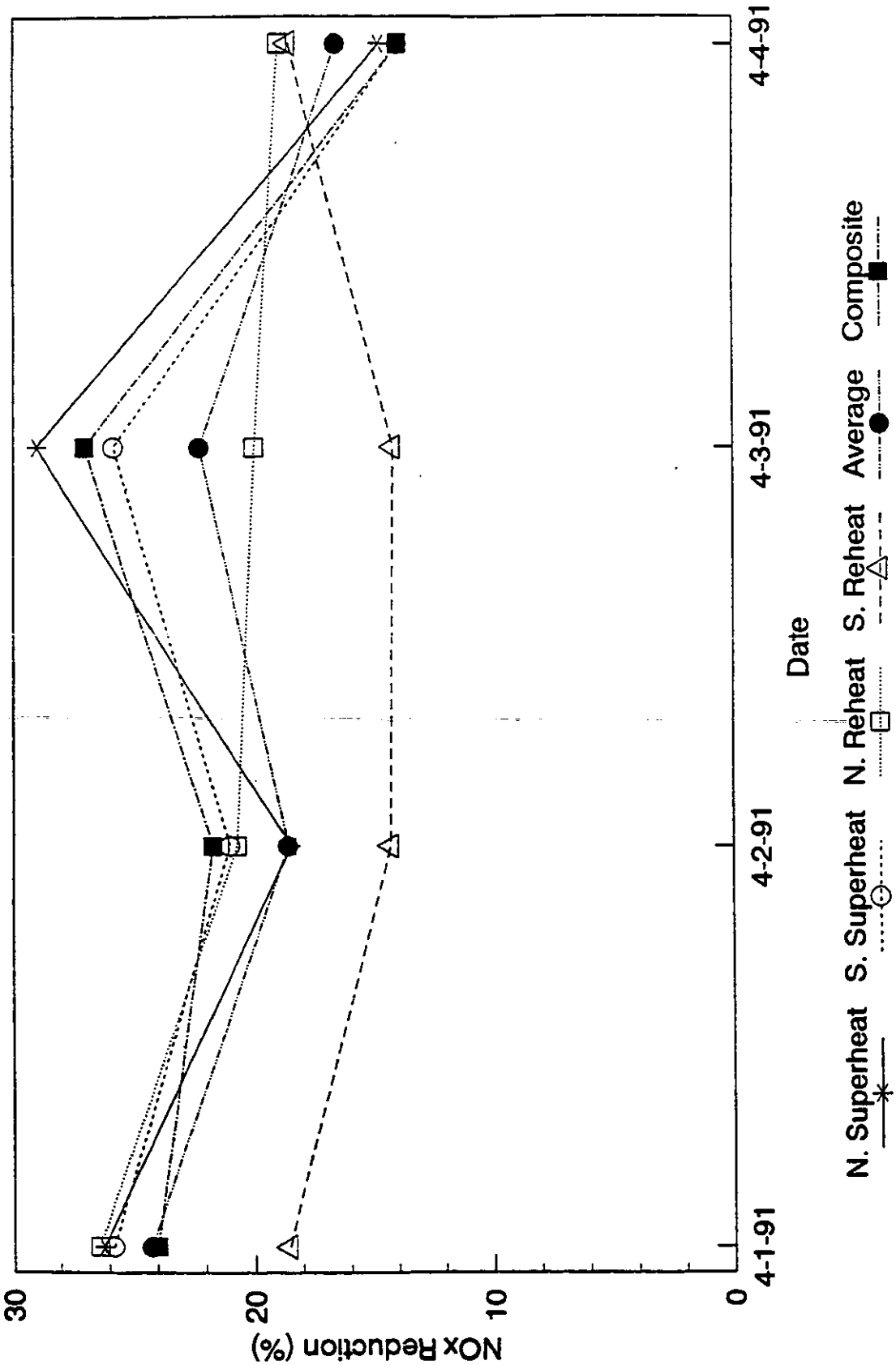

Figure 3-3. Daily NO_x Reduction for the Site 13 Boiler During Low NO_x Tests

PRELIMINARY

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concentrations. Since the flue gas samples, with the exception of the Cyclade PSD tests, were obtained exclusively from the south reheat duct sample location, there appeared to be a potential to bias the sample results due to this burner firing configuration.

In an attempt to quantify this possible bias, an additional day of low-NO_x testing was conducted on April 4. Again, the unit was operated at a normal full load condition. Five burners were removed from service: Burners 33, 34, 72, and 74, as before, and burner 32, which is located on the south side of the reheat furnace. This configuration was difficult to set up in terms of balancing the air to each furnace to inhibit smoking. Also, the fuel oil header pressure was once again above recommended operating limits. The pressure was reduced by lowering the load by approximately 4 MW while tests were being conducted. Interestingly, although the overall NO_x reduction was lower for this burner configuration in comparison to the prior three days of testing, the NO_x reduction was greater for the south reheat furnace relative to the other sampling locations, as illustrated in Figure 3-3.

Pulse-Jet Fabric Filter Inlet Gas

Table 3-5 presents the concentrations of the substances measured in the flue gas entering the pilot-scale, pulse-jet fabric filter. Most concentrations are comparable to the concentrations measured at the boiler outlet. The concentration of formaldehyde, which was below reporting limits in all of the tests conducted at the boiler outlet, is inexplicably above the reporting limits in all three runs at the fabric filter inlet and extremely high in Run C. The Run C value is not used in the mean calculation. When compared to all of the other formaldehyde values measured, it is an outlier, using Nalimov's method ("Detection of Outliers by Means of Nalimov's Test, *Chemical Engineering*, August 6, 1984, pp. 74). Other aldehydes measured by this method for this sample are also very high, indicating an anomalous condition or an analytical problem, presumably the latter.

Pulse-Jet Fabric Filter Outlet Gas

Table 3-6 presents the concentrations of the substances measured at the outlet of the pulse-jet fabric filter. Three multi-metals trains were run at this location, but the results for all of the FCEM target metals in the solid-phase fraction were below laboratory reporting limits (i.e., no substances were detected on any of the filters). However a mass gain was seen in the probe and nozzle rinse fraction. Filter weight gains were negligible. Analysis revealed that the mass was comprised primarily of sulfate, presumably due to sulfuric acid condensation in the probe and out-of-stack filter.

In conjunction with these tests, a single cascade impactor train was run over the five days of sampling (see Figure 3-1) to obtain particle size distribution data. This in-stack device had a measurable mass gain in the final stage and the filter. The filter contained 93% of the total collected mass (these particles are <0.7 microns in diameter). This filter was analyzed and detectable quantities of many substances were found at concentrations lower than the reporting limits for the Method 5 train. Approximately nine months after

Table 3-5

PJFF Inlet Gas Composition - Baseline ($\mu g/Nm^3$ unless noted)

	Solid Phase					Vapor Phase						
Substance	Run A	Run B	Run C	Run D	Run E	Run A	Run B	Run C	Run D	Run E	Mean	95% CI[a] About Mean
Gas Flow (dscfm)		2,860		3,030	2,690						2,860	420
Gas Flow (Nm^3/hr)		4,610		4,880	4,330						4,610	680
Particulate (lb/hr)		0.293		0.465	0.457						0.41	0.24
Particulate (mg/Nm^3)		28.9		43.3	47.9						40	25
Arsenic		6.3		6.6	6.8		NR(1.5)[b]		NR(1.5)	NR(1.6)	6.6	0.7
Barium		20		23	24		NR(3.7)		NR(3.7)	NR(4.1)	22	6.3
Benzene		--		--	--		1.1	1.3	NR(0.56)		0.90	1.4
Beryllium		NR(0.10)		NR(0.11)	NR(0.22)		NR(0.33)		NR(0.29)	NR(0.48)	NR(0.22)	--
Cadmium		NR(0.26)[c]		NR(0.16)[c]	NR(0.11)[c]		NR(0.37)		NR(0.37)	NR(0.41)	NR(0.26)	--
Chloride	NR(1.2)[c]		NR(1.4)[c]		NR(1.6)[c]	1,850		1,100		1,280	1,410	970
Chromium		6.7		7.7	8.0		NR(3.7)		NR(2.3)	NR(1.7)	7.5	1.7
Cobalt		76		90	92		NR(3.7)		NR(1.5)	NR(1.7)	86	22
Copper		7.6@		9.3@	9.4@		NR(7.4)		NR(4.6)	NR(3.4)	9	2
Fluoride			6.3@		NR(6.6)	39@		25@		28@	33	15
Formaldehyde		--		--	--		33	2,020[d]		36	35	19
Lead		6.2		4.3	6.5		NR(1.1)		NR(1.1)	NR(1.2)	5.6	3.0
Manganese		5.4		6.2	6.9		NR(3.7)		NR(3.7)	NR(4.1)	6.2	1.9
Mercury		0.074@		0.066@	0.072@		NR(0.062)		NR(0.076)	NR(0.079)	0.070	0.010
Molybdenum		NR(5.2)[c]		5.4[c]	NR(5.5)[c]		NR(19)		NR(19)	NR(20)	NR(5.5)	--
Nickel		1,430		1,720	1,730		NR(7.4)		NR(7.5)	NR(8.2)	1,620	420
Phosphorus	NR(25)		NR(31)		NR(35)	NR(118)		NR(122)		NR(123)	NR(35)	--
Selenium		NR(0.52)		NR(0.54)	NR(0.55)		NR(1.0)		NR(1.1)	NR(1.2)	NR(0.55)	--
Toluene		--		--	--		1.4	2.1	0.95		1.5	1.5
Vanadium		258		NR(324)	338		NR(7.4)		NR(2.9)	NR(3.4)	310	110

@ = Concentration is less than five times the laboratory reporting limit.
[a] CI = Confidence interval.
[b] Concentration not above laboratory reporting limits, shown in parentheses.
[c] Blank correction is greater than 50% of the measured value.
[d] Not included in statistics.

Table 3-6

PJFF Outlet Gas Composition - Baseline ($\mu g/Nm^3$ unless noted)

	Solid Phase						Vapor Phase						
Substance	Run A	Run B	Run C	Run D	Run E	Impactor	Run A	Run B	Run C	Run D	Run E	Mean	95% CI[b] About Mean
Gas Flow (dscfm)		3,310		3,230	3,350							3,300	146
Gas Flow (Nm^3/hr)		5,320		5,190	5,380							5,300	235
Particulate (lb/hr)		0.05[e]		0.04[e]	0.05[e]	0.0068						0.0068	--
Particulate (mg/Nm^3		3.9[e]		3.7[e]	4.1[e]	0.58						0.58	--
Arsenic		NR(0.4)[c]		NR(0.4)	NR(0.4)	0.037		NR(1.3)[c]		NR(1.5)	NR(0.83)	0.037	--
Barium		NR(1)		NR(1)	NR(1)	0.57		NR(3.2)		NR(1.5)	NR(3.6))	0.57	--
Benzene								1.9	2.1	1.9		2.0	0.37
Beryllium		NR(0.2)		NR(0.2)	NR(0.2)	NR(0.0097)		NR(0.33)		NR(0.31)	NR(0.42)	NR(0.0097)	--
Cadmium		NR(0.15)		NR(0.05)	NR(0.05)	NR(0.0048)		NR(0.32)		NR(0.37)	NR(0.36)	NR(0.0048)	--
Chloride	NR(0.28)[d]		NR(0.59)[d]		NR(0.59)[d]		877		1,020		2,640	1,510	2,440
Chromium		NR(1)		NR(1)	NR(1)	1.6		NR(1.7)		NR(2.2)	NR(2.1)	1.6	--
Cobalt		NR(1)		NR(1)	NR(0.5)	NR(0.048)		NR(1.7)		NR(3.7)	NR(3.6)	NR(0.048)	--
Copper		NR(2)		NR(2)	NR(2)	0.18@		NR(3.3)		NR(4.3)	NR(4.2)	0.18	--
Fluoride	1.4@				NR(2.6)		38@		34@		23@	32	20
Formaldehyde								30@	28@		42	33	19
Lead		NR(0.3)		NR(0.3)	NR(0.3)	0.024@		NR(0.95)		NR(1.1)	NR(1.1)	0.024	--
Manganese		1.3		NR(1)	NR(1)	0.79@		NR(3.2)		NR(3.7)	NR(3.6)	0.79	--
Mercury		NR(0.0088)		NR(0.018)	NR(0.0091)			NR(0.061)		0.073@	0.071@	NR(0.061)	--
Molybdenum		NR(5)		NR(5)	NR(5)	NR(0.24)		NR(16)		NR(19)	NR(18)	NR(0.24)	--
Nickel		NR(2)		NR(2)	NR(2)	1.5		NR(6.3)		NR(4.3)	NR(2.9)	1.5	--
Phosphorus	NR(7)		NR(40)		NR(10)	4.6@	NR(110)		NR(110)		NR(104)	4.6	--
Selenium		NR(5)		NR(5)	NR(5)	NR(0.024)		NR(0.83)		NR(1.1)	NR(1.0)	NR(0.024)	--
Toluene								1.6	3.8	2.1		2.5	2.9
Vanadium		NR(2)		NR(2)	NR(2)	NR(0.097)		NR(3.3)		NR(7.4)	NR(4.2)	NR(0.097)	--

@ - Concentration is less than five times the laboratory reporting limit.
[a]Solid phase result is based on single impactor sample integrated over all three vapor sampling runs.
[b]CI = Confidence interval.
[c]Concentration below laboratory reporting limits, shown in parentheses.
[d]Blank correction is greater than 50% of the measured value.
[e]Value biased high due to sulfuric acid condensation.

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this sampling event occurred, the PJFF gas streams were tested by another contractor for particulate concentrations. The outlet mass loadings obtained then, using Method 17 (in-stack filter), are even lower than the impactor particulate concentration, as shown below. During the retest, inlet concentrations were 30 to 60% of the values shown earlier in Table 3-5.

Sample Method	Particulate Concentration (mg/Nm^3)	Comment
PJFF Outlet		
Method 5	3.7 to 4.1	From Table 3-6
Cascade Impactor	0.58	From Table 3-6
Method 17	0.07 to 0.16	Retest 9 months later
PJFF Inlet		
Method 5	29-48	From Table 3-5
Method 17	7-22	Retest 9 months later

Therefore, except for chloride, fluoride, mercury, and the organic substances, the mean value in Table 3-6 and subsequent tables for PJFF outlet concentrations are based upon the single filter analysis of the cascade impactor. All values have also been corrected for blank results to account for significant background levels, as discussed in Appendix I.

Emission Factors

Table 3-7 presents emission factors, on a unit-energy basis, for the boiler outlet emission during baseline and low-NO_x operation and for the pulse-jet fabric filter. Boiler outlet emission factors were calculated by dividing the mean mass flow rate of a substance by the average heat input to the boiler during the test period. Pulse-jet fabric filter emission factors were calculated similarly, except that the heat input rate to the boiler was scaled down to pilot scale by the ratio of the fabric filter inlet gas flow rate to the total boiler outlet gas flow rate.

Emission factors for many of the trace metals are higher at the boiler outlet during baseline operation than during low-NO_x operation. However, the method used to induce low NO_x operation at this unit could have influenced the concentrations measured at the south reheat duct." It should not be concluded that low-NO_x operation reduces trace substance emissions.

Table 3-7

Emission Factors (lb/10^{12} Btu unless noted)

Substance	Boiler Outlet - Baseline Combined Average	Boiler Outlet - Baseline 95% CI[a] About Mean	Boiler Outlet - Low NO_x Combined Average	Boiler Outlet - Low NO_x 95% CI About Mean	PJFF Outlet - Baseline Combined Average	PJFF Outlet - Baseline 95% CI About Mean
Gas Flow (dscfm)	784,000	36,600	818,000	28,800	3,300	146
Gas Flow (Nm ^{3}/hr)	1,260,000	59,000	1,320,000	46,400	5,290	235
Fuel Flow (lb/hr)	156,000	14,700	163,000	7,410	568	75
Fuel Heating Value (Btu/lb)	19,000	41	18,900	103	19,000	41
Particulate (lb/10^6 Btu)	0.0490	0.0140	0.0376	0.0120	0.00063[b]	--
Arsenic	7.2	1.2	3.8	1.3	0.040[b]	--
Barium	24	6.5	10	4.7	0.62[b]	--
Benzene	1.4	1.0	1.0	0.84	2.1	0.34
Beryllium	NR(0.26)[c]	--	NR(0.20)	--	NR(0.010)[b]	--
Cadmium	14	45	11	41	NR(0.0052)[b]	--
Chloride	1,120	780	2,670	920	1,630	2,700
Chromium	9.1	2.3	3.0	1.3	1.7[b]	--
Cobalt	101	50	69	7.1	NR(0.052)[b]	--
Copper	16	15	7.8	2.2	0.19[b]	--
Fluoride	44	72	14	6.5	35	23
Formaldehyde	NR(8.4)	--	NR(6.9)	--	36	16
Lead	8.2	5.4	4.7	5.2	0.026[b]	--
Manganese	8.0	1.3	4.8	0.68	0.85[b]	--
Mercury	0.23	0.14	0.16	0.076	NR(0.066)	--
Molybdenum	NR(6.5)	--	NR(5.1)	--	NR(0.26)[b]	--
Nickel	1,860	530	1,380	150	1.6[b]	--
Phosphorus	NR(39)	--	NR(36)	--	5.0[b]	--
Selenium	NR(0.65)	--	2.2	1.6	NR(0.026)	--
Toluene	5.3	13	2.3	1.0	2.7	3.1
Vanadium	353	100	177	28	NR(0.10)[b]	--
PAHs and Other POM[d]	NR	--	NR	--	NR	--

[a]CI = Confidence interval.
[b]Result is based on single impactor sample.
[c]Concentration below laboratory reporting limit. Number in parentheses is based on the reporting limit.
[d]None of these substances were present above laboratory reporting limits. Reporting limits for the individual compounds are presented in Appendices B and D.

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Control Device Performance

Table 3-8 presents the average removal efficiency of the pilot-scale pulse-jet fabric filter calculated for various substances.

The average particulate removal efficiency is 98.3 percent. Most of the trace elements were removed quite effectively. As expected, the acid gases and the volatile organic compounds, benzene, formaldehyde, and toluene, were not controlled by the particulate removal device. A comparison of the confidence intervals about the mean on the inlet and outlet confirms this observation. The mercury removal of >13% is calculated based upon the rules stated in the Data Treatment section. Since some mercury was found in the inlet gas solid phase and some was found in the outlet gas vapor phase, this calculation can be performed, although the value can be questioned. The reporting limit varies based on the analytical method, sample volumes, and preparation procedures used.

Other Species of Interest

Other substances not on the FCEM list (Table 1-1) but listed in Title III of the CAAA of 1990 were also determined by the multi-substance analytical techniques used. These concentrations appear in Appendices C and E. Measurements for which the concentration of at least one run was above the reporting limit are shown in Table 3-9.

Table 3-8

Pulse-Jet Fabric Filter Removal Efficiencies

Substance	Removal (%)
Particulate Matter[a]	98.3
Arsenic[a]	99.4
Barium[a]	97
Benzene	0[b]
Beryllium[a]	NC
Cadmium[a]	NC
Chloride	0[b]
Chromium[a]	76
Cobalt[a]	>99.9
Copper[a]	98
Fluoride	0[b]
Formaldehyde	6
Lead[a]	99.5
Manganese[a]	85
Mercury	>13
Molybdenum[a]	95
Nickel[a]	99.9
Phosphorus[a]	NC
Selenium[a]	NC
Toluene	0[b]
Vanadium[a]	>99.96

NC = Not calculated because substance was below reporting limit in inlet stream.

[a]Results based on single impactor sample at PJFF outlet and average of three Method 5 samples at the PJFF inlet.

[b]Calculated removal efficiencies were negative but are shown as zero.

These data not used: See footnotes. Also, no stack gas flow data.

Table 3-9

Other Species of Interest

Substance	Concentration, $\mu g/Nm^3$					
	Run 1	Run 2	Run 3	Run 4	Mean	95% CI [a] of Mean
Baseline Boiler Outlet						
1,1,1-Trichloroethane	--	2.4	39 [b]	--	21	230
Methylene Chloride [d]	--	4.7	6.1	--	5.4	8.9
m,p-Xylene	--	1.4	1.3	--	1.4	0.6
Phenol	17	12	15	7.6	13	7
Tetrachloroethene	--	0.76 [c]	NR(0.50)	--	0.50	3.2
Vinyl Acetate	--	NR(5.1)	11 [c]	--	6.8	54
Baseline-PJFF Inlet						
1,1,1-Trichloroethane	27 [b]	1.8	16	--	15	31
Acetaldehyde	NR(7.8) [e]	2,500 [f]	NR(9.3) [e]	--	NR(9.3) [e]	--
Methylene Chloride [d]	19	19	42 [b]	--	27	33
m,p-Xylene	0.89 [c]	1.0 [c]	NR(0.56)	--	0.72	1.0
Phenol	64	31	40	21 [c]	39	
Baseline-PJFF Outlet						
1,1,1-Trichloroethane	33	16	37 [b]	--	29	28
Methylene Chloride [d]	17	180 [b]	1.8	--	66	250
m,p-Xylene	0.74	1.9	1.8	--	1.5	1.6
Phenol	89	40	21 [c]	23 [c]	43	50
Tetrachloroethene	NR(0.49)	1.3 [c]	NR(0.53)	--	0.60	1.5
Vinyl Acetate	NR(4.9)	NR(5.1)	13 [c]	--	6	15

Table 3-9 (Continued)

Substance	Concentration, $\mu g/Nm^3$					
Baseline Boiler Outlet	Run 1	Run 2	Run 3	Run 4	Mean	95% CI [a] of Mean
Low NO_x-Boiler Outlet						
1,1,1-Trichloroethane	3.1	9.2	8.4	12	8.2	5.9
Acetaldehyde	19 [e]	NR(8.3) [e]	NR(8.9) [e]	NR(8.9)	NR(8.9)	--
Methylene Chloride [d]	2.0	2.0	8.9	2.3	3.8	5.4
m,p-Xylene	1.7	0.92	1.8	1.2	1.4	0.4
Phenol	14 [c]	11 [c]	NR(6.1)	9.3 [c]	9.3	7.4
Vinyl Acetate	11 [c]	NR(5.1)	NR(5.2)	NR(5.2)	NR(5.2)	--
Ethyl Benzene	NR(0.51)	NR(0.51)	0.52 [c]	NR(0.52)	NR(0.52)	--

[a]CI = Confidence interval.

[b]Concentration exceeded the calibration range of the instrument.

[c]Concentration was less than five times the reporting limit.

[d]Substance was detected in the field blank. Suspected VOST contaminant.

[e]Blank correction was greater than 50% of the measured value.

[f]Not included in statistics.

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Section 4

DATA ASSESSMENT

Several procedures can be used to evaluate data quality from a field sampling program. The primary methods to evaluate analytical quality are the traditional QA/QC protocols of laboratory analysis: comparing the results of duplicates, blanks, standards, and spiked samples to the data quality objectives. These procedures are used to assess the effects of analytical precision, bias, and potential contamination. Field QA/QC procedures include the calibration of sampling equipment and the adherence to standard operating procedures.

Data consistency can be used as another evaluation tool, especially in the evaluation of coal, ash, and flue gas flow rates. Material balances for ash and major elements can be used to verify self-consistency of stream flows. Material balance closures for trace species can be used to decide whether the samples collected were representative with respect to the trace element concentrations, and can help to identify analytical biases in one or more types of samples. Closures between 70 and 130% are considered desirable. Closures outside this range indicate a higher degree of uncertainty or bias in the results.

QA/QC Summary

Laboratory Analysis

The laboratory QA/QC data gathered during this field effort are discussed in detail in Appendix H. The results show that the data collected during this field sampling effort are valid and usable for the needs of this project. Data quality objectives--in terms of blank sample purity, accuracy in analyzing standards, spike recoveries, and duplicate precision--were met or exceeded for the target analytes with very few exceptions. The laboratory QA/QC findings which potentially impact the data are:

- Field blank HNO_3/H_2O_2 impinger solutions from the multi-metals trains show low levels of metals (<5x the reporting limit) for nearly all substances.

- The level of target metals in blank Method 5 filters, while near reporting limits, were found to be significant when compared to the low levels found in the gas samples. The PJFF outlet impactor filter had significantly lower blank levels. However, this identified the need to blank correct all particulate phase samples affected, as discussed in Appendix I.

- The recovery of silver and arsenic was low for filters and impingers and high for lead for both quality control check samples and spiked samples.

- The duplicate analysis relative percent difference was above the desired value for the oil ash measurement.

Other less significant deviations from the data quality objectives are discussed in Appendix H. None of these observations are serious enough to discredit the laboratory results.

Sample Collection

Key components of the sampling equipment--pitot tubes, thermocouples, orifice meters, dry gas meters, and sampling nozzles--were calibrated prior to use in the field and those calibrations were checked at the conclusion of sampling. All flue gas samples were collected at rates between 90 and 110% of the isokinetic rates. Grab samples of fuel oil and atomizing steam were obtained from continually flowing pipes. The solids were obtained from the center of the limestone pre-coat bag and the ash hopper.

Process Stream Flows

Process stream flows which are presented in this report appear to be valid. A combustion calculation was performed using the mean oil composition, mean oil flow rate, and the mean oxygen concentration in the outlet gas to predict a "theoretical" flue gas flow. This calculated flow rate agreed with the estimated total outlet flow rate within 10 percent. The mean flow rate measured at the PJFF outlet was 10-15% higher than that measured at the PJFF inlet. Inleakage of air across the PJFF is possible, however, the oxygen measurements for both streams do not substantiate this hypothesis.

Material Balance Results

At Site 13, three key streams define the overall plant material balance: the fuel oil, the steam condensate (used to atomize the fuel oil), and the boiler outlet flue gas. For the pulse-jet fabric filter, the inlet and outlet flue gases and the collected ash define the material balance. For substances of interest, stream flow and concentration distributions (average, standard deviation, and number of measurements) were entered into an error propagation model to estimate the uncertainty in the overall material balance closure. Closure is defined as the ratio of outlet to inlet mass rate. A 100% closure indicates perfect agreement. For trace substances, closures between 70 and 130% are the goal for the FCEM project. This range reflects the typical level of analytical uncertainty and, therefore, allows the investigator to interpret the inlet and outlet stream component mass flow rates as being statistically equivalent. Poor closure values usually indicate an analytical problem with one or more types of sample matrices or problems collecting representative samples.

Table 4-1 presents the results of the material balance error propagation analysis. The detailed calculations appear in Appendix G. Three separate material balances are presented: around the boiler during both baseline and low-NO_x operation and around the fabric filter during baseline operation. In addition to the FCEM elements of

Table 4-1

Material Balance Closures and Uncertainties

Substance	Boiler Material Balance Baseline Closure (%)	Boiler Material Balance Baseline 95% CI[a] About Closure	Boiler Material Balance Low NO_x Closure (%)	Boiler Material Balance Low NO_x 95% CI About Closure	PJFF Material Balance Baseline Closure (%)	PJFF Material Balance Baseline 95% CI About Closure
Aluminum	175	61	123	48	117	59
Arsenic	107	20	66	17	89	56
Barium	NC[b]	--	NC	--	100	59
Beryllium	NC	--	NC	--	NC	--
Cadmium	NC	--	NC	--	NC	--
Chloride	140	77	268	84	124	160
Chromium	25	17	19	10	144	61
Cobalt	85	42	62	9	136	68
Copper	3	2	2	1	146	72
Fluoride	10	16	4	2	114	55
Iron	84	34	62	14	180	94
Lead	3	4	8	8	129	65
Manganese	131	36	110	1	167	79
Mercury	NC	--	NC	--	NC	--
Molybdenum	NC	--	NC	--	NC	--
Nickel	91	27	72	11	115	58
Phosphorus	NC	--	NC	--	NC	--
Selenium	NC	--	NC	--	NC	--
Sulfur	153	43	168	17	107	27
Vanadium	113	32	56	9	100	52

[a] CI = Confidence interval.
[b] NC = Not calculated because substance was below reporting limit in major inlet or outlet stream.

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interest, the closures of aluminum, iron, and sulfur, elements that are all present in significant concentrations in the fuel oil, are included for comparison.

The closures of some substances could not be calculated because their concentrations were below laboratory reporting limits in one or more key streams. Barium, beryllium, cadmium, molybdenum, and selenium concentrations were below reporting limits in the fuel oil. The phosphorus concentration was below reporting limits in the boiler outlet gas, which prevented the calculation of a boiler material balance. Fabric filter material balances for beryllium, cadmium, molybdenum, phosphorus, and selenium were not possible because concentrations of these elements were below reporting limits in the fabric filter inlet gas.

Only nickel shows acceptable closure in all three material balances. The data for nickel are considered valid and no further discussion is presented. In general, more substances showed acceptable closures around the fabric filter than around the boiler, indicating better agreement between the flue gas and the collected ash results than between the flue gas and the fuel oil results. Most of the substances were measured in the flue gas samples and the collected ash samples by the same technique (ICP-AES); however, the fuel oil was analyzed mainly by INAA. Therefore, the generally poorer closures around the boiler may indicate an inconsistency between concentrations measured by INAA and those measured by ICP-AES. On the other hand, it may also reflect the greater difficulty in getting representative samples of the fuel oil, and especially of the boiler outlet flue gas, where only one duct out of four was sampled.

Substance Discussion

Although the closures were outside the desired range for most substances, in many instances, the uncertainty associated with the closure is large and the 95% confidence interval encompasses 100 percent. For many substances, the data are adequate in terms of describing the operation of Site 13. More severe inconsistencies exist for chromium, copper, chlorine, fluorine, lead, and mercury. A brief discussion of FCEM target elements whose material balance closures were not within the desired range, as well as of the organic compounds measured, appears below.

Arsenic, Cobalt, Manganese, and Vanadium

Each of these elements has one or more material balance closures slightly outside the desirable range; however, the results do not indicate any serious measurement errors that would invalidate the results.

Chloride

The chloride closure around the fabric filter was within the desirable range, but since the collected ash contributes very little to the balance, the closure merely demonstrates agreement between the inlet and outlet gas concentrations. The closure around the boiler under baseline operation (140 $\pm$ 77%) encompasses the desired range, but the

closure around the boiler during low-NO_x operation (268 ± 84%) does not. Chloride concentrations in the fuel oil were not highly variable and were similar for low-NO_x (19 mg/kg mean) and baseline (15 mg/kg) operation. However, the chloride concentrations measured in the boiler outlet gas during low-NO_x (2,850 $\mu g/Nm^3$ mean) operation are significantly higher than those measured during baseline (1,190 $\mu g/Nm^3$ mean) operation. Since chloride is predominantly present in the vapor phase, it should be distributed fairly uniformly throughout the flue gas. The reason for the higher chloride flue gas concentrations during low-NO_x operation is not readily apparent. Laboratory QA information does not indicate possible analytical problems.

Chromium, Copper, and Lead

Each of these elements has a closure around the fabric filter within or near the acceptable range. However, the closures around the boiler during both baseline and low-NO_x operation are well below the acceptable range. These low boiler closures reflect an inconsistency between the fuel oil concentrations and the boiler outlet concentrations. Problems analyzing the fuel oil by INAA, or the flue gas by ICP-AES (GFAAS for lead), or both, may be responsible for the low boiler closures.

Fluoride

The fluoride closure around the fabric filter was within the desired range, but, as with chloride, the collected ash contributes little to the balance, and the closure merely indicates agreement between the two flue gas streams. The closures around the boiler during both baseline (10 ± 16%) and low-NO_x (4 ± 2%) operation are well below the desirable range and indicate problems analyzing the fuel oil, the flue gas, or both.

Mercury

Recent FCEM sampling experience with multi-metals trains indicates that, if mercury is present, a large portion of the mercury will be trapped in the nitric acid/hydrogen peroxide impingers. Review of laboratory analysis records indicate that correct procedures were followed during the preparation and analysis of the nitric acid/hydrogen peroxide impingers at Site 13. Mercury concentrations were below or only slightly above reporting limits in all of the nitric acid/ hydrogen peroxide impingers, and below reporting limits in all but two of the potassium permanganate impingers, which indicates that vapor phase mercury was present at very low levels in all gas streams.

Mercury concentrations in the fuel oil were determined by both INAA and DGA/CVAAS; however, results from the two methods were inconsistent. INAA analyses showed that mercury was present in only one sample at a reporting limit of approximately 0.03 $\mu g/g$, whereas DGA/CVAAS analyses of the same fuel oil indicated mercury was present at concentrations ranging from 0.09 to 0.36 $\mu g/g$. The INAA results are consistent with the low levels of mercury found in the vapor phase and are also comparable to historical mercury data from the PISCES database for No. 6 fuel oil (mean literature value = 0.01 $\mu g/g$). Fuel oil mercury concentrations ranging from 0.003 to

0.004 mg/kg are calculated when the boiler outlet gas mercury concentrations are converted to equivalent fuel oil concentrations. Because of this discrepancy, oil samples were retrieved from sample archives and re-analyzed by DGA/CVAAS. Four samples all reported at 0.03 or 0.04 μg/g. A blank mineral oil sample reported as 0.03 μg/g; therefore, the original INAA results are considered to be valid.

Benzene and Toluene

The benzene and toluene concentrations at each gas sampling location were comparable, considering the variabilities in the individual runs. Mean benzene concentrations ranged from 0.9 to 2.0 $\mu g/Nm^3$. Mean toluene concentrations ranged from 1.5 to 5.4 $\mu g/Nm^3$.

Formaldehyde

Measurements of flue gas formaldehyde concentrations produced inconsistent results. Formaldehyde was not present in concentrations above the reporting limits of approximately 7 to 9 $\mu g/Nm^3$ in five of six samples at the boiler outlet during baseline and low-NO_x operation. One concentration of 10 $\mu g/Nm^3$, measured at the boiler outlet during baseline testing, was barely above the reporting limit. However, five of the six samples collected at the fabric filter inlet and outlet (obtained during the boiler baseline testing) showed concentrations ranging from 30 to 42 $\mu g/Nm^3$. One sample at the fabric filter inlet showed a concentration of 2,020 $\mu g/Nm^3$, which is much higher than the others and is considered an outlier. Acetaldehyde also exhibits this behavior.

PAHs and Additional POMs

No PAHs or additional POMs were present in concentrations above reporting limits in any of the flue gas samples.

Section 5

EXAMPLE CALCULATIONS

This section describes the methodology and sample calculations used to develop the results discussed in Sections 3 and 4. Specifically, the calculation of stream flow rates, mean values, confidence intervals, and unit-energy emission factors are described.

Stream Flow Rates

Appendix F contains information about the stream flow rates measured or calculated at Site 13 during the sampling trip. Fuel oil feed rates were obtained directly from plant meters. The flow rates of the flue gas in the south reheat boiler outlet duct and the pulse-jet fabric filter inlet and outlet ducts were measured directly during sampling. The total boiler outlet flue gas flow was calculated from the measured south reheat duct flow rate, multiplied by 3.45. This factor was derived from two velocity traverses of all four boiler outlet ducts, which indicated that the south reheat duct represents 29% of the total flue gas flow. The flow rate of ash collected by the pulse-jet fabric filter was calculated from a particulate balance around the fabric filter, using the measured particulate loadings and gas flow rates of the inlet and outlet flue gas streams. The flow rate of steam used to atomize the fuel oil was calculated to be 1.2% of the measured main steam flow rate for the unit, based on burner design specifications supplied by the utility.

Unit Energy Emission Factor Calculation

In addition to the gas phase concentrations, a unit-energy basis emission factor was also developed for each substance. These values were determined by dividing the mass flow rate of a substance (mean concentration times mean flow rate) by the mean heat input to the boiler during testing. The mean heat input was obtained from the product of the mean fuel oil flow rate and the mean higher heating value (HHV) of the fuel.

As an example, we have presented the calculation of the emission factor for arsenic from the boiler outlet during baseline operation. The mean fuel oil flow rate during baseline operation is 156,000 lb/hr, and the mean HHV is 19,000 Btu/lb. Multiplying these two values produces a mean heat input of 2.9×10^9 Btu/hr. The mean arsenic mass flow rate, the product of the mean arsenic concentration, 7.7 μg/Nm^3, and the mean gas flow rate, 1,260,000 Nm^3/hr, is 9.7×10^6 μg/hr, or 0.021 lb/hr. When the mean mass flow rate is divided by the mean heat input, an emission factor of 7.2 lb/10^{12} Btu is obtained, as shown in Table 3-7.

The equations in Appendix G were use to calculate the 95% confidence intervals for the emission factors. For each parameter (flue gas flow rate, concentration, oil flow rate, and HHV) the mean, standard deviation, number of points, and bias estimates were used to calculate the combined uncertainty in the mean emission factors.

Section 6

GLOSSARY

Btu	British Thermal Unit
CAAA	Clean Air Act Amendments
CI	Confidence Interval
CVAAS	Cold Vapor Atomic Absorption Spectroscopy
DGA	Double Gold Amalgamation
DQO	Data Quality Objectives
dscfm	Dry Standard Cubic Feet per Minute (1 atm, 68°F)
ESP	Electrostatic Precipitator
FCEM	Field Chemical Emissions Monitoring
GFAAS	Graphite Furnace Atomic Adsorption Spectroscopy
HGAAS	Hydride Generation Atomic Absorption Spectroscopy
HHV	Higher Heating Value
IC	Ion Chromatography
ICP-AES	Inductively Coupled Plasma-Atomic Emission Spectroscopy
ID	Induced Draft
MDL	Method Detection Limit
MSD	Matrix Spike Duplicate
MW	Megawatt
INAA	Neutron Activation Analysis
NBS	National Bureau of Standards
NC	Not Calculated
Nm^3	Dry Normal Cubic Meter (1 atm, 0°C)
NR	Not Reported (below reporting limit)
PAH	Polynuclear Aromatic Hydrocarbons
PJFF	Pulse-Jet Fabric Filter
POM	Polycyclic Organic Matter
PSD	Particle Size Distribution
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
SIE	Selective Ion Electrode
VOC	Volatile Organic Compound
VOST	Volatile Organic Sampling Train

Appendix A

Detailed Sample Collection/Preparation/Analysis Tables

PRELIMINARY

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Table A-1

Sample Collection, Preservation, and Handling Techniques for Site 13

Stream	Collection Method	Fraction Description	Sample Handling & Preservation	Comments
FLUE GAS				
Boiler Outlet, PJFF Inlet, PJFF Outlet	SW 0030	VOST	Cooled to 4°C.	Analyzed for volatile organic compounds.
	SW 0010	MM5-Filter MM5-XAD Resin MM5-PNR/Condensate	Cooled to 4°C. Cooled to 4°C. Cooled to 4°C.	Analyzed for semivolatile organic compounds.
	EPA Draft Method*	"Metals" probe, nozzle rinse, and filter.	Acetone portion dried and weighed; nitric acid portion sealed and kept at ambient temperature; filter desiccated to constant weight.	Entire filter digested and combined with digested probe and nozzle rinses, and combined digest analyzed for "metals".
		"Metals" - Impinger 1 & 2		Analyzed for "metals".
		"Metals" - Impinger 3 & 4	Sealed and kept at ambient temperature. Sealed and kept at ambient temperature.	Mercury analysis only.
	SW 0011	Formaldehyde Impinger	Rinsed with $MeCl_2$; cooled to 4°C.	Analyzed for aldehydes.
	Radian Method	Anion Train	Sealed and kept at ambient temperature.	Analyzed for chloride, fluoride, total P, and total S.
LIQUIDS				
Fuel Oil	Grab/Composite	Ultimate Water "Metals" Cl, F, P	Kept in sealed container; submitted "as collected".	Multiple grab samples collected from sample tap on the main fuel supply header.
Condensate Water		"Metals" Cl, F Total P Total S	Nitric acid to pH <2. None Sulfuric acid to pH <2. None	Collected from Unit 20 main steam sample line.

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Table A-1 (Continued)

Stream	Collection Method	Fraction Description	Sample Handling & Preservation	Comments
SOLIDS				
Collected Fly Ash	Grab/Composite	"Metals" Cl, F Total P Total S	Placed in sealed container in field.	Samples were collected from the center of the volume of solids collected in the hopper bottom after about seven days of operation.
		Semivolatile Organics	Placed in sealed glass container in field, cooled to 4°C, shipped cool.	
Limestone		"Metals" Cl, F Total P Total S	Placed in sealed container in field.	Grab sample collected from one limestone supply bag (50 lb. bag).

*U.S. Environmental Protection Agency, Environmental Monitoring Branch. "Methodology for the Determination of Metals Emissions in Exhaust Gases from Incineration Processes." Draft, October 1989.

Table A-2

Preparation and Analysis Methods for Fuel Oil

Constituent or Property	Preparation	Analysis	Preparation Reference	Method Reference
Heating Value	Oxygen Bomb Combustion	Calorimetric	ASTM D 240	ASTM D 240
Water by Distillation	Distillation	Volumetric	ASTM D 95	ASTM D 95
Ultimate Analysis				
Carbon	Combustion	NDIR	Leco	Leco C,H,N Analyzer 600
Hydrogen	Combustion	NDIR	Leco	Leco C,H,N Analyzer 600
Nitrogen	Combustion	NDIR	Leco	Leco C,H,N Analyzer 600
Sulfur	Combustion	NDIR	Leco	Leco SC132 Sulfur Analyzer
Ash	Combustion	Gravimetric	ASTM D 482	ASTM D 482
Oxygen	Calculation	Difference	Not Applicable	Leco C,H,N Analyzer 600
FCEM Target Metals and Semi-metals				
Arsenic	None	INAA	Not Applicable	Hofstader, et al.[a]
Barium	None	INAA	Not Applicable	Hofstader, et al.
Beryllium	Oxygen Bomb Combustion	GFAAS	ASTM D 240	Private Communication[b]
Cadmium	None	INAA	Not Applicable	Hofstader, et al.
Cadmium	Oxygen Bomb Combustion	GFAAS	ASTM D 240	Private Communication[b]
Chromium	None	INAA	Not Applicable	Hofstader, et al.
Cobalt	None	INAA	Not Applicable	Hofstader, et al.
Copper	None	INAA	Not Applicable	Hofstader, et al.
Lead	Oxygen Bomb Combustion	GFAAS	ASTM D 240	Private Communication[b]
Manganese	None	INAA	Not Applicable	Hofstader, et al.
Mercury	None	INAA	Not Applicable	Hofstader, et al.
Molybdenum	None	INAA	Not Applicable	Hofstader, et al.
Nickel	None	INAA	Not Applicable	Hofstader, et al.
Selenium	None	INAA	Not Applicable	Hofstader, et al.
Vanadium	None	INAA	Not Applicable	Hofstader, et al.
Vanadium	Oxygen Bomb Combustion	GFAAS	ASTM D 240	Private Communication[b]

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Table A-2 (Continued)

Constituent or Property	Preparation	Analysis	Preparation Reference	Method Reference
FCEM Acid-forming Anions				
Chlorine	None	INAA	Not Applicable	Hofstader, et al.
Chlorine	Oxygen Bomb Combustion	ISE	ASTM D 4208, Adapted	ASTM D 4208, Adapted
Fluorine	Oxygen Bomb Combustion	ISE	ASTM D 3761, Adapted	ASTM D 3761, Adapted
Total Phosphorus	Ash	Spectrophotometric	ASTM D 482	ASTM D 2795, Adapted
Additional Inorganic Analytes				
Aluminum	None	INAA	Not Applicable	Hofstader, et al.
Calcium	None	INAA	Not Applicable	Hofstader, et al.
Iron	None	INAA	Not Applicable	Hofstader, et al.
Magnesium	None	INAA	Not Applicable	Hofstader, et al.
Potassium	None	INAA	Not Applicable	Hofstader, et al.
Sodium	None	INAA	Not Applicable	Hofstader, et al.
Sodium	Oxygen Bomb Combustion	Flame AAS	ASTM D 240	Private Communication[b]
Titanium	None	INAA	Not Applicable	Hofstader, et al.
Zinc	None	INAA	Not Applicable	Hofstader, et al.

[a]Hofstader, R.A., O.I. Milner, and J.H. Runnel (Editors), "Analysis of Petroleum for Trace Metals," Advances in Chemistry Series, 156 (1976), pp. 41-45.

[b]Telephone conversation between Rick Anderson, Commercial Testing and Engineering Co., South Holland, Illinois, and Carol May Thompson, Radian Corporation, Austin, Texas, September 11, 1991.

Table A-3

Preparation and Analysis Methods for Limestone, Collected Fly Ash, and Multiple Metals Train Flue Gas Solids from Site 13

Constituent or Property	Preparation	Analysis	Limestone	PJFF Collected Fly Ash	Flue Gas Solids	Preparation Reference	Analysis Reference
FCEM Target Metals and Semi-metals							
Arsenic	None	INAA	X	X	NA*	Not Applicable	
Arsenic	Microwave Acid Digestion	GFAAS	X	X	X	CEM	SW 7060
Barium	None	INAA	X	X	NA	Not Applicable	
Barium	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Barium	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Beryllium	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Cadmium	None	INAA	X	X	NA	Not Applicable	
Cadmium	Microwave Acid Digestion	GFAAS	X	X	X	CEM	SW 7131
Chromium	None	INAA	X	X	NA	Not Applicable	
Chromium	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Cobalt	None	INAA	X	X	NA	Not Applicable	
Cobalt	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Cobalt	Lithium Borate Fusion	XRF	NA	X	NA	ASTM D 4326	ASTM D 4326
Copper	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Lead	Microwave Acid Digestion	GFAAS	X	X	X	CEM	SW 7421
Manganese	None	INAA	X	X	NA	Not Applicable	
Manganese	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Manganese	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Mercury	None	INAA	X	X	NA	Not Applicable	
Mercury	Acid Digestion	CVAA	X	X	NA	SW 7471	SW 7471
Mercury	Microwave Acid Digestion	CVAA	NA	NA	X	CEM	SW 7471
Mercury	Double Gold Amalgam	CVAA	X	X	NA	Bureau of Mines	Bureau of Mines
Molybdenum	None	INAA	X	X	NA	Not Applicable	
Molybdenum	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010

PRELIMINARY

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Table A-3 (Continued)

Constituent or Property	Preparation	Analysis	Limestone	PJFF Collected Fly Ash	Flue Gas Solids	Preparation Reference	Analysis Reference
Nickel	None	INAA	X	X	NA	Not Applicable	
Nickel	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Nickel	Lithium Borate Fusion	XRF	NA	X	NA	ASTM D 4326	ASTM D 4326
Selenium	None	INAA	X	X	NA	Not Applicable	
Selenium	Microwave Acid Digestion	HGAAS	X	X	X	CEM	SW 7741
Vanadium	None	INAA	X	X	NA	Not Applicable	
Vanadium	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Vanadium	Lithium Borate Fusion	XRF	NA	X	NA	ASTM D 4326	ASTM D 4326
FCEM Acid-forming Anions							
Chlorine	None	INAA	X	X	NA	Not Applicable	
Chlorine	Water Extraction	IC	NA	X	X	Radian	FGD Handbook
Chlorine	Oxygen Bomb Combustion [b]	PT	X	X	NA	Radian	SM 407 C
Fluorine	NaOH Fusion	ISE	X	X	NA	McQuaker and Guerney	McQuaker and Guerney
Fluorine	Water Extraction	ISE	NA	NA	X	EPA 340.2	EPA 340.2
Total Phosphorus	Microwave Acid Digestion	ICAPES	X	X	NA	CEM	SW 6010
Total Phosphorus	Water Extraction	IC	NA	X	X	Radian	FGD Handbook
Total Phosphorus	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Additional Inorganic Analytes							
Aluminum	None	INAA	X	X	NA	Not Applicable	
Aluminum	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Aluminum	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Calcium	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Calcium	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Iron	None	INAA	X	X	NA	Not Applicable	
Iron	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Iron	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Magnesium	None	INAA	X	X	NA	Not Applicable	
Magnesium	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Magnesium	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010

PRELIMINARY DO NOT CITE OR QUOTE

Table A-3 (Continued)

Constituent or Property	Preparation	Analysis	Limestone	PJFF Collected Fly Ash	Flue Gas Solids	Preparation Reference	Analysis Reference
Potassium	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Potassium	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Silicon	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Sodium	None	INAA	X	X	NA	Not Applicable	
Sodium	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Sodium	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Titanium	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Titanium	Microwave Acid Digestion	ICAPES	X	X	X	CEM	SW 6010
Zinc	None	INAA	X	X	NA	Not Applicable	
Zinc	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Zinc	Microwave Acid Digestion	ICAPES	NA	X	X	CEM	SW 6010
Total Sulfur	Lithium Borate Fusion	XRF	X	X	NA	ASTM D 4326	ASTM D 4326
Total Sulfur	Induction Furnace	NDIR	X	X	NA	ASTM D 4239	ASTM D 4239
Total Sulfur	Water Extraction	IC	NA	X	X	Radian	FGD Handbook

[a]NA means not analyzed by this technique.

[b]Methanol used as a combustion aid.

PRELIMINARY

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Table A-4

Preparation and Analysis Methods for Condensate Water, Flue Gas Impingers, and Water Extracts of Anion Train Solids from Site 13

Constituent or Property	Preparation	Analysis	Condensate Water	Flue Gas Impingers	Water Extracts of Anions Train Solids	Preparation Reference	Analysis Reference
FCEM Target Metals and Semi-metals							
Arsenic	Digestion for HGAAS	HGAAS	X	NA	NA	SW 7061	SW 7061
Arsenic	Acid Digestion for GFAAS	GFAAS	NA	X	NA	SW 3020	SW 7060
Barium	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Beryllium	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Cadmium	Acid Digestion for GFAAS	GFAAS	X	X	NA	SW 3020	SW 7131
Chromium	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Cobalt	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Copper	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Lead	Acid Digestion for GFAAS	GFAAS	X	X	NA	SW 3020	SW 7421
Manganese	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Mercury	Digestion for Hg Analysis	CVAA	X	X	NA	SW 7470	SW 7470
Molybdenum	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Nickel	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Selenium	Acid Digestion for HGAAS	HGAAS	X	X	NA	SW 7741	SW 7741
Vanadium	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
FCEM Acid-forming Anions							
Chlorine	None	IC	X	X	X	Not Applicable	FGD Handbook
Fluorine	None	ISE	X	X	X	Not Applicable	EPA 340.2
Total Phosphorus	Acid Digestion for ICAPES	ICAPES	NA	X	NA	SW 3005	SW 6010
Total Phosphorus	None	IC	X	NA	X	Not Applicable	FGD Handbook

Table A-4 (Continued)

Constituent or Property	Preparation	Analysis	Condensate Water	Flue Gas Impingers	Water Extracts of Anions Train Solids	Preparation Reference	Analysis Reference
Additional Inorganic Analytes							
Aluminum	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Calcium	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Iron	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Magnesium	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Potassium	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Sodium	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Titanium	Acid Digestion for ICAPES	ICAPES	NA	X	NA	SW 3005	SW 6010
Zinc	Acid Digestion for ICAPES	ICAPES	X	X	NA	SW 3005	SW 6010
Total Sulfur	None	IC	X	X	X	Not Applicable	FGD Handbook

Table A-5

Summary of Preparation Procedures and Analytical Methods Used to Measure Organic Chemical Constituents from Site 13

Constituent	Preparation	Analysis	Collected Fly Ash	Flue Gas	Preparation Reference	Analysis Reference
Volatile Organic Compounds						
Benzene	Thermal Desorption	GC/MS		X	SW 0030	SW 8240
Toluene	Thermal Desorption	GC/MS		X	SW 0030	SW 8240
Formaldehyde	Methylene Chloride Extraction	HPLC		X	TO 5 (b)	TO 5 (b)
Polynuclear Aromatic Organic Compounds						
Acenaphthene	Solvent Extraction*	GC/MS	X	X	SW 3540 or 3520	SW 8270
Acenaphthylene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Anthracene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Benzo(a)anthracene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Benzo(a)pyrene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Benzo(b)fluoranthene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Benzo(g,h,i)perylene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Benzo(k)fluoranthene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Chrysene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Dibenzo(a,h)anthracene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Fluoranthene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Fluorene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Indeno(1,2,3-cd)pyrene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Naphthalene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Phenanthrene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Pyrene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
2-Methylnaphthalene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
3-Methylcholanthrene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
7,12-Dimethylbenz(a)anthracene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270

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Table A-5 (Continued)

Constituent	Preparation	Analysis	Collected Fly Ash	Flue Gas	Preparation Reference	Analysis Reference
Additional Polycyclic Organic Matter						
1,2-Diphenylhydrazine	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
1-Chloronaphthalene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
1-Naphthylamine	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
2-Chloronaphthalene	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
2-Naphthylamine	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
3,3-Dichlorobenzidine	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
4-Aminobyphenyl	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
4-Bromophenyl Phenyl Ether	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
4-Chlorophenyl Phenyl Ether	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Benzidine	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Butylbenzylphthalate	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Dibenzofuran	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Dibenz(a,j)acridine	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
Diphenylamine	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270
N-Nitrosodiphenylamine	Solvent Extraction	GC/MS	X	X	SW 3540 or 3520	SW 8270

[a]Methlyene chloride of DNPH (2,4-dinitrophenylhydrazine) impinger solution.

[b]TO 5 is EPA Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, EPA 600/4/84/041.

[c]Soxhlet extraction (SW 3540) was applied to collected fly ash and to PNR solids, filter solids, and resins from MM5 train. Liquid/liquid extraction (SW 3520) was applied to condensate from the MM5 train.

SW is EPA SW-846, "Test Methods for Evaluating Solid Waste."

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Appendix B

Baseline Data Used In Calculations

03-Feb-93

Site 13 Baseline Data Used in Calculations

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, solid phase	1-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	1-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	1-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	1-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	1-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	1-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	1-Naphthylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	1-Naphthylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	1-Naphthylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	1-Naphthylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	1-Naphthylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	1-Naphthylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	2-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2-Methylnaphthalene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2-Methylnaphthalene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	2-Methylnaphthalene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2-Methylnaphthalene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2-Methylnaphthalene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2-Methylnaphthalene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2-Naphthylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2-Naphthylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	2-Naphthylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2-Naphthylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2-Naphthylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2-Naphthylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	3-Methylcholanthrene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	3-Methylcholanthrene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	3-Methylcholanthrene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	3-Methylcholanthrene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	3-Methylcholanthrene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	3-Methylcholanthrene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	3,3' -Dichlorobenzidine	827SSNT1	mg/Nm3	< 0.0138	< 0.0138	< 0.0127	< 0.0125	
boiler outlet gas, vapor phase	3,3' -Dichlorobenzidine	827SSNT1	mg/Nm3	< 0.0138	< 0.0138	< 0.0127	< 0.0125	
PJFF inlet gas, solid phase	3,3' -Dichlorobenzidine	827SSNT1	mg/Nm3	< 0.0115	< 0.0107	< 0.0111	< 0.0110	
PJFF inlet gas, vapor phase	3,3' -Dichlorobenzidine	827SSNT1	mg/Nm3	< 0.0115	< 0.0107	< 0.0111	< 0.0110	
PJFF outlet gas, solid phase	3,3' -Dichlorobenzidine	827SSNT1	mg/Nm3	< 0.0101	< 0.0104	< 0.00996	< 0.0101	
PJFF outlet gas, vapor phase	3,3' -Dichlorobenzidine	827SSNT1	mg/Nm3	< 0.0101	< 0.0104	< 0.00996	< 0.0101	

DO NOT CITE OR QUOTE

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, solid phase	4-Aminobiphenyl	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	4-Aminobiphenyl	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	4-Aminobiphenyl	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	4-Aminobiphenyl	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	4-Aminobiphenyl	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	4-Aminobiphenyl	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	4-Bromophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	4-Bromophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	4-Bromophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	4-Bromophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	4-Bromophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	4-Bromophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	4-Chlorophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	4-Chlorophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	4-Chlorophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	4-Chlorophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	4-Chlorophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	4-Chlorophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	7,12-Dimethylbenz(a)anthracene	827SSNT1	mg/Nm3	< 0.0173	< 0.0173	< 0.0159	< 0.0157	
boiler outlet gas, vapor phase	7,12-Dimethylbenz(a)anthracene	827SSNT1	mg/Nm3	< 0.0173	< 0.0173	< 0.0159	< 0.0157	
PJFF inlet gas, solid phase	7,12-Dimethylbenz(a)anthracene	827SSNT1	mg/Nm3	< 0.0143	< 0.0134	< 0.0138	< 0.0138	
PJFF inlet gas, vapor phase	7,12-Dimethylbenz(a)anthracene	827SSNT1	mg/Nm3	< 0.0143	< 0.0134	< 0.0138	< 0.0138	
PJFF outlet gas, solid phase	7,12-Dimethylbenz(a)anthracene	827SSNT1	mg/Nm3	< 0.0126	< 0.0130	< 0.0124	< 0.0126	
PJFF outlet gas, vapor phase	7,12-Dimethylbenz(a)anthracene	827SSNT1	mg/Nm3	< 0.0126	< 0.0130	< 0.0124	< 0.0126	
boiler outlet gas, solid phase	Acenaphthene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Acenaphthene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Acenaphthene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Acenaphthene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Acenaphthene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Acenaphthene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Acenaphthylene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Acenaphthylene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Acenaphthylene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Acenaphthylene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Acenaphthylene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Acenaphthylene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Aluminum	ICPSSNFC	mg/kg		28371		25701	20525
boiler outlet gas, solid phase	Aluminum	ICPSSNFC	mg/Nm3		1.29		1.54	1.09
boiler outlet gas, vapor phase	Aluminum	ICPSWNFC	mg/Nm3		< 0.0936 R		< 0.0505 R	< 0.0901
condensate water	Aluminum	ICPSWNFC	mg/L		< 0.200		< 0.200	
fuel oil	Aluminum	NAA	ug/g	17.8	12.1	11.0	13.4	12.5
limestone	Aluminum	ICPSSNFC	mg/kg	754 @				

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF inlet gas, particulate	Aluminum	ICPSSNFC	mg/kg		27619		22900	19508
PJFF inlet gas, solid phase	Aluminum	ICPSSNFC	mg/Nm3		0.809		1.00	0.942
PJFF inlet gas, vapor phase	Aluminum	ICPSWNFC	mg/Nm3		< 0.0743 R		< 0.0747 R	< 0.0819 R
PJFF out gas, particulate (impactor)	Aluminum	SW6010	mg/kg	17177 @R				
PJFF out gas, solid phase (impactor)	Aluminum	SW6010	mg/Nm3	0.0103 @R				
PJFF outlet gas, particulate (M5)	Aluminum	ICPSSNFC	mg/kg		< 4651		< 5263	< 4598
PJFF outlet gas, solid phase (M5)	Aluminum	ICPSSNFC	mg/Nm3		< 0.0195		< 0.0205	< 0.0202
PJFF outlet gas, vapor phase	Aluminum	ICPSWNFC	mg/Nm3		< 0.0634 R		< 0.0743 R	< 0.0712
boiler outlet gas, solid phase	Anthracene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00628	
boiler outlet gas, vapor phase	Anthracene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00628	
PJFF inlet gas, solid phase	Anthracene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Anthracene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Anthracene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Anthracene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Arsenic	ASGSSA00	mg/kg		154		135	150
boiler outlet gas, solid phase	Arsenic	ASGSSA00	mg/Nm3		0.00698		0.00813	0.00800
boiler outlet gas, vapor phase	Arsenic	ASGSWA00	mg/Nm3		< 0.00113 R		< 0.000657	< 0.000736
condensate water	Arsenic	ASHRWA00	mg/L		< 0.00500		< 0.00500	
fuel oil	Arsenic	NAA	ug/g	0.108	0.117	0.138	0.134	0.145
limestone	Arsenic	ASGSSA00	mg/kg	< 16.0				
PJFF inlet gas, particulate	Arsenic	ASGSSA00	mg/kg		214		151	141
PJFF inlet gas, solid phase	Arsenic	ASGSSA00	mg/Nm3		0.00627		0.00662	0.00679
PJFF inlet gas, vapor phase	Arsenic	ASGSWA00	mg/Nm3		< 0.00149 R		< 0.00149 R	< 0.00164 R
PJFF out gas, particulate (impactor)	Arsenic	SW7060	mg/kg	61.3 @R				
PJFF out gas, solid phase (impactor)	Arsenic	SW7060	mg/Nm3	0.0000368				
PJFF outlet gas, particulate (M5)	Arsenic	ASGSSA00	mg/kg		< 93.0		< 105	< 92.0
PJFF outlet gas, solid phase (M5)	Arsenic	ASGSSA00	mg/Nm3		< 0.000390		< 0.000411	< 0.000403
PJFF outlet gas, vapor phase	Arsenic	ASGSWA00	mg/Nm3		< 0.00127 R		< 0.00149 R	< 0.000835 R
fuel oil	Ash	ultimate	%wt	0.110	0.0700	0.0600	0.01000	0.0400
boiler outlet gas, particulate	Barium	ICPSSNFC	mg/kg		501		490	488
boiler outlet gas, solid phase	Barium	ICPSSNFC	mg/Nm3		0.0227		0.0294	0.0260
boiler outlet gas, vapor phase	Barium	ICPSWNFC	mg/Nm3		< 0.00468 R		< 0.00417 R	< 0.00450 R
condensate water	Barium	ICPSWNFC	mg/L		< 0.01000		< 0.01000	
fuel oil	Barium	NAA	ug/g	< 4.11	< 4.19	< 4.04	< 3.63	5.87
limestone	Barium	ICPSSNFC	mg/kg	< 10.00				
PJFF inlet gas, particulate	Barium	ICPSSNFC	mg/kg		671		535	507
PJFF inlet gas, solid phase	Barium	ICPSSNFC	mg/Nm3		0.0197		0.0234	0.0245
PJFF inlet gas, vapor phase	Barium	ICPSWNFC	mg/Nm3		< 0.00372 R		< 0.00374 R	< 0.00410 R
PJFF out gas, particulate (impactor)	Barium	SW6010	mg/kg	957 R				
PJFF out gas, solid phase (impactor)	Barium	SW6010	mg/Nm3	0.000575 R				
PJFF outlet gas, particulate (M5)	Barium	ICPSSNFC	mg/kg		< 233		< 263	< 230
PJFF outlet gas, solid phase (M5)	Barium	ICPSSNFC	mg/Nm3		< 0.000976		< 0.00103	< 0.00101

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF outlet gas, vapor phase	Barium	ICPSWNFC	mg/Nm3		< 0.00317 R		< 0.00154 R	< 0.00356 R
boiler outlet gas, 20-L VOST	Benzene	GCMS	mg/Nm3			0.00152	0.00107	
boiler outlet gas, 5-L VOST	Benzene	GCMS	mg/Nm3		< 0.00201			
PJFF inlet gas, 20-L VOST	Benzene	GCMS	mg/Nm3		0.00110	0.00132	< 0.000556	
PJFF outlet gas, 20-L VOST	Benzene	GCMS	mg/Nm3		0.00188	0.00213	0.00186	
boiler outlet gas, solid phase	Benzidine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Benzidine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Benzidine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Benzidine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Benzidine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Benzidine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Benzo(a)anthracene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Benzo(a)anthracene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Benzo(a)anthracene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Benzo(a)anthracene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Benzo(a)anthracene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Benzo(a)anthracene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Benzo(a)pyrene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Benzo(a)pyrene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Benzo(a)pyrene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Benzo(a)pyrene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Benzo(a)pyrene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Benzo(a)pyrene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Benzo(b)fluoranthene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Benzo(b)fluoranthene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Benzo(b)fluoranthene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Benzo(b)fluoranthene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Benzo(b)fluoranthene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Benzo(b)fluoranthene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Benzo(g,h,i)perylene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Benzo(g,h,i)perylene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Benzo(g,h,i)perylene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Benzo(g,h,i)perylene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Benzo(g,h,i)perylene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Benzo(g,h,i)perylene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Benzo(k)fluoranthene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Benzo(k)fluoranthene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Benzo(k)fluoranthene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Benzo(k)fluoranthene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Benzo(k)fluoranthene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Benzo(k)fluoranthene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Beryllium	ICPSSNFC	mg/kg		< 6.11		< 2.05	< 4.55

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, solid phase	Beryllium	ICPSSNFC	mg/Nm3		< 0.000277		< 0.000123	< 0.000242
boiler outlet gas, vapor phase	Beryllium	ICPSWNFC	mg/Nm3		< 0.000563		< 0.000505	< 0.000901
condensate water	Beryllium	ICPSWNFC	mg/L		< 0.00200		< 0.00200	
fuel oil	Beryllium	GFAA	ug/g	< 0.01000	< 0.01000	< 0.01000	< 0.01000	< 0.01000
limestone	Beryllium	ICPSSNFC	mg/kg	< 2.00				
PJFF inlet gas, particulate	Beryllium	ICPSSNFC	mg/kg		< 3.55		< 2.47	< 4.56
PJFF inlet gas, solid phase	Beryllium	ICPSSNFC	mg/Nm3		< 0.000104		< 0.000108	< 0.000220
PJFF inlet gas, vapor phase	Beryllium	ICPSWNFC	mg/Nm3		< 0.000326		< 0.000290	< 0.000480
PJFF out gas, particulate (impactor)	Beryllium	SW6010	mg/kg	< 16.1				
PJFF out gas, solid phase (impactor)	Beryllium	SW6010	mg/Nm3	< 0.00000968				
PJFF outlet gas, particulate (M5)	Beryllium	ICPSSNFC	mg/kg		< 23.3		< 52.6	< 46.0
PJFF outlet gas, solid phase (M5)	Beryllium	ICPSSNFC	mg/Nm3		< 0.0000976		< 0.000205	< 0.000202
PJFF outlet gas, vapor phase	Beryllium	ICPSWNFC	mg/Nm3		< 0.000333		< 0.000309	< 0.000417
boiler outlet gas, solid phase	Butylbenzylphthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Butylbenzylphthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Butylbenzylphthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Butylbenzylphthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Butylbenzylphthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Butylbenzylphthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Cadmium	CDGSSA00	mg/kg		128 @		39.7 @	702
boiler outlet gas, solid phase	Cadmium	CDGSSA00	mg/Nm3		0.00582 @		0.00238 @	0.0373
boiler outlet gas, vapor phase	Cadmium	CDGSWA00	mg/Nm3		< 0.000468 R		< 0.000417	< 0.000450 R
condensate water	Cadmium	CDGSWA00	mg/L		< 0.001000		< 0.001000	
fuel oil	Cadmium	NAA	ug/g	< 0.498	< 0.351	< 0.443	< 0.457	< 0.527
limestone	Cadmium	CDGSSA00	mg/kg	< 1.000				
PJFF inlet gas, particulate	Cadmium	CDGSSA00	mg/kg		< 8.87		< 3.70	< 2.28
PJFF inlet gas, solid phase	Cadmium	CDGSSA00	mg/Nm3		< 0.000260		< 0.000162	< 0.000110
PJFF inlet gas, vapor phase	Cadmium	CDGSWA00	mg/Nm3		< 0.000372 R		< 0.000374 R	< 0.000410 R
PJFF out gas, particulate (impactor)	Cadmium	SW7131	mg/kg	< 8.06 R				
PJFF out gas, solid phase (impactor)	Cadmium	SW7131	mg/Nm3	< 0.00000464 R				
PJFF outlet gas, particulate (M5)	Cadmium	CDGSSA00	mg/kg		< 34.9		< 13.2	< 11.5
PJFF outlet gas, solid phase (M5)	Cadmium	CDGSSA00	mg/Nm3		< 0.000146		< 0.0000514	< 0.0000504
PJFF outlet gas, vapor phase	Cadmium	CDGSWA00	mg/Nm3		< 0.000317 R		< 0.000372 R	< 0.000356 R
boiler outlet gas, particulate	Calcium	ICPSSNFC	mg/kg		6195 @		4323 @	5211 @
boiler outlet gas, solid phase	Calcium	ICPSSNFC	mg/Nm3		0.281 @		0.260 @	0.277 @
boiler outlet gas, vapor phase	Calcium	ICPSWNFC	mg/Nm3		< 0.468 R		< 0.417 R	< 0.450 R
condensate water	Calcium	ICPSWNFC	mg/L		< 1.000		< 1.000	
fuel oil	Calcium	NAA	ug/g	< 97.7	< 73.8	< 91.1	82.3	< 131
limestone	Calcium	ICPSSNFC	mg/kg	221000				
PJFF inlet gas, particulate	Calcium	ICPSSNFC	mg/kg		5240 @		3721 @	4205 @
PJFF inlet gas, solid phase	Calcium	ICPSSNFC	mg/Nm3		0.153 @		0.163 @	0.203 @
PJFF inlet gas, vapor phase	Calcium	ICPSWNFC	mg/Nm3		< 0.372 R		< 0.374 R	< 0.410 R

PRELIMINARY

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Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF out gas, particulate (impactor)	Calcium	SW6010	mg/kg	< 8065 R				
PJFF out gas, solid phase (impactor)	Calcium	SW6010	mg/Nm3	< 0.00484 R				
PJFF outlet gas, particulate (M5)	Calcium	ICPSSNFC	mg/kg		< 23256		< 26316	< 22989
PJFF outlet gas, solid phase (M5)	Calcium	ICPSSNFC	mg/Nm3		< 0.0976		< 0.103	< 0.101
PJFF outlet gas, vapor phase	Calcium	ICPSWNFC	mg/Nm3		< 0.317 R		< 0.372 R	< 0.356 R
fuel oil	Carbon	ultimate	%wt	87.2	87.0	86.7	86.7	86.7
boiler outlet gas, particulate	Chloride	CLIFWN00	mg/kg	3208 @		2401 @		1045
boiler outlet gas, solid phase	Chloride	CLIFWN00	mg/Nm3	0.0464 @		0.0457 @		0.0266
boiler outlet gas, vapor phase	Chloride	CLIFWN00	mg/Nm3	0.841		1.11		1.51
condensate water	Chloride	CLIFWN00	mg/L				< 0.0120	
limestone	Chloride	CLPMSN00	mg/kg	< 100.0				
PJFF inlet gas, particulate	Chloride	CLIFWN00	mg/kg	< 68.1		< 68.2		< 45.7
PJFF inlet gas, solid phase	Chloride	CLIFWN00	mg/Nm3	< 0.00117		< 0.00143		< 0.00159
PJFF inlet gas, vapor phase	Chloride	CLIFWN00	mg/Nm3	1.85		1.10		1.28
PJFF outlet gas, particulate	Chloride	CLIFWN00	mg/kg	< 222		< 923		< 520
PJFF outlet gas, solid phase	Chloride	CLIFWN00	mg/Nm3	< 0.000283		< 0.000592		< 0.000586
PJFF outlet gas, vapor phase	Chloride	CLIFWN00	mg/Nm3	0.877		1.01		2.64
fuel oil	Chlorine	NAA	ug/g	12.0	18.1	14.6	15.4	15.8
boiler outlet gas, particulate	Chromium	ICPSSNFC	mg/kg		191		184	178
boiler outlet gas, solid phase	Chromium	ICPSSNFC	mg/Nm3		0.00868		0.0110	0.00946
boiler outlet gas, vapor phase	Chromium	ICPSWNFC	mg/Nm3		< 0.00468 R		< 0.00417 R	< 0.00450 R
condensate water	Chromium	ICPSWNFC	mg/L		< 0.01000		< 0.01000	
fuel oil	Chromium	NAA	ug/g	0.260	0.328	0.419	1.02	1.43
limestone	Chromium	ICPSSNFC	mg/kg	< 10.00				
PJFF inlet gas, particulate	Chromium	ICPSSNFC	mg/kg		230		176	166
PJFF inlet gas, solid phase	Chromium	ICPSSNFC	mg/Nm3		0.00672		0.00769	0.00803
PJFF inlet gas, vapor phase	Chromium	ICPSWNFC	mg/Nm3		< 0.00372 R		< 0.00228	< 0.00170
PJFF out gas, particulate (impactor)	Chromium	SW6010	mg/kg	2640 R				
PJFF out gas, solid phase (impactor)	Chromium	SW6010	mg/Nm3	0.00158 R				
PJFF outlet gas, particulate (M5)	Chromium	ICPSSNFC	mg/kg		< 233		< 263	< 230
PJFF outlet gas, solid phase (M5)	Chromium	ICPSSNFC	mg/Nm3		< 0.000976		< 0.00103	< 0.00101
PJFF outlet gas, vapor phase	Chromium	ICPSWNFC	mg/Nm3		< 0.00166 R		< 0.00217 R	< 0.00209 R
boiler outlet gas, solid phase	Chrysene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Chrysene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Chrysene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Chrysene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Chrysene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Chrysene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Cobalt	ICPSSNFC	mg/kg		1979		2165	1938
boiler outlet gas, solid phase	Cobalt	ICPSSNFC	mg/Nm3		0.0897		0.130	0.103
boiler outlet gas, vapor phase	Cobalt	ICPSWNFC	mg/Nm3		< 0.00282 R		< 0.00417 R	< 0.00450
condensate water	Cobalt	ICPSWNFC	mg/L		< 0.01000		< 0.01000	

PRELIMINARY DO NOT CITE OR QUOTE

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
fuel oil	Cobalt	NAA	ug/g	2.23	2.28	2.19	2.28	2.30
limestone	Cobalt	NAA	ug/g				0.378	
PJFF inlet gas, particulate	Cobalt	ICPSSNFC	mg/kg		2591		2052	1907
PJFF inlet gas, solid phase	Cobalt	ICPSSNFC	mg/Nm3		0.0759		0.0897	0.0921
PJFF inlet gas, vapor phase	Cobalt	ICPSWNFC	mg/Nm3		< 0.00372 R		< 0.00145	< 0.00170
PJFF out gas, particulate (impactor)	Cobalt	SW6010	mg/kg	< 80.6 R				
PJFF out gas, solid phase (impactor)	Cobalt	SW6010	mg/Nm3	< 0.0000484 R				
PJFF outlet gas, particulate (M5)	Cobalt	ICPSSNFC	mg/kg		< 233		< 263	< 115
PJFF outlet gas, solid phase (M5)	Cobalt	ICPSSNFC	mg/Nm3		< 0.000976		< 0.00103	< 0.000504
PJFF outlet gas, vapor phase	Cobalt	ICPSWNFC	mg/Nm3		< 0.00166 R		< 0.00372 R	< 0.00356 R
boiler outlet gas, particulate	Copper	ICPSSNFC	mg/kg		305 @		234	248
boiler outlet gas, solid phase	Copper	ICPSSNFC	mg/Nm3		0.0138 @		0.0140	0.0132
boiler outlet gas, vapor phase	Copper	ICPSWNFC	mg/Nm3		< 0.00563		0.0102 @	< 0.00532
condensate water	Copper	ICPSWNFC	mg/L		< 0.0200		< 0.0200	
fuel oil	Copper	NAA	ug/g	12.6	9.35	8.77	6.99	9.24
limestone	Copper	ICPSSNFC	mg/kg	< 20.0				
PJFF inlet gas, particulate	Copper	ICPSSNFC	mg/kg		261 @		212 @	195 @
PJFF inlet gas, solid phase	Copper	ICPSSNFC	mg/Nm3		0.00764 @		0.00927 @	0.00939 @
PJFF inlet gas, vapor phase	Copper	ICPSWNFC	mg/Nm3		< 0.00743		< 0.00457	< 0.00339
PJFF out gas, particulate (impactor)	Copper	SW6010	mg/kg	293 @R				
PJFF out gas, solid phase (impactor)	Copper	SW6010	mg/Nm3	0.000176 @R				
PJFF outlet gas, particulate (M5)	Copper	ICPSSNFC	mg/kg		< 465		< 526	< 460
PJFF outlet gas, solid phase (M5)	Copper	ICPSSNFC	mg/Nm3		< 0.00195		< 0.00205	< 0.00202
PJFF outlet gas, vapor phase	Copper	ICPSWNFC	mg/Nm3		< 0.00333		< 0.00435	< 0.00417
boiler outlet gas, solid phase	Dibenzofuran	627SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Dibenzofuran	627SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Dibenzofuran	627SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Dibenzofuran	627SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Dibenzofuran	627SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Dibenzofuran	627SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Dibenz(a,h)anthracene	627SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Dibenz(a,h)anthracene	627SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Dibenz(a,h)anthracene	627SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Dibenz(a,h)anthracene	627SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Dibenz(a,h)anthracene	627SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Dibenz(a,h)anthracene	627SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Dibenz(a,j)acridine	627SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Dibenz(a,j)acridine	627SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Dibenz(a,j)acridine	627SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Dibenz(a,j)acridine	627SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Dibenz(a,j)acridine	627SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Dibenz(a,j)acridine	627SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, solid phase	Diphenylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Diphenylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Diphenylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Diphenylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Diphenylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Diphenylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Fluoranthene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Fluoranthene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Fluoranthene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Fluoranthene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Fluoranthene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Fluoranthene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Fluorene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Fluorene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Fluorene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Fluorene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Fluorene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Fluorene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Fluoride	F_SEWS00	mg/kg					< 297
boiler outlet gas, solid phase	Fluoride	F_SEWS00	mg/Nm3					< 0.00754
boiler outlet gas, vapor phase	Fluoride	SIE	mg/Nm3	0.0822 @R		0.0252 @R		0.0340 @R
condensate water	Fluoride	F_SEWA00	mg/L				< 0.1000	
limestone	Fluoride	F_SFSN00	mg/kg	10.7 @				
PJFF inlet gas, particulate	Fluoride	F_SEWS00	mg/kg			300 @		< 190
PJFF inlet gas, solid phase	Fluoride	F_SEWS00	mg/Nm3			0.00630 @		< 0.00661
PJFF inlet gas, vapor phase	Fluoride	SIE	mg/Nm3	0.0394 @R		0.0248 @R		0.0278 @R
PJFF outlet gas, particulate	Fluoride	F_SEWS00	mg/kg	1135 @				< 2280
PJFF outlet gas, solid phase	Fluoride	F_SEWS00	mg/Nm3	0.00145 @				< 0.00257
PJFF outlet gas, vapor phase	Fluoride	SIE	mg/Nm3	0.0378 @R		0.0335 @R		0.0235 @R
fuel oil	Fluorine	elemental	mg/kg	12.0	6.00	8.00	11.0	7.00
boiler outlet gas, vapor phase	Formaldehyde	ALDELKAS	mg/Nm3		< 0.00886 R	< 0.00904 R		0.0103 @R
PJFF inlet gas, vapor phase	Formaldehyde	ALDELKAS	mg/Nm3		0.0328 R	2.02 R		0.0357 @R
PJFF outlet gas, vapor phase	Formaldehyde	ALDELKAS	mg/Nm3		0.0301 @R	0.0276 @R		0.0418 R
fuel oil	Heating value	D240	Btu/lb	19029	19032	19046	18980	18973
fuel oil	Hydrogen	ultimate	%wt	11.5	11.2	11.2	11.1	11.0
boiler outlet gas, solid phase	Indeno(1,2,3-cd)pyrene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Indeno(1,2,3-cd)pyrene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Indeno(1,2,3-cd)pyrene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Indeno(1,2,3-cd)pyrene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Indeno(1,2,3-cd)pyrene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Indeno(1,2,3-cd)pyrene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Iron	ICPSSNFC	mg/kg		20167		19934	18396

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, solid phase	Iron	ICPSSNFC	mg/Nm3		0.915		1.20	0.978
boiler outlet gas, vapor phase	Iron	ICPSWNFC	mg/Nm3		0.0283 @R		0.122 R	< 0.0180 R
condensate water	Iron	ICPSWNFC	mg/L		< 0.0400		0.327	
fuel oil	Iron	NAA	ug/g	14.9	17.1	31.5	26.6	25.0
limestone	Iron	ICPSSNFC	mg/kg	528				
PJFF inlet gas, particulate	Iron	ICPSSNFC	mg/kg		24171		21049	20061
PJFF inlet gas, solid phase	Iron	ICPSSNFC	mg/Nm3		0.708		0.920	0.968
PJFF inlet gas, vapor phase	Iron	ICPSWNFC	mg/Nm3		0.0286 @R		< 0.0149 R	< 0.0164 R
PJFF out gas, particulate (impactor)	Iron	SW6010	mg/kg	16065 R				
PJFF out gas, solid phase (impactor)	Iron	SW6010	mg/Nm3	0.00964 R				
PJFF outlet gas, particulate (M5)	Iron	ICPSSNFC	mg/kg		22779		4245 @	942 @
PJFF outlet gas, solid phase (M5)	Iron	ICPSSNFC	mg/Nm3		0.0956		0.0166 @	0.00413 @
PJFF outlet gas, vapor phase	Iron	ICPSWNFC	mg/Nm3		0.0193 @R		< 0.0149 R	< 0.0142 R
boiler outlet gas, particulate	Lead	PBGSSA00	mg/kg		178		188	130
boiler outlet gas, solid phase	Lead	PBGSSA00	mg/Nm3		0.00807		0.0113	0.00690
boiler outlet gas, vapor phase	Lead	PBGSWA00	mg/Nm3		< 0.00140		< 0.00125	< 0.00135
condensate water	Lead	PBGSWA00	mg/L		0.00880 @		0.00440 @	
fuel oil	Lead	GFAA	ug/g	< 0.1000	0.520	1.28	19.5	1.40
limestone	Lead	PBGSSA00	mg/kg	< 3.00				
PJFF inlet gas, particulate	Lead	PBGSSA00	mg/kg		212		97.6	134
PJFF inlet gas, solid phase	Lead	PBGSSA00	mg/Nm3		0.00622		0.00426	0.00645
PJFF inlet gas, vapor phase	Lead	PBGSWA00	mg/Nm3		< 0.00111		< 0.00112	< 0.00123
PJFF out gas, particulate (impactor)	Lead	SW7421	mg/kg	40.3 @R				
PJFF out gas, solid phase (impactor)	Lead	SW7421	mg/Nm3	0.0000242 @R				
PJFF outlet gas, particulate (M5)	Lead	PBGSSA00	mg/kg		< 69.8		< 78.9	< 69.0
PJFF outlet gas, solid phase (M5)	Lead	PBGSSA00	mg/Nm3		< 0.000293		< 0.000308	< 0.000302
PJFF outlet gas, vapor phase	Lead	PBGSWA00	mg/Nm3		< 0.000951 R		< 0.00112	< 0.00107
limestone	LOI @ 1000C	XRF	wt%	45.7				
boiler outlet gas, particulate	Magnesium	ICPSSNFC	mg/kg		< 3053		< 2049	< 2275
boiler outlet gas, solid phase	Magnesium	ICPSSNFC	mg/Nm3		< 0.138		< 0.123	< 0.121
boiler outlet gas, vapor phase	Magnesium	ICPSWNFC	mg/Nm3		< 0.468		< 0.253 R	< 0.450
condensate water	Magnesium	ICPSWNFC	mg/L		< 1.000		< 1.000	
fuel oil	Magnesium	NAA	ug/g	< 7.90	7.63	< 6.31	< 6.99	< 8.38
limestone	Magnesium	ICPSSNFC	mg/kg	99700				
PJFF inlet gas, particulate	Magnesium	ICPSSNFC	mg/kg		< 3546		< 2466	< 2278
PJFF inlet gas, solid phase	Magnesium	ICPSSNFC	mg/Nm3		< 0.104		< 0.108	< 0.110
PJFF inlet gas, vapor phase	Magnesium	ICPSWNFC	mg/Nm3		< 0.372 R		< 0.228	< 0.410
PJFF out gas, particulate (impactor)	Magnesium	SW6010	mg/kg	< 8065 R				
PJFF out gas, solid phase (impactor)	Magnesium	SW6010	mg/Nm3	< 0.00484 R				
PJFF outlet gas, particulate (M5)	Magnesium	ICPSSNFC	mg/kg		< 23256		< 26316	< 22989
PJFF outlet gas, solid phase (M5)	Magnesium	ICPSSNFC	mg/Nm3		< 0.0976		< 0.103	< 0.101
PJFF outlet gas, vapor phase	Magnesium	ICPSWNFC	mg/Nm3		< 0.317 R		< 0.217	< 0.356

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, particulate	Manganese	ICPSSNFC	mg/kg		170		152	162
boiler outlet gas, solid phase	Manganese	ICPSSNFC	mg/Nm3		0.00773		0.00910	0.00861
boiler outlet gas, vapor phase	Manganese	ICPSWNFC	mg/Nm3		< 0.00468 R		< 0.00417 R	< 0.00450 R
condensate water	Manganese	ICPSWNFC	mg/L		< 0.01000		< 0.01000	
fuel oil	Manganese	NAA	ug/g	0.157	0.0952	0.0976	0.0954	0.128
limestone	Manganese	ICPSSNFC	mg/kg	31.5 @				
PJFF inlet gas, particulate	Manganese	ICPSSNFC	mg/kg		184		143	143
PJFF inlet gas, solid phase	Manganese	ICPSSNFC	mg/Nm3		0.00539		0.00623	0.00692
PJFF inlet gas, vapor phase	Manganese	ICPSWNFC	mg/Nm3		< 0.00372 R		< 0.00374 R	< 0.00410 R
PJFF out gas, particulate (impactor)	Manganese	SW6010	mg/kg	1318 @R				
PJFF out gas, solid phase (impactor)	Manganese	SW6010	mg/Nm3	0.000791 @R				
PJFF outlet gas, particulate (M5)	Manganese	ICPSSNFC	mg/kg		304 @		< 263	< 230
PJFF outlet gas, solid phase (M5)	Manganese	ICPSSNFC	mg/Nm3		0.00128 @		< 0.00103	< 0.00101
PJFF outlet gas, vapor phase	Manganese	ICPSWNFC	mg/Nm3		< 0.00317 R		< 0.00372 R	< 0.00356 R
boiler outlet gas, HNO3 imp	Mercury	HGC_WN00	mg/Nm3		< 0.0000563		< 0.0000328 @	< 0.0000532
boiler outlet gas, MnO4 imp	Mercury	HGC_WN00	mg/Nm3		0.000120 @		0.000110 @	< 0.0000352
boiler outlet gas, particulate	Mercury	HGC_SN00	mg/kg		2.00 @		2.16	3.12
boiler outlet gas, solid phase	Mercury	HGC_SN00	mg/Nm3		0.0000909 @		0.000130	0.000166
fuel oil	Mercury	NAA	ug/g	< 0.0379	< 0.0258	< 0.0342	< 0.0326	< 0.0384
limestone	Mercury	DGAAA	ug/g	< 0.0200				
PJFF inlet gas, HNO3 imp	Mercury	HGC_WN00	mg/Nm3		0.0000440 @		< 0.0000457	< 0.0000480
PJFF inlet gas, MnO4 imp	Mercury	HGC_WN00	mg/Nm3		< 0.0000297		< 0.0000299	< 0.0000313
PJFF inlet gas, particulate	Mercury	HGC_SN00	mg/kg		2.51 @		1.51 @	1.50 @
PJFF inlet gas, solid phase	Mercury	HGC_SN00	mg/Nm3		0.0000735 @		0.0000658 @	0.0000722 @
PJFF outlet gas, HNO3 imp	Mercury	HGC_WN00	mg/Nm3		< 0.0000333		0.0000500 @	0.0000626 @
PJFF outlet gas, MnO4 imp	Mercury	HGC_WN00	mg/Nm3		< 0.0000279		< 0.0000294	< 0.0000292
PJFF outlet gas, particulate (M5)	Mercury	HGC_SN00	mg/kg		< 2.09		< 4.74	< 2.07
PJFF outlet gas, solid phase (M5)	Mercury	HGC_SN00	mg/Nm3		< 0.00000878		< 0.0000185	< 0.00000907
boiler outlet gas, particulate	Molybdenum	ICPSSNFC	mg/kg		< 153		< 102	< 114
boiler outlet gas, solid phase	Molybdenum	ICPSSNFC	mg/Nm3		< 0.00692		< 0.00615	< 0.00605
boiler outlet gas, vapor phase	Molybdenum	ICPSWNFC	mg/Nm3		< 0.0234		< 0.0208	< 0.0225
condensate water	Molybdenum	ICPSWNFC	mg/L		< 0.0500		< 0.0500	
fuel oil	Molybdenum	NAA	ug/g	< 0.251	0.166	< 0.220	< 0.209	< 0.246
limestone	Molybdenum	ICPSSNFC	mg/kg	< 50.0				
PJFF inlet gas, particulate	Molybdenum	ICPSSNFC	mg/kg		< 177		< 123	< 114
PJFF inlet gas, solid phase	Molybdenum	ICPSSNFC	mg/Nm3		< 0.00519		< 0.00539	< 0.00550
PJFF inlet gas, vapor phase	Molybdenum	ICPSWNFC	mg/Nm3		< 0.0186		< 0.0187	< 0.0205
PJFF out gas, particulate (impactor)	Molybdenum	SW6010	mg/kg	< 403 R				
PJFF out gas, solid phase (impactor)	Molybdenum	SW6010	mg/Nm3	< 0.000242 R				
PJFF outlet gas, particulate (M5)	Molybdenum	ICPSSNFC	mg/kg		< 1163		< 1316	< 1149
PJFF outlet gas, solid phase (M5)	Molybdenum	ICPSSNFC	mg/Nm3		< 0.00488		< 0.00514	< 0.00504
PJFF outlet gas, vapor phase	Molybdenum	ICPSWNFC	mg/Nm3		< 0.0159		< 0.0186	< 0.0178

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, solid phase	Naphthalene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Naphthalene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Naphthalene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Naphthalene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Naphthalene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Naphthalene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Nickel	ICPSSNFC	mg/kg		37846		37151	36472
boiler outlet gas, solid phase	Nickel	ICPSSNFC	mg/Nm3		1.72		2.23	1.94
boiler outlet gas, vapor phase	Nickel	ICPSWNFC	mg/Nm3		< 0.00938 R		0.0480 R	< 0.00532 R
condensate water	Nickel	ICPSWNFC	mg/L		< 0.0200		< 0.0200	
fuel oil	Nickel	NAA	ug/g	39.4	43.5	36.5	38.0	37.4
limestone	Nickel	ICPSSNFC	mg/kg	< 20.0				
PJFF inlet gas, particulate	Nickel	ICPSSNFC	mg/kg		48775		39247	35819
PJFF inlet gas, solid phase	Nickel	ICPSSNFC	mg/Nm3		1.43		1.72	1.73
PJFF inlet gas, vapor phase	Nickel	ICPSWNFC	mg/Nm3		< 0.00743 R		< 0.00747	< 0.00819 R
PJFF out gas, particulate (impactor)	Nickel	SW6010	mg/kg	2448 R				
PJFF out gas, solid phase (impactor)	Nickel	SW6010	mg/Nm3	0.00147 R				
PJFF outlet gas, particulate (M5)	Nickel	ICPSSNFC	mg/kg		< 465		< 526	< 460
PJFF outlet gas, solid phase (M5)	Nickel	ICPSSNFC	mg/Nm3		< 0.00195		< 0.00205	< 0.00202
PJFF outlet gas, vapor phase	Nickel	ICPSWNFC	mg/Nm3		< 0.00634		< 0.00435	< 0.00294
fuel oil	Nitrogen	ultimate	%wt	0.290	0.330	0.260	0.320	0.260
boiler outlet gas, solid phase	N-Nitrosodiphenylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	N-Nitrosodiphenylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	N-Nitrosodiphenylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	N-Nitrosodiphenylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	N-Nitrosodiphenylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	N-Nitrosodiphenylamine	627SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
fuel oil	Oxygen	ultimate	%wt	0.600	1.17	1.53	1.55	1.76
boiler outlet gas, solid phase	Phenanthrene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Phenanthrene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Phenanthrene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Phenanthrene	827S9NT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Phenanthrene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Phenanthrene	627SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Phosphate	PO4FWN00	mg/kg	< 7887		< 6739	< 4762	
boiler outlet gas, solid phase	Phosphate	PO4FWN00	mg/Nm3	< 0.111		< 0.128	< 0.121	
condensate water	Phosphate	PO4FWN00	mg/L				< 0.800	
PJFF inlet gas, particulate	Phosphate	PO4FWN00	mg/kg	< 4539		< 4471	< 3097	
PJFF inlet gas, solid phase	Phosphate	PO4FWN00	mg/Nm3	< 0.0782		< 0.0937	< 0.107	
PJFF outlet gas, particulate (M5)	Phosphate	PO4FWN00	mg/kg	< 15556		< 200308	< 35200	
PJFF outlet gas, solid phase (M5)	Phosphate	PO4FWN00	mg/Nm3	< 0.0198		< 0.128	< 0.0397	
boiler outlet gas, vapor phase	Phosphorus	P_ESWN00	mg/Nm3	< 0.123		< 0.134	< 0.149	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
fuel oil	Phosphorus	elemental	mg/kg	0.360	0.480	0.460	0.450	0.440
limestone	Phosphorus	D4326	mg/kg	118				
PJFF inlet gas, vapor phase	Phosphorus	P_ESWN00	mg/Nm3	< 0.118		< 0.122	< 0.123	
PJFF out gas, particulate (impactor)	Phosphorus	SW6010	mg/kg	7685 @				
PJFF out gas, solid phase (impactor)	Phosphorus	SW6010	mg/Nm3	0.00461 @				
PJFF outlet gas, vapor phase	Phosphorus	P_ESWN00	mg/Nm3	< 0.110		< 0.110	< 0.104	
boiler outlet gas, solid phase	Pyrene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Pyrene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
PJFF inlet gas, solid phase	Pyrene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Pyrene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Pyrene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Pyrene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Selenium	SEHRSN00	mg/kg		< 15.3		< 10.2	< 11.4
boiler outlet gas, solid phase	Selenium	SEHRSN00	mg/Nm3		< 0.000692		< 0.000615	< 0.000605
boiler outlet gas, vapor phase	Selenium	SEHRSN00	mg/Nm3		< 0.00141		< 0.00126	< 0.00133
condensate water	Selenium	SEHRWN00	mg/L		< 0.00500		< 0.00500	
fuel oil	Selenium	NAA	ug/g	< 0.0784	< 0.0837	< 0.0811	< 0.0721	< 0.0896
limestone	Selenium	SEHRSN00	mg/kg	< 5.40				
PJFF inlet gas, particulate	Selenium	SEHRSN00	mg/kg		< 17.7		< 12.3	< 11.4
PJFF inlet gas, solid phase	Selenium	SEHRSN00	mg/Nm3		< 0.000519		< 0.000539	< 0.000550
PJFF inlet gas, vapor phase	Selenium	SEHRSN00	mg/Nm3		< 0.00104		< 0.00114	< 0.00120
PJFF out gas, particulate (impactor)	Selenium	SW7740	mg/kg	< 40.3 R				
PJFF out gas, solid phase (impactor)	Selenium	SW7740	mg/Nm3	< 0.0000242 R				
PJFF outlet gas, particulate (M5)	Selenium	SEHRSN00	mg/kg		< 116		< 132	< 115
PJFF outlet gas, solid phase (M5)	Selenium	SEHRSN00	mg/Nm3		< 0.000488		< 0.000514	< 0.000504
PJFF outlet gas, vapor phase	Selenium	SEHRSN00	mg/Nm3		< 0.000832		< 0.00109	< 0.00104
fuel oil	Specific Gravity	D287	ug/g	0.938	0.943	0.936	0.947	0.946
boiler outlet gas, particulate	Sulfate	SF_FWN00	mg/kg	1118583		720155		626840
boiler outlet gas, solid phase	Sulfate	SF_FWN00	mg/Nm3	16.2		13.7		15.9
boiler outlet gas, vapor phase	Sulfate	SFIFWN00	mg/Nm3	626		695		835
condensate water	Sulfate	SFIFWN00	mg/L				< 0.0340	
PJFF inlet gas, particulate	Sulfate	SF_FWN00	mg/kg	523730		469647		245723
PJFF inlet gas, solid phase	Sulfate	SF_FWN00	mg/Nm3	9.02		9.84		8.53
PJFF inlet gas, vapor phase	Sulfate	SFIFWN00	mg/Nm3	595		575		744
PJFF outlet gas, particulate	Sulfate	SF_FWN00	mg/kg	748148		511892		1232000
PJFF outlet gas, solid phase	Sulfate	SF_FWN00	mg/Nm3	0.954		0.328		1.39
PJFF outlet gas, vapor phase	Sulfate	SFIFWN00	mg/Nm3	548		596		621
fuel oil	Sulfur	ultimate	%wt	0.300		0.290	0.300	0.250
limestone	Sulfur	TTSRSN00	Percent	0.00750 @				
boiler outlet gas, 20-L VOST	Toluene	GCMS	mg/Nm3			0.00254	0.00163	
boiler outlet gas, 5-L VOST	Toluene	GCMS	mg/Nm3		0.00261			
PJFF inlet gas, 20-L VOST	Toluene	GCMS	mg/Nm3		0.00136	0.00212	0.000945	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF outlet gas, 20-L VOST	Toluene	GCMS	mg/Nm3		0.00163	0.00380	0.00208	
boiler outlet gas, particulate	Vanadium	ICPSSNFC	mg/kg		7081		7171	7097
boiler outlet gas, solid phase	Vanadium	ICPSSNFC	mg/Nm3		0.321		0.431	0.377
boiler outlet gas, vapor phase	Vanadium	ICPSWNFC	mg/Nm3		< 0.00563		< 0.00834	< 0.00368
condensate water	Vanadium	ICPSWNFC	mg/L		< 0.0200		< 0.0200	
fuel oil	Vanadium	NAA	ug/g	5.20	6.21	5.68	5.91	6.82
limestone	Vanadium	ICPSSNFC	mg/kg	< 20.0				
PJFF inlet gas, particulate	Vanadium	ICPSSNFC	mg/kg		8814		7416	7003
PJFF inlet gas, solid phase	Vanadium	ICPSSNFC	mg/Nm3		0.258		0.324	0.338
PJFF inlet gas, vapor phase	Vanadium	ICPSWNFC	mg/Nm3		< 0.00743		< 0.00290	< 0.00339
PJFF out gas, particulate (impactor)	Vanadium	SW6010	mg/kg	< 161 R				
PJFF out gas, solid phase (impactor)	Vanadium	SW6010	mg/Nm3	< 0.0000968 R				
PJFF outlet gas, particulate (M5)	Vanadium	ICPSSNFC	mg/kg		< 465		< 526	< 460
PJFF outlet gas, solid phase (M5)	Vanadium	ICPSSNFC	mg/Nm3		< 0.00195		< 0.00205	< 0.00202
PJFF outlet gas, vapor phase	Vanadium	ICPSWNFC	mg/Nm3		< 0.00333		< 0.00743	< 0.00417

Cited name	Substance	Method	UOM	Sample 1	Sample 2	Sample 3
collected fly ash	Aluminum	ICPSSNFC	mg/kg	22800	25600	23400
collected fly ash	Arsenic	ASGSSA00	mg/kg	127	132	133
collected fly ash	Barium	ICPSSNFC	mg/kg	481	478	514
collected fly ash	Beryllium	ICPSSNFC	mg/kg	< 2.00	< 2.00	< 2.00
collected fly ash	Cadmium	CDGSSA00	mg/kg	< 1.000	< 1.000	< 1.000
collected fly ash	Calcium	ICPSSNFC	mg/kg	34500 @	27000 @	31000 @
collected fly ash	Chloride	CLPMSN00	mg/kg	< 100.0	< 100.0	< 100.0
collected fly ash	Chromium	ICPSSNFC	mg/kg	196	204	203
collected fly ash	Cobalt	ICPSSNFC	mg/kg	2550	2680	2640
collected fly ash	Copper	ICPSSNFC	mg/kg	279	284	289
collected fly ash	Fluoride	F_SFSN00	mg/kg	11.4 @	19.0 @	13.8 @
collected fly ash	Iron	ICPSSNFC	mg/kg	34200	34900	36300
collected fly ash	Lead	PBGSSA00	mg/kg	163	161	165
collected fly ash	Magnesium	ICPSSNFC	mg/kg	15200	12000	13700
collected fly ash	Manganese	ICPSSNFC	mg/kg	213	212	220
collected fly ash	Mercury	DGAAA	ug/g	0.0200	0.0200	0.0200
collected fly ash	Molybdenum	ICPSSNFC	mg/kg	127 @	106 @	106 @
collected fly ash	Nickel	ICPSSNFC	mg/kg	41000	42900	42200
collected fly ash	Phosphorus	D4328	mg/kg	921	839	960
collected fly ash	Selenium	SEHRSN00	mg/kg	5.53 @	5.81 @	5.37 @
collected fly ash	Sulfur	TTSRSN00	Percent	9.18	9.18	9.05
collected fly ash	Vanadium	ICPSSNFC	mg/kg	6680	6970	7050

A single collected fly ash (PJFF ash) sample was split into three fractions prior to analysis.

Key to Data Flags

Flag	Description
@	Less than five times the reporting limit.
E	Estimated analyte result greater than calibration range.
NA	Not analyzed.
R	Reported in blank, corrected in sample result.
<	Less than the reporting limit.

Methods Key

Method Code	Method Description
824SWNT1	Gas Chromatography/Mass Spectroscopy
827SSNT1	Gas Chromatography/Mass Spectroscopy
827SWNT1	Gas Chromatography/Mass Spectroscopy
AGESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
ALDELKAS	High Performance Liquid Chromatography
ALESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
ASGSSAOO	Graphite Furnace Atomic Absorption Spectrophotometry
ASHRWAOO	Hydride Generation Atomic Absorption Spectrophotometry
BAESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
BEESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
B_ESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
CAESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
CDGSSAOO	Graphite Furnace Atomic Absorption Spectrophotometry
CDGSWAOO	Graphite Furnace Atomic Absorption Spectrophotometry
CDGSWOOO	Graphite Furnace Atomic Absorption Spectrophotometry
CLIESNOO	Ion Chromatography
CLIFWNOO	Ion Chromatography
COESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
CRESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
CUESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
D2361	Parr Bomb Digestion/Potentiometric Titration
D2795	Parr Bomb Digestion/Visible Spectrophotometry
D3302	Oven Drying
D3761	Parr Bomb Digestion/Ion Selective Electrode
D4326	X-ray Fluorescence

Method Code	Method Description
FEESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
F_SESAOO	Ion Specific Electrode
GFAA	Graphite Furnace Atomic Absorption Spectrophotometry
HGAA	Hydride Generation Atomic Absorption Spectrophotometry
HGC_SNOO	Cold Vapor Atomic Absorption Spectrophotometry
HGC_WNOO	Cold Vapor Atomic Absorption Spectrophotometry
HHV	Adiabatic Bomb Calorimetry
HPLC	High Performance Liquid Chromatography
I39RWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
IC	Ion Chromatography
ICP	Inductively Coupled Argon Plasma Emission Spectrophotometry
ICPSSNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
ICPSWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
K_ESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
MGESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
MNESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
MOESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
NAA	Neutron Activation Analysis
NAESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
NIESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
NaOH FUS	Sodium Hydroxide Fusion/Ion Chromatography
PBGSSAOO	Graphite Furnace Atomic Absorption Spectrophotometry
PBGSWAOO	Graphite Furnace Atomic Absorption Spectrophotometry
PBGSWOOO	Graphite Furnace Atomic Absorption Spectrophotometry
P_ESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry

Method Code	Method Description
PROXIMAT	Oven Drying, Oven Heating, Ignition
SEHRSNOO	Hydride Generation Atomic Absorption Spectrophotometry
SEHRWNOO	Hydride Generation Atomic Absorption Spectrophotometry
SFIFWNOO	Ion Chromatography
SIESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
SNESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
SRESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
S_ESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
TIESSNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
TIESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
TPOESJ	Visible Spectrophotometry
TPOEWJ	Visible Spectrophotometry
TPORSNOO	Visible Spectrophotometry
TTSRSNOO	Leco Total Sulfur Analysis
ULTIMATE	Combustion/Gas Absorption, Digestion/Titration, Ignition
VSTSAOT2	Gas Chromatography/Mass Spectroscopy
V_ESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
ZNESWNOO	Inductively Coupled Argon Plasma Emission Spectrophotometry
AC DISS	Acid Dissolution/Ion Chromatography
AQ	Ion Specific Electrode
IMP	Ion Specific Electrode
OVEN DRY	Oven Drying

Appendix C

Baseline Data Not Used In Calculations

PRELIMINARY

DO NOT CITE OR QUOTE

11-Feb-93 Site 13 Baseline Data NOT Used in Calculations 1

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, 1-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3			0.00244	0.0387 E	
boiler outlet gas, 5-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3		0.0123	0.00331	0.0190	
PJFF inlet gas, 1-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3		0.0608	0.0213	< 0.0110	
PJFF inlet gas, 20-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3		0.0272 E	0.00175	0.0161	
PJFF inlet gas, 5-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3		0.0938 E	0.00618	< 0.00217	
PJFF outlet gas, 1-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3		0.108	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3		0.0331	0.0162	0.0373 E	
PJFF outlet gas, 5-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3		0.0832 E	0.00470	0.0161	
boiler outlet gas, 1-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3			< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3			< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	

DO NOT CITE OR QUOTE

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF inlet gas, 5-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3			< 0.00207	< 0.00206	
boiler outlet gas, solid phase	1,2-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	1,2-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	1,2-Dichlorobenzene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, 1-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF inlet gas, solid phase	1,2-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	1,2-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, 1-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
PJFF outlet gas, solid phase	1,2-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	1,2-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, 1-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, solid phase	1,2-Diphenylhydrazine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	1,2-Diphenylhydrazine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	1,2-Diphenylhydrazine	827SSNT1	ug/g	< 0.330				

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF inlet gas, solid phase	1,2-Diphenylhydrazine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	1,2-Diphenylhydrazine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	1,2-Diphenylhydrazine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	1,2-Diphenylhydrazine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	1,2,4-Trichlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	1,2,4-Trichlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	1,2,4-Trichlorobenzene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	1,2,4-Trichlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	1,2,4-Trichlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	1,2,4-Trichlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	1,2,4-Trichlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	1,2,4,5-Tetrachlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	1,2,4,5-Tetrachlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	1,2,4,5-Tetrachlorobenzene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	1,2,4,5-Tetrachlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	1,2,4,5-Tetrachlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	1,2,4,5-Tetrachlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	1,2,4,5-Tetrachlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, 1-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3			< 0.00207	< 0.00206	
boiler outlet gas, solid phase	1,3-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	1,3-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	1,3-Dichlorobenzene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, 1-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF inlet gas, solid phase	1,3-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	1,3-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, 1-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
PJFF outlet gas, solid phase	1,3-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	1,3-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, 1-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3			< 0.00207	< 0.00206	
boiler outlet gas, solid phase	1,4-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	1,4-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	1,4-Dichlorobenzene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, 1-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	

DO NOT CITE OR QUOTE

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF inlet gas, 20-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF inlet gas, solid phase	1,4-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	1,4-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, 1-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
PJFF outlet gas, solid phase	1,4-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	1,4-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, 1-L VOST	2-Butanone	GCMS	mg/Nm3		< 0.100	< 0.103		
boiler outlet gas, 20-L VOST	2-Butanone	GCMS	mg/Nm3			< 0.00508	< 0.00510	
boiler outlet gas, 5-L VOST	2-Butanone	GCMS	mg/Nm3		< 0.0201	< 0.0207	< 0.0206	
PJFF inlet gas, 1-L VOST	2-Butanone	GCMS	mg/Nm3		< 0.0950	< 0.106	< 0.110	
PJFF inlet gas, 20-L VOST	2-Butanone	GCMS	mg/Nm3		< 0.00523	< 0.00530	< 0.00556	
PJFF inlet gas, 5-L VOST	2-Butanone	GCMS	mg/Nm3		< 0.0208	< 0.0213	< 0.0217	
PJFF outlet gas, 1-L VOST	2-Butanone	GCMS	mg/Nm3		< 0.0985	< 0.102	< 0.103	
PJFF outlet gas, 20-L VOST	2-Butanone	GCMS	mg/Nm3		< 0.00494	< 0.00507	0.00586	
PJFF outlet gas, 5-L VOST	2-Butanone	GCMS	mg/Nm3		< 0.0198	< 0.0204	< 0.0209	
boiler outlet gas, solid phase	2-Chlorophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2-Chlorophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2-Chlorophenol	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2-Chlorophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2-Chlorophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2-Chlorophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2-Chlorophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, 1-L VOST	2-Hexanone	GCMS	mg/Nm3		< 0.100	< 0.103		
boiler outlet gas, 20-L VOST	2-Hexanone	GCMS	mg/Nm3			< 0.00508	< 0.00510	
boiler outlet gas, 5-L VOST	2-Hexanone	GCMS	mg/Nm3			< 0.0207	< 0.0206	
PJFF inlet gas, 1-L VOST	2-Hexanone	GCMS	mg/Nm3		< 0.0950	< 0.106	< 0.110	
PJFF inlet gas, 20-L VOST	2-Hexanone	GCMS	mg/Nm3		< 0.00523	< 0.00530	< 0.00556	
PJFF inlet gas, 5-L VOST	2-Hexanone	GCMS	mg/Nm3		< 0.0208	< 0.0213	< 0.0217	
PJFF outlet gas, 1-L VOST	2-Hexanone	GCMS	mg/Nm3		< 0.0985	< 0.102	< 0.103	
PJFF outlet gas, 20-L VOST	2-Hexanone	GCMS	mg/Nm3		< 0.00494	< 0.00507	< 0.00532	
PJFF outlet gas, 5-L VOST	2-Hexanone	GCMS	mg/Nm3		< 0.0198	< 0.0204	< 0.0209	
boiler outlet gas, solid phase	2-Methylphenol(o-cresol)	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2-Methylphenol(o-cresol)	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2-Methylphenol(o-cresol)	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2-Methylphenol(o-cresol)	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2-Methylphenol(o-cresol)	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2-Methylphenol(o-cresol)	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2-Methylphenol(o-cresol)	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, solid phase	2-Nitroaniline	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
boiler outlet gas, vapor phase	2-Nitroaniline	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
collected fly ash	2-Nitroaniline	827SSNT1	ug/g	< 1.60				
PJFF inlet gas, solid phase	2-Nitroaniline	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF inlet gas, vapor phase	2-Nitroaniline	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF outlet gas, solid phase	2-Nitroaniline	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
PJFF outlet gas, vapor phase	2-Nitroaniline	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
boiler outlet gas, solid phase	2-Nitrophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2-Nitrophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2-Nitrophenol	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2-Nitrophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2-Nitrophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2-Nitrophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2-Nitrophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2-Picoline	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2-Picoline	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2-Picoline	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2-Picoline	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2-Picoline	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2-Picoline	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2-Picoline	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2,3,4,6-Tetrachlorophenol	827SSNT1	mg/Nm3	< 0.0138	< 0.0138	< 0.0127	< 0.0125	
boiler outlet gas, vapor phase	2,3,4,6-Tetrachlorophenol	827SSNT1	mg/Nm3	< 0.0138	< 0.0138	< 0.0127	< 0.0125	
collected fly ash	2,3,4,6-Tetrachlorophenol	827SSNT1	ug/g	< 0.660				
PJFF inlet gas, solid phase	2,3,4,6-Tetrachlorophenol	827SSNT1	mg/Nm3	< 0.0115	< 0.0107	< 0.0111	< 0.0110	
PJFF inlet gas, vapor phase	2,3,4,6-Tetrachlorophenol	827SSNT1	mg/Nm3	< 0.0115	< 0.0107	< 0.0111	< 0.0110	
PJFF outlet gas, solid phase	2,3,4,6-Tetrachlorophenol	827SSNT1	mg/Nm3	< 0.0101	< 0.0104	< 0.00996	< 0.0101	
PJFF outlet gas, vapor phase	2,3,4,6-Tetrachlorophenol	827SSNT1	mg/Nm3	< 0.0101	< 0.0104	< 0.00996	< 0.0101	
boiler outlet gas, solid phase	2,4-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2,4-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2,4-Dichlorophenol	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2,4-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2,4-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2,4-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2,4-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2,4-Dimethylphenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2,4-Dimethylphenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2,4-Dimethylphenol	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2,4-Dimethylphenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2,4-Dimethylphenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2,4-Dimethylphenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF outlet gas, vapor phase	2,4-Dimethylphenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2,4-Dinitrophenol	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
boiler outlet gas, vapor phase	2,4-Dinitrophenol	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
collected fly ash	2,4-Dinitrophenol	827SSNT1	ug/g	< 1.60				
PJFF inlet gas, solid phase	2,4-Dinitrophenol	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF inlet gas, vapor phase	2,4-Dinitrophenol	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF outlet gas, solid phase	2,4-Dinitrophenol	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
PJFF outlet gas, vapor phase	2,4-Dinitrophenol	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
boiler outlet gas, solid phase	2,4-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2,4-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2,4-Dinitrotoluene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2,4-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2,4-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2,4-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2,4-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2,4,5-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2,4,5-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2,4,5-Trichlorophenol	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2,4,5-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2,4,5-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2,4,5-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2,4,5-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2,4,6-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2,4,6-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2,4,6-Trichlorophenol	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2,4,6-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2,4,6-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2,4,6-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2,4,6-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2,6-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2,6-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2,6-Dichlorophenol	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2,6-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2,6-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	2,6-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2,6-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	2,6-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	2,6-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	2,6-Dinitrotoluene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	2,6-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	2,6-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF outlet gas, solid phase	2,6-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	2,6-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	3-Nitroaniline	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
boiler outlet gas, vapor phase	3-Nitroaniline	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
collected fly ash	3-Nitroaniline	827SSNT1	ug/g	< 1.60				
PJFF inlet gas, solid phase	3-Nitroaniline	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF inlet gas, vapor phase	3-Nitroaniline	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF outlet gas, solid phase	3-Nitroaniline	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
PJFF outlet gas, vapor phase	3-Nitroaniline	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
boiler outlet gas, solid phase	4-Chloro-3-methylphenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	4-Chloro-3-methylphenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	4-Chloro-3-methylphenol	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	4-Chloro-3-methylphenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	4-Chloro-3-methylphenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	4-Chloro-3-methylphenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	4-Chloro-3-methylphenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, 1-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3		< 0.100	< 0.103		
boiler outlet gas, 20-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3			< 0.00508	< 0.00510	
boiler outlet gas, 5-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3		< 0.0201	< 0.0207	< 0.0206	
PJFF inlet gas, 1-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3		< 0.0950	< 0.106	< 0.110	
PJFF inlet gas, 20-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3		< 0.00523	< 0.00530	< 0.00556	
PJFF inlet gas, 5-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3		< 0.0208	< 0.0213	< 0.0217	
PJFF outlet gas, 1-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3		< 0.0985	< 0.102	< 0.103	
PJFF outlet gas, 20-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3		< 0.00494	< 0.00507	< 0.00532	
PJFF outlet gas, 5-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3		< 0.0198	< 0.0204	< 0.0209	
boiler outlet gas, solid phase	4-Methylphenol(p-cresol)	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	4-Methylphenol(p-cresol)	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	4-Methylphenol(p-cresol)	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	4-Methylphenol(p-cresol)	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	4-Methylphenol(p-cresol)	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	4-Methylphenol(p-cresol)	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	4-Methylphenol(p-cresol)	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	4-Nitroaniline	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
boiler outlet gas, vapor phase	4-Nitroaniline	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
collected fly ash	4-Nitroaniline	827SSNT1	ug/g	< 1.60				
PJFF inlet gas, solid phase	4-Nitroaniline	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF inlet gas, vapor phase	4-Nitroaniline	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF outlet gas, solid phase	4-Nitroaniline	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
PJFF outlet gas, vapor phase	4-Nitroaniline	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
boiler outlet gas, solid phase	4-Nitrophenol	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
boiler outlet gas, vapor phase	4-Nitrophenol	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
collected fly ash	4-Nitrophenol	827SSNT1	ug/g	< 1.60				
PJFF inlet gas, solid phase	4-Nitrophenol	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF inlet gas, vapor phase	4-Nitrophenol	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF outlet gas, solid phase	4-Nitrophenol	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
PJFF outlet gas, vapor phase	4-Nitrophenol	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
boiler outlet gas, solid phase	4,6-Dinitro-2-methylphenol	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
boiler outlet gas, vapor phase	4,6-Dinitro-2-methylphenol	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
collected fly ash	4,6-Dinitro-2-methylphenol	827SSNT1	ug/g	< 1.60				
PJFF inlet gas, solid phase	4,6-Dinitro-2-methylphenol	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF inlet gas, vapor phase	4,6-Dinitro-2-methylphenol	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF outlet gas, solid phase	4,6-Dinitro-2-methylphenol	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
PJFF outlet gas, vapor phase	4,6-Dinitro-2-methylphenol	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
boiler outlet gas, vapor phase	Acetaldehyde	ALDELKAS	mg/Nm3		< 0.0107 R	< 0.0109 R		< 0.0110 R
PJFF inlet gas, vapor phase	Acetaldehyde	ALDELKAS	mg/Nm3		< 0.00782 R	2.55 R		< 0.00925 R
PJFF outlet gas, vapor phase	Acetaldehyde	ALDELKAS	mg/Nm3		< 0.00787 R	< 0.00852 R		< 0.00893 R
boiler outlet gas, 1-L VOST	Acetone	GCMS	mg/Nm3		< 0.100	< 0.103		
boiler outlet gas, 20-L VOST	Acetone	GCMS	mg/Nm3			< 0.00508	< 0.00510	
boiler outlet gas, 5-L VOST	Acetone	GCMS	mg/Nm3		< 0.0201	< 0.0207	< 0.0206	
PJFF inlet gas, 1-L VOST	Acetone	GCMS	mg/Nm3		< 0.0950	< 0.106	< 0.110	
PJFF inlet gas, 20-L VOST	Acetone	GCMS	mg/Nm3		< 0.00523	< 0.00530	< 0.00556	
PJFF inlet gas, 5-L VOST	Acetone	GCMS	mg/Nm3		< 0.0208	< 0.0213	< 0.0217	
PJFF outlet gas, 1-L VOST	Acetone	GCMS	mg/Nm3		< 0.0985	< 0.102	< 0.103	
PJFF outlet gas, 20-L VOST	Acetone	GCMS	mg/Nm3		< 0.00494	< 0.00507	< 0.00532	
PJFF outlet gas, 5-L VOST	Acetone	GCMS	mg/Nm3		< 0.0198	< 0.0204	< 0.0209	
boiler outlet gas, solid phase	Acetophenone	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Acetophenone	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Acetophenone	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Acetophenone	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Acetophenone	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Acetophenone	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Acetophenone	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, vapor phase	Acrolein	ALDELKAS	mg/Nm3		< 0.0129	< 0.0132		< 0.0133
PJFF inlet gas, vapor phase	Acrolein	ALDELKAS	mg/Nm3		< 0.00943	0.463		< 0.0112
PJFF outlet gas, vapor phase	Acrolein	ALDELKAS	mg/Nm3		< 0.00950	< 0.0103		< 0.0108
collected fly ash	Aluminum	D4326	mg/kg	27020	26642	25726		
collected fly ash	Aluminum	NAA	ug/g				24505	
limestone	Aluminum	D4326	mg/kg	2183				
limestone	Aluminum	NAA	ug/g				1991	
boiler outlet gas, solid phase	Aniline	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Aniline	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Aniline	827SSNT1	ug/g	< 0.330				

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF inlet gas, solid phase	Aniline	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Aniline	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Aniline	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Aniline	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, particulate	Antimony	ICPSSNFC	mg/kg		< 305		< 102	< 114
boiler outlet gas, solid phase	Antimony	ICPSSNFC	mg/Nm3		< 0.0138		< 0.00615	< 0.00605
boiler outlet gas, vapor phase	Antimony	ICPSWNFC	mg/Nm3		< 0.0468 R		< 0.0253	< 0.0266
collected fly ash	Antimony	ICPSSNFC	mg/kg	< 100.0	< 100.0	145 @		
collected fly ash	Antimony	NAA	ug/g				133	
condensate water	Antimony	ICPSWNFC	mg/L		< 0.1000		< 0.1000	
fuel oil	Antimony	NAA	ug/g	0.0461	0.332	0.181	0.519	0.392
limestone	Antimony	ICPSSNFC	mg/kg	< 100.0				
limestone	Antimony	NAA	ug/g				0.0262	
PJFF inlet gas, particulate	Antimony	ICPSSNFC	mg/kg		< 355		< 123	< 114
PJFF inlet gas, solid phase	Antimony	ICPSSNFC	mg/Nm3		< 0.0104		< 0.00539	< 0.00550
PJFF inlet gas, vapor phase	Antimony	ICPSWNFC	mg/Nm3		< 0.0209		< 0.0145	< 0.0170
PJFF out gas, particulate (impactor)	Antimony	SW6010	mg/kg	< 806				
PJFF out gas, solid phase (impactor)	Antimony	SW6010	mg/Nm3	< 0.000484				
PJFF outlet gas, particulate (M5)	Antimony	ICPSSNFC	mg/kg		< 2326		< 2632	< 2299
PJFF outlet gas, solid phase (M5)	Antimony	ICPSSNFC	mg/Nm3		< 0.00976		< 0.0103	< 0.0101
PJFF outlet gas, vapor phase	Antimony	ICPSWNFC	mg/Nm3		< 0.0166		< 0.0217	< 0.0209
collected fly ash	Arsenic	NAA	ug/g				177	
limestone	Arsenic	NAA	ug/g				1.22	
PJFF out gas, particulate (impactor)	Arsenic	SW6010	mg/kg	< 2419				
PJFF out gas, solid phase (impactor)	Arsenic	SW6010	mg/Nm3	< 0.00145 @R				
collected fly ash	Barium	D4326	mg/kg	1221	1011	1159		
collected fly ash	Barium	NAA	ug/g				< 1326	
limestone	Barium	D4326	mg/kg	< 48.6				
limestone	Barium	NAA	ug/g				98.1	
boiler outlet gas, vapor phase	Benzaldehyde	ALDELKAS	mg/Nm3		< 0.0207	< 0.0211		< 0.0213
PJFF inlet gas, vapor phase	Benzaldehyde	ALDELKAS	mg/Nm3		< 0.0151	< 0.340		< 0.0179
PJFF outlet gas, vapor phase	Benzaldehyde	ALDELKAS	mg/Nm3		< 0.0152	< 0.0165		< 0.0173
boiler outlet gas, 1-L VOST	Benzene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 5-L VOST	Benzene	GCMS	mg/Nm3			0.00227	0.00309	
PJFF inlet gas, 1-L VOST	Benzene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 5-L VOST	Benzene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Benzene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 5-L VOST	Benzene	GCMS	mg/Nm3		0.00376	0.00348	< 0.00209	
boiler outlet gas, solid phase	Benzoic acid	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
boiler outlet gas, vapor phase	Benzoic acid	827SSNT1	mg/Nm3	< 0.0346	0.149 @	0.133 @	0.106 @	
collected fly ash	Benzoic acid	827SSNT1	ug/g	< 1.60				

DO NOT CITE OR QUOTE

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF inlet gas, solid phase	Benzoic acid	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF inlet gas, vapor phase	Benzoic acid	827SSNT1	mg/Nm3	0.0296 @	0.139	0.118 @	0.148	
PJFF outlet gas, solid phase	Benzoic acid	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
PJFF outlet gas, vapor phase	Benzoic acid	827SSNT1	mg/Nm3	0.0314 @	0.0297 @	0.107 @	0.149	
boiler outlet gas, solid phase	Benzyl alcohol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Benzyl alcohol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Benzyl alcohol	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Benzyl alcohol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Benzyl alcohol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Benzyl alcohol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Benzyl alcohol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	bis(2-Chloroethoxy)methane	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	bis(2-Chloroethoxy)methane	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	bis(2-Chloroethoxy)methane	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	bis(2-Chloroethoxy)methane	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	bis(2-Chloroethoxy)methane	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	bis(2-Chloroethoxy)methane	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	bis(2-Chloroethoxy)methane	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	bis(2-Chloroethyl)ether	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	bis(2-Chloroethyl)ether	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	bis(2-Chloroethyl)ether	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	bis(2-Chloroethyl)ether	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	bis(2-Chloroethyl)ether	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	bis(2-Chloroethyl)ether	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	bis(2-Chloroethyl)ether	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	bis(2-Chloroisopropyl)ether	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	bis(2-Chloroisopropyl)ether	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	bis(2-Chloroisopropyl)ether	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	bis(2-Chloroisopropyl)ether	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	bis(2-Chloroisopropyl)ether	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	bis(2-Chloroisopropyl)ether	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	bis(2-Chloroisopropyl)ether	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	bis(2-Ethylhexyl)phthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	bis(2-Ethylhexyl)phthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	bis(2-Ethylhexyl)phthalate	827SSNT1	ug/g	0.570 @				
PJFF inlet gas, solid phase	bis(2-Ethylhexyl)phthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	0.147	0.0421	
PJFF inlet gas, vapor phase	bis(2-Ethylhexyl)phthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	bis(2-Ethylhexyl)phthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	bis(2-Ethylhexyl)phthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, vapor phase	Boron	ICPSWNFC	mg/Nm3		< 0.169		< 0.152	< 0.160
condensate water	Boron	ICPSWNFC	mg/L		< 0.600		< 0.600	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF inlet gas, vapor phase	Boron	ICPSWNFC	mg/Nm3		< 0.223		< 0.137	< 0.144
PJFF outlet gas, vapor phase	Boron	ICPSWNFC	mg/Nm3		< 0.0998		< 0.130	< 0.125
collected fly ash	Bromine	NAA	ug/g				32.1	
fuel oil	Bromine	NAA	ug/g	0.347	0.268	0.329	0.319	0.311
limestone	Bromine	NAA	ug/g				1.10	
boiler outlet gas, 1-L VOST	Bromodichloromethane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Bromodichloromethane	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Bromodichloromethane	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Bromodichloromethane	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Bromodichloromethane	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Bromodichloromethane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Bromodichloromethane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Bromodichloromethane	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Bromodichloromethane	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	Bromoform	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Bromoform	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Bromoform	GCMS	mg/Nm3			< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Bromoform	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Bromoform	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Bromoform	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Bromoform	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Bromoform	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Bromoform	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	Bromomethane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Bromomethane	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Bromomethane	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Bromomethane	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Bromomethane	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Bromomethane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Bromomethane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Bromomethane	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Bromomethane	GCMS	mg/Nm3		0.00436	< 0.00204	< 0.00209	
collected fly ash	Cadmium	CDESSN00	mg/kg	< 5.00	< 5.00	< 5.00		
collected fly ash	Cadmium	NAA	ug/g				< 130	
fuel oil	Cadmium	GFAA	ug/g	< 0.01000	< 0.01000	< 0.01000	0.0600	< 0.01000
limestone	Cadmium	CDESSN00	mg/kg	< 5.00				
limestone	Cadmium	NAA	ug/g				< 0.550	
PJFF out gas, particulate (impactor)	Cadmium	SW6010	mg/kg	< 40.3 R				
PJFF out gas, solid phase (impactor)	Cadmium	SW6010	mg/Nm3	< 0.0000242 R				
collected fly ash	Calcium	D4326	mg/kg	33691	31316	30549		
collected fly ash	Calcium	NAA	ug/g				< 34930	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
limestone	Calcium	D4326	mg/kg	212668				
limestone	Calcium	NAA	ug/g				101350	
boiler outlet gas, 1-L VOST	Carbon disulfide	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Carbon disulfide	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Carbon disulfide	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Carbon disulfide	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Carbon disulfide	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Carbon disulfide	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Carbon disulfide	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Carbon disulfide	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Carbon disulfide	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	Carbon tetrachloride	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Carbon tetrachloride	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Carbon tetrachloride	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Carbon tetrachloride	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Carbon tetrachloride	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Carbon tetrachloride	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Carbon tetrachloride	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Carbon tetrachloride	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Carbon tetrachloride	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
collected fly ash	Cerium	NAA	ug/g				363	
fuel oil	Cerium	NAA	ug/g	0.325	0.137	0.202	0.147	0.115
limestone	Cerium	NAA	ug/g				2.96	
collected fly ash	Cesium	NAA	ug/g				< 5.57	
fuel oil	Cesium	NAA	ug/g	< 0.0194	< 0.0154	< 0.0189	< 0.0181	< 0.0226
limestone	Cesium	NAA	ug/g				0.119	
collected fly ash	Chloride	CLIFWN00	mg/kg				92.5	
collected fly ash	Chlorine	NAA	ug/g				< 723	
fuel oil	Chlorine	elemental	%wt	0.0300		0.0200	0.0200	0.0200
limestone	Chlorine	NAA	ug/g				221	
boiler outlet gas, 1-L VOST	Chlorobenzene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Chlorobenzene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Chlorobenzene	GCMS	mg/Nm3			< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Chlorobenzene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Chlorobenzene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Chlorobenzene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Chlorobenzene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Chlorobenzene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Chlorobenzene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	Chloroethane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Chloroethane	GCMS	mg/Nm3			< 0.000508	< 0.000510	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, 5-L VOST	Chloroethane	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Chloroethane	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Chloroethane	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Chloroethane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Chloroethane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Chloroethane	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Chloroethane	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	Chloroform	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Chloroform	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Chloroform	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Chloroform	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Chloroform	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Chloroform	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Chloroform	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Chloroform	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Chloroform	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	Chloromethane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Chloromethane	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Chloromethane	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Chloromethane	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Chloromethane	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Chloromethane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Chloromethane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Chloromethane	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Chloromethane	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
collected fly ash	Chromium	NAA	ug/g				242	
limestone	Chromium	NAA	ug/g				2.67	
boiler outlet gas, 1-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3			< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF inlet gas, 5-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
collected fly ash	Cobalt	D4326	mg/kg	3009	2795	3155		
collected fly ash	Cobalt	NAA	ug/g				3924	
limestone	Cobalt	ICPSSNFC	mg/kg	< 10.00				
collected fly ash	Copper	NAA	ug/g				< 1826	
limestone	Copper	NAA	ug/g				< 84.3	
boiler outlet gas, 1-L VOST	Dibromochloromethane	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Dibromochloromethane	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Dibromochloromethane	GCMS	mg/Nm3			< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Dibromochloromethane	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Dibromochloromethane	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Dibromochloromethane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Dibromochloromethane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Dibromochloromethane	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Dibromochloromethane	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, solid phase	Dibutylphthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Dibutylphthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Dibutylphthalate	627SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Dibutylphthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Dibutylphthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Dibutylphthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Dibutylphthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Diethylphthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Diethylphthalate	627SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Diethylphthalate	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Diethylphthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Diethylphthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Diethylphthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Diethylphthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Dimethylphenethylamine	627SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Dimethylphenethylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Dimethylphenethylamine	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Dimethylphenethylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Dimethylphenethylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Dimethylphenethylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Dimethylphenethylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Dimethylphthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Dimethylphthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
collected fly ash	Dimethylphthalate	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Dimethylphthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Dimethylphthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Dimethylphthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Dimethylphthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Di-n-octylphthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Di-n-octylphthalate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Di-n-octylphthalate	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Di-n-octylphthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Di-n-octylphthalate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Di-n-octylphthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Di-n-octylphthalate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, 1-L VOST	Ethyl benzene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Ethyl benzene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Ethyl benzene	GCMS	mg/Nm3			< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Ethyl benzene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Ethyl benzene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Ethyl benzene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Ethyl benzene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Ethyl benzene	GCMS	mg/Nm3		< 0.000494	0.000558	< 0.000532	
PJFF outlet gas, 5-L VOST	Ethyl benzene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, solid phase	Ethyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Ethyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Ethyl methanesulfonate	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Ethyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Ethyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Ethyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Ethyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
collected fly ash	Europium	NAA	ug/g				< 0.473	
fuel oil	Europium	NAA	ug/g	< 0.00340	< 0.00260	0.00780	< 0.00330	< 0.00390
limestone	Europium	NAA	ug/g				0.0201	
collected fly ash	Hafnium	NAA	ug/g				< 3.84	
fuel oil	Hafnium	NAA	ug/g	< 0.0125	< 0.0108	< 0.0129	< 0.0118	< 0.0150
limestone	Hafnium	NAA	ug/g				0.116	
boiler outlet gas, solid phase	Hexachlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Hexachlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Hexachlorobenzene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Hexachlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Hexachlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Hexachlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Hexachlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, solid phase	Hexachlorobutadiene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Hexachlorobutadiene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Hexachlorobutadiene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Hexachlorobutadiene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Hexachlorobutadiene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Hexachlorobutadiene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Hexachlorobutadiene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Hexachlorocyclopentadiene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Hexachlorocyclopentadiene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Hexachlorocyclopentadiene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Hexachlorocyclopentadiene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Hexachlorocyclopentadiene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Hexachlorocyclopentadiene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Hexachlorocyclopentadiene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Hexachloroethane	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Hexachloroethane	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Hexachloroethane	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Hexachloroethane	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Hexachloroethane	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Hexachloroethane	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Hexachloroethane	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
collected fly ash	Iodine	NAA	ug/g				< 36.3	
fuel oil	Iodine	NAA	ug/g	< 0.0621	< 0.0557	< 0.0515	< 0.0450	< 0.0655
limestone	Iodine	NAA	ug/g				< 4.63	
collected fly ash	Iron	D4326	mg/kg	44352	46322	43803		
collected fly ash	Iron	NAA	ug/g				44975	
limestone	Iron	D4326	mg/kg	1177				
limestone	Iron	NAA	ug/g				1121	
boiler outlet gas, solid phase	Isophorone	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Isophorone	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Isophorone	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Isophorone	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Isophorone	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Isophorone	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Isophorone	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
collected fly ash	Lanthanum	NAA	ug/g				922	
fuel oil	Lanthanum	NAA	ug/g	0.685	0.230	0.318	0.297	0.189
limestone	Lanthanum	NAA	ug/g				1.21	
PJFF out gas, particulate (impactor)	Lead	SW6010	mg/kg	< 403				
PJFF out gas, solid phase (impactor)	Lead	SW6010	mg/Nm3	< 0.000242				
collected fly ash	Lutetium	NAA	ug/g				< 0.579	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
fuel oil	Lutetium	NAA	ug/g	< 0.00180	< 0.00140	< 0.00180	< 0.00160	< 0.00230
limestone	Lutetium	NAA	ug/g				0.0176	
collected fly ash	Magnesium	D4326	mg/kg	18271	16262	16828		
collected fly ash	Magnesium	NAA	ug/g				7460	
limestone	Magnesium	D4326	mg/kg	126096				
limestone	Magnesium	NAA	ug/g				26521	
collected fly ash	Manganese	D4326	mg/kg	538	512	528		
collected fly ash	Manganese	NAA	ug/g				239	
limestone	Manganese	D4326	mg/kg	39.1				
limestone	Manganese	NAA	ug/g				36.2	
collected fly ash	Mercury	HGCSSN00	mg/kg	< 0.0450	< 0.0450	< 0.0450		
collected fly ash	Mercury	NAA	ug/g				< 15.7	
fuel oil	Mercury	DGAAA	ug/g	0.360	0.140	0.0600	0.0900	0.0900
limestone	Mercury	HGCSSN00	mg/kg	< 0.0450				
limestone	Mercury	NAA	ug/g				0.136	
PJFF out gas, particulate (impactor)	Mercury	E245.5	mg/kg	< 2.90 R				
PJFF out gas, solid phase (impactor)	Mercury	E245.5	mg/Nm3	< 0.00000174 R				
boiler outlet gas, solid phase	Methyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Methyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Methyl methanesulfonate	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Methyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Methyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Methyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Methyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, 1-L VOST	Methylene chloride	GCMS	mg/Nm3		0.0231	0.0454		
boiler outlet gas, 20-L VOST	Methylene chloride	GCMS	mg/Nm3			0.00472	0.00612	
boiler outlet gas, 5-L VOST	Methylene chloride	GCMS	mg/Nm3		0.0141	0.110 E	0.0111	
PJFF inlet gas, 1-L VOST	Methylene chloride	GCMS	mg/Nm3		0.0779	0.244	1.97 E	
PJFF inlet gas, 20-L VOST	Methylene chloride	GCMS	mg/Nm3		0.0193	0.0191	0.0422 E	
PJFF inlet gas, 5-L VOST	Methylene chloride	GCMS	mg/Nm3		0.104 E	0.0660	0.113 E	
PJFF outlet gas, 1-L VOST	Methylene chloride	GCMS	mg/Nm3		0.0512	0.654 E	0.0877	
PJFF outlet gas, 20-L VOST	Methylene chloride	GCMS	mg/Nm3		0.0168	0.178 E	0.00176	
PJFF outlet gas, 5-L VOST	Methylene chloride	GCMS	mg/Nm3		0.0117	0.225 E	0.0481	
collected fly ash	Molybdenum	NAA	ug/g				98.8	
limestone	Molybdenum	NAA	ug/g				0.480	
boiler outlet gas, 1-L VOST	m,p-Xylene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	m,p-Xylene	GCMS	mg/Nm3			0.00137	0.00127	
boiler outlet gas, 5-L VOST	m,p-Xylene	GCMS	mg/Nm3			< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	m,p-Xylene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	m,p-Xylene	GCMS	mg/Nm3		0.000889	0.00101	< 0.000556	
PJFF inlet gas, 5-L VOST	m,p-Xylene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	

DO NOT CITE OR QUOTE

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF outlet gas, 1-L VOST	m,p-Xylene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	m,p-Xylene	GCMS	mg/Nm3		0.000741	0.00193	0.00181	
PJFF outlet gas, 5-L VOST	m,p-Xylene	GCMS	mg/Nm3		0.00257	0.00348	< 0.00209	
collected fly ash	Neodymium	NAA	ug/g				359	
fuel oil	Neodymium	NAA	ug/g	< 0.623	< 0.664	< 0.638	< 0.564	< 0.756
limestone	Neodymium	NAA	ug/g				2.32	
collected fly ash	Nickel	D4326	mg/kg	50279	46424	51382		
collected fly ash	Nickel	NAA	ug/g				57316	
limestone	Nickel	NAA	ug/g				< 6.39	
boiler outlet gas, solid phase	Nitrobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Nitrobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Nitrobenzene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Nitrobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Nitrobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Nitrobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Nitrobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	N-Nitrosodimethylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	N-Nitrosodimethylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	N-Nitrosodimethylamine	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	N-Nitrosodimethylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	N-Nitrosodimethylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	N-Nitrosodimethylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	N-Nitrosodimethylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	N-Nitroso-di-n-butylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	N-Nitroso-di-n-butylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	N-Nitroso-di-n-butylamine	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	N-Nitroso-di-n-butylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	N-Nitroso-di-n-butylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	N-Nitroso-di-n-butylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	N-Nitroso-di-n-butylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	N-Nitrosodipropylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	N-Nitrosodipropylamine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	N-Nitrosodipropylamine	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	N-Nitrosodipropylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	N-Nitrosodipropylamine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	N-Nitrosodipropylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	N-Nitrosodipropylamine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	N-Nitrosopiperidine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	N-Nitrosopiperidine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	N-Nitrosopiperidine	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	N-Nitrosopiperidine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF inlet gas, vapor phase	N-Nitrosopiperidine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	N-Nitrosopiperidine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	N-Nitrosopiperidine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, 1-L VOST	o-Xylene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	o-Xylene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	o-Xylene	GCMS	mg/Nm3			< 0.00207	< 0.00208	
PJFF inlet gas, 1-L VOST	o-Xylene	GCMS	mg/Nm3		< 0.00950	< 0.0108	< 0.0110	
PJFF inlet gas, 20-L VOST	o-Xylene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	o-Xylene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	o-Xylene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	o-Xylene	GCMS	mg/Nm3		< 0.000494	0.000609	0.000692	
PJFF outlet gas, 5-L VOST	o-Xylene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, solid phase	p-Chloroaniline	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	p-Chloroaniline	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	p-Chloroaniline	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	p-Chloroaniline	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	p-Chloroaniline	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	p-Chloroaniline	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	p-Chloroaniline	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	p-Dimethylaminoazobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	p-Dimethylaminoazobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	p-Dimethylaminoazobenzene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	p-Dimethylaminoazobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	p-Dimethylaminoazobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	p-Dimethylaminoazobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	p-Dimethylaminoazobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Pentachlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Pentachlorobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Pentachlorobenzene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Pentachlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Pentachlorobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Pentachlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Pentachlorobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Pentachloronitrobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Pentachloronitrobenzene	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Pentachloronitrobenzene	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Pentachloronitrobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Pentachloronitrobenzene	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Pentachloronitrobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Pentachloronitrobenzene	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Pentachlorophenol	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, vapor phase	Pentachlorophenol	827SSNT1	mg/Nm3	< 0.0346	< 0.0346	< 0.0317	< 0.0313	
collected fly ash	Pentachlorophenol	827SSNT1	ug/g	< 1.60				
PJFF inlet gas, solid phase	Pentachlorophenol	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF inlet gas, vapor phase	Pentachlorophenol	827SSNT1	mg/Nm3	< 0.0287	< 0.0267	< 0.0277	< 0.0276	
PJFF outlet gas, solid phase	Pentachlorophenol	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
PJFF outlet gas, vapor phase	Pentachlorophenol	827SSNT1	mg/Nm3	< 0.0252	< 0.0259	< 0.0249	< 0.0252	
boiler outlet gas, solid phase	Phenacetin	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Phenacetin	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Phenacetin	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Phenacetin	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Phenacetin	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Phenacetin	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Phenacetin	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Phenol	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Phenol	827SSNT1	mg/Nm3	0.0174 @	0.0118 @	0.0154 @	0.00758 @	
collected fly ash	Phenol	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Phenol	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Phenol	827SSNT1	mg/Nm3	0.0635	0.0306	0.0401	0.0212 @	
PJFF outlet gas, solid phase	Phenol	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Phenol	827SSNT1	mg/Nm3	0.0891	0.0403	0.0211 @	0.0233 @	
collected fly ash	Phosphate	PO4FWN00	mg/kg				< 320 N	
collected fly ash	Phosphorus	P_ESSN00	mg/kg	< 300	< 300	< 300		
limestone	Phosphorus	P_ESSN00	mg/kg	< 300				
boiler outlet gas, particulate	Potassium	ICPSSNFC	mg/kg		< 9160		< 6148	< 6826
boiler outlet gas, solid phase	Potassium	ICPSSNFC	mg/Nm3		< 0.415		< 0.369	< 0.363
boiler outlet gas, vapor phase	Potassium	ICPSWNFC	mg/Nm3		< 0.845		< 0.758	< 0.799
collected fly ash	Potassium	D4326	mg/kg	1679	1423	1933		
collected fly ash	Potassium	ICPSSNFC	mg/kg	< 3000	< 3000	< 3000		
collected fly ash	Potassium	NAA	ug/g				< 191850	
condensate water	Potassium	ICPSWNFC	mg/L		< 3.00		< 3.00	
fuel oil	Potassium	NAA	ug/g	< 54.7	< 45.1	< 39.6	< 39.6	< 52.9
limestone	Potassium	D4326	mg/kg	946				
limestone	Potassium	ICPSSNFC	mg/kg	< 3000				
limestone	Potassium	NAA	ug/g				< 3703	
PJFF inlet gas, particulate	Potassium	ICPSSNFC	mg/kg		< 10638		< 3699	< 6834
PJFF inlet gas, solid phase	Potassium	ICPSSNFC	mg/Nm3		< 0.312		< 0.162	< 0.330
PJFF inlet gas, vapor phase	Potassium	ICPSWNFC	mg/Nm3		< 1.11 R		< 0.685	< 0.509
PJFF out gas, particulate (impactor)	Potassium	SW6010	mg/kg	< 24194 R				
PJFF out gas, solid phase (impactor)	Potassium	SW6010	mg/Nm3	< 0.0145 R				
PJFF outlet gas, particulate (M5)	Potassium	ICPSSNFC	mg/kg		< 34884		< 78947	< 68966
PJFF outlet gas, solid phase	Potassium	ICPSSNFC	mg/Nm3		< 0.146		< 0.308	< 0.302

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF outlet gas, vapor phase	Potassium	ICPSWNFC	mg/Nm3		< 0.499		< 0.652	< 0.441
boiler outlet gas, solid phase	Pronamide	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Pronamide	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Pronamide	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Pronamide	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Pronamide	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Pronamide	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Pronamide	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
boiler outlet gas, solid phase	Pyridine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
boiler outlet gas, vapor phase	Pyridine	827SSNT1	mg/Nm3	< 0.00691	< 0.00691	< 0.00635	< 0.00626	
collected fly ash	Pyridine	827SSNT1	ug/g	< 0.330				
PJFF inlet gas, solid phase	Pyridine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF inlet gas, vapor phase	Pyridine	827SSNT1	mg/Nm3	< 0.00574	< 0.00535	< 0.00553	< 0.00552	
PJFF outlet gas, solid phase	Pyridine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
PJFF outlet gas, vapor phase	Pyridine	827SSNT1	mg/Nm3	< 0.00504	< 0.00519	< 0.00498	< 0.00504	
collected fly ash	Rubidium	NAA	ug/g				< 156	
fuel oil	Rubidium	NAA	ug/g	< 0.524	< 0.507	0.474	< 0.461	< 0.592
limestone	Rubidium	NAA	ug/g				3.37	
collected fly ash	Samarium	NAA	ug/g				2.49	
fuel oil	Samarium	NAA	ug/g	0.00290	0.00190	0.00120	0.00230	0.00160
limestone	Samarium	NAA	ug/g				0.285	
collected fly ash	Scandium	NAA	ug/g				2.65	
fuel oil	Scandium	NAA	ug/g	0.00210	0.00170	0.00180	0.00240	0.00210
limestone	Scandium	NAA	ug/g				0.427	
collected fly ash	Selenium	NAA	ug/g				32.3	
limestone	Selenium	NAA	ug/g				< 0.161	
PJFF out gas, particulate (impactor)	Selenium	SW6010	mg/kg	< 2419				
PJFF out gas, solid phase (impactor)	Selenium	SW6010	mg/Nm3	< 0.00145				
boiler outlet gas, vapor phase	Silicon	ICPSWNFC	mg/Nm3		0.976 @R		0.889 @R	0.458 @R
collected fly ash	Silicon	D4326	mg/kg	36321	36038	34052		
condensate water	Silicon	ICPSWNFC	mg/L		< 1.000		< 1.000	
limestone	Silicon	D4326	mg/kg	12456				
PJFF inlet gas, vapor phase	Silicon	ICPSWNFC	mg/Nm3		< 0.372 R		< 0.374 R	0.533 @R
PJFF outlet gas, vapor phase	Silicon	ICPSWNFC	mg/Nm3		< 0.317		< 0.372 R	< 0.356 R
boiler outlet gas, particulate	Silver	ICPSSNFC	mg/kg		< 30.5		< 20.5	< 22.8
boiler outlet gas, solid phase	Silver	ICPSSNFC	mg/Nm3		< 0.00138		< 0.00123	< 0.00121
boiler outlet gas, vapor phase	Silver	ICPSWNFC	mg/Nm3		< 0.00468 R		< 0.00253	< 0.00450 R
collected fly ash	Silver	ICPSSNFC	mg/kg	< 10.00	< 10.00	< 10.00		
collected fly ash	Silver	NAA	ug/g				< 21.1	
condensate water	Silver	ICPSWNFC	mg/L		< 0.01000		< 0.01000	
fuel oil	Silver	NAA	ug/g	< 0.0855	< 0.0824	< 0.0834	0.0820	< 0.0929

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
limestone	Silver	ICPSSNFC	mg/kg	< 10.00				
limestone	Silver	NAA	ug/g				< 0.220	
PJFF inlet gas, particulate	Silver	ICPSSNFC	mg/kg		< 35.5		< 24.7	< 22.8
PJFF inlet gas, solid phase	Silver	ICPSSNFC	mg/Nm3		< 0.00104		< 0.00108	< 0.00110
PJFF inlet gas, vapor phase	Silver	ICPSWNFC	mg/Nm3		< 0.00163		< 0.00145	< 0.00170
PJFF out gas, particulate (impactor)	Silver	SW6010	mg/kg	< 80.6				
PJFF out gas, solid phase (impactor)	Silver	SW6010	mg/Nm3	< 0.0000484				
PJFF outlet gas, particulate (M5)	Silver	ICPSSNFC	mg/kg		< 233		< 263	< 230
PJFF outlet gas, solid phase (M5)	Silver	ICPSSNFC	mg/Nm3		< 0.000976		< 0.00103	< 0.00101
PJFF outlet gas, vapor phase	Silver	ICPSWNFC	mg/Nm3		< 0.00166		< 0.00372 R	< 0.00356
boiler outlet gas, particulate	Sodium	ICPSSNFC	mg/kg		24809		17923	18696
boiler outlet gas, solid phase	Sodium	ICPSSNFC	mg/Nm3		1.13		1.08	0.994
boiler outlet gas, vapor phase	Sodium	ICPSWNFC	mg/Nm3		< 0.468 R		< 0.417 R	< 0.450
collected fly ash	Sodium	D4326	mg/kg	18856	18145	20446		
collected fly ash	Sodium	ICPSSNFC	mg/kg	18500	18300	19800		
collected fly ash	Sodium	NAA	ug/g				24206	
condensate water	Sodium	ICPSWNFC	mg/L		< 1.000		< 1.000	
fuel oil	Sodium	flame aa	ug/g	3.99	7.62	15.9	112	39.0
fuel oil	Sodium	NAA	ug/g	7.94	13.2	8.99	11.0	13.2
limestone	Sodium	D4326	mg/kg	121				
limestone	Sodium	ICPSSNFC	mg/kg	< 1000				
limestone	Sodium	NAA	ug/g				211	
PJFF inlet gas, particulate	Sodium	ICPSSNFC	mg/kg		21348		15504	14892
PJFF inlet gas, solid phase	Sodium	ICPSSNFC	mg/Nm3		0.625		0.678	0.719
PJFF inlet gas, vapor phase	Sodium	ICPSWNFC	mg/Nm3		< 0.372 R		< 0.374 R	< 0.410 R
PJFF out gas, particulate (impactor)	Sodium	SW6010	mg/kg	< 32258 R				
PJFF out gas, solid phase (impactor)	Sodium	SW6010	mg/Nm3	< 0.0194 R				
PJFF outlet gas, particulate (M5)	Sodium	ICPSSNFC	mg/kg		< 23256		< 26316	< 22989
PJFF outlet gas, solid phase (M5)	Sodium	ICPSSNFC	mg/Nm3		< 0.0976		< 0.103	< 0.101
PJFF outlet gas, vapor phase	Sodium	ICPSWNFC	mg/Nm3		< 0.317 R		< 0.372 R	< 0.356 R
boiler outlet gas, particulate	Strontium	ICPSSNFC	mg/kg		141		125	128
boiler outlet gas, solid phase	Strontium	ICPSSNFC	mg/Nm3		0.00639		0.00752	0.00679
boiler outlet gas, vapor phase	Strontium	ICPSWNFC	mg/Nm3		< 0.00140 R		< 0.00125 R	< 0.00135 R
collected fly ash	Strontium	D4326	mg/kg	37.2	35.4	109		
collected fly ash	Strontium	ICPSSNFC	mg/kg	48.3	44.7	57.6		
collected fly ash	Strontium	NAA	ug/g				< 1896	
condensate water	Strontium	ICPSWNFC	mg/L		< 0.00300		0.00320 @	
fuel oil	Strontium	NAA	ug/g	< 5.71	< 4.14	< 5.44	< 4.87	< 6.46
limestone	Strontium	D4326	mg/kg	184				
limestone	Strontium	ICPSSNFC	mg/kg	< 3.00				
limestone	Strontium	NAA	ug/g				222	

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF inlet gas, particulate	Strontium	ICPSSNFC	mg/kg		167		128	122
PJFF inlet gas, solid phase	Strontium	ICPSSNFC	mg/Nm3		0.00488		0.00581	0.00589
PJFF inlet gas, vapor phase	Strontium	ICPSWNFC	mg/Nm3		< 0.00111 R		< 0.00112 R	< 0.00123 R
PJFF out gas, particulate (impactor)	Strontium	SW6010	mg/kg	24.8 @R				
PJFF out gas, solid phase (impactor)	Strontium	SW6010	mg/Nm3	0.0000149 @R				
PJFF outlet gas, particulate (M5)	Strontium	ICPSSNFC	mg/kg		< 69.8		< 78.9	< 69.0
PJFF outlet gas, solid phase (M5)	Strontium	ICPSSNFC	mg/Nm3		< 0.000293		< 0.000308	< 0.000302
PJFF outlet gas, vapor phase	Strontium	ICPSWNFC	mg/Nm3		< 0.000499 R		< 0.00112 R	< 0.00107 R
boiler outlet gas, 1-L VOST	Styrene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Styrene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Styrene	GCMS	mg/Nm3			< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Styrene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Styrene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Styrene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Styrene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Styrene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Styrene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
collected fly ash	Sulfate	SF_FWN00	mg/kg				305000	
collected fly ash	Sulfur	D4326	mg/kg	19794	13060	20761		
limestone	Sulfur	D4326	mg/kg	630				
PJFF out gas, particulate (impactor)	Sulfur	SW6010	mg/kg	149911 @R				
PJFF out gas, solid phase (impactor)	Sulfur	SW6010	mg/Nm3	0.0900 @R				
collected fly ash	Tantalum	NAA	ug/g				< 3.60	
fuel oil	Tantalum	NAA	ug/g	< 0.0142	< 0.0141	< 0.0142	< 0.0126	< 0.0165
limestone	Tantalum	NAA	ug/g				0.0332	
collected fly ash	Terbium	NAA	ug/g				< 0.849	
fuel oil	Terbium	NAA	ug/g	< 0.0511	< 0.0425	< 0.0179	< 0.0477	< 0.0516
limestone	Terbium	NAA	ug/g				0.0379	
boiler outlet gas, 1-L VOST	Tetrachloroethene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Tetrachloroethene	GCMS	mg/Nm3			0.000762	< 0.000510	
boiler outlet gas, 5-L VOST	Tetrachloroethene	GCMS	mg/Nm3			< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Tetrachloroethene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Tetrachloroethene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Tetrachloroethene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Tetrachloroethene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Tetrachloroethene	GCMS	mg/Nm3		< 0.000494	0.00127	< 0.000532	
PJFF outlet gas, 5-L VOST	Tetrachloroethene	GCMS	mg/Nm3		< 0.00198	0.00225	< 0.00209	
boiler outlet gas, particulate	Thallium	ICPSSNFC	mg/kg		< 153		< 205	< 114
boiler outlet gas, solid phase	Thallium	ICPSSNFC	mg/Nm3		< 0.00692		< 0.0123	< 0.00605
boiler outlet gas, vapor phase	Thallium	ICPSWNFC	mg/Nm3		< 0.0282		< 0.0253	< 0.0450
collected fly ash	Thallium	ICPSSNFC	mg/kg	< 100.0	< 100.0	< 100.0		

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
condensate water	Thallium	ICPSWNFC	mg/L		< 0.1000		< 0.1000	
limestone	Thallium	ICPSSNFC	mg/kg	< 100.0				
PJFF inlet gas, particulate	Thallium	ICPSSNFC	mg/kg		< 355		< 123	< 114
PJFF inlet gas, solid phase	Thallium	ICPSSNFC	mg/Nm3		< 0.0104		< 0.00539	< 0.00550
PJFF inlet gas, vapor phase	Thallium	ICPSWNFC	mg/Nm3		< 0.0372		< 0.0228	< 0.0240
PJFF out gas, particulate (impactor)	Thallium	SW6010	mg/kg	< 806				
PJFF out gas, solid phase (impactor)	Thallium	SW6010	mg/Nm3	< 0.000484				
PJFF outlet gas, particulate (M5)	Thallium	ICPSSNFC	mg/kg		< 1163		< 1316	< 1149
PJFF outlet gas, solid phase (M5)	Thallium	ICPSSNFC	mg/Nm3		< 0.00488		< 0.00514	< 0.00504
PJFF outlet gas, vapor phase	Thallium	ICPSWNFC	mg/Nm3		< 0.0166		< 0.0372	< 0.0209
collected fly ash	Thorium	NAA	ug/g				4.96	
fuel oil	Thorium	NAA	ug/g	< 0.0104	0.0108	< 0.0102	0.01000	0.0127
limestone	Thorium	NAA	ug/g				0.389	
collected fly ash	Tin	NAA	ug/g				< 100.0	
fuel oil	Tin	NAA	ug/g	< 1.000	< 1.000	< 5.00	< 1.000	< 1.000
limestone	Tin	NAA	ug/g				< 2.50	
boiler outlet gas, particulate	Titanium	TIESSN00	mg/kg		1087		970	791
boiler outlet gas, solid phase	Titanium	TIESSN00	mg/Nm3		0.0493		0.0582	0.0421
boiler outlet gas, vapor phase	Titanium	TIESWN00	mg/Nm3		< 0.0234 R		< 0.0208 R	< 0.0225 R
collected fly ash	Titanium	D4326	mg/kg	1345	1303	1267		
collected fly ash	Titanium	NAA	ug/g				< 3068	
collected fly ash	Titanium	TIESSN00	mg/kg	971	1070	995		
fuel oil	Titanium	NAA	ug/g	< 5.54	< 4.85	< 4.45	6.51	< 5.62
limestone	Titanium	D4326	mg/kg	97.6				
limestone	Titanium	NAA	ug/g				< 388	
limestone	Titanium	TIESSN00	mg/kg	< 50.0				
PJFF inlet gas, particulate	Titanium	TIESSN00	mg/kg		1109		913	775
PJFF inlet gas, solid phase	Titanium	TIESSN00	mg/Nm3		0.0325		0.0399	0.0374
PJFF inlet gas, vapor phase	Titanium	TIESWN00	mg/Nm3		< 0.0186 R		< 0.0187 R	< 0.0205 R
PJFF out gas, particulate (impactor)	Titanium	SW6010	mg/kg	< 403 R				
PJFF out gas, solid phase (impactor)	Titanium	SW6010	mg/Nm3	< 0.000242 R				
PJFF outlet gas, particulate (M5)	Titanium	TIESSN00	mg/kg		< 1163		< 1316	< 1149
PJFF outlet gas, solid phase (M5)	Titanium	TIESSN00	mg/Nm3		< 0.00488		< 0.00514	< 0.00504
PJFF outlet gas, vapor phase	Titanium	TIESWN00	mg/Nm3		< 0.00832 R		< 0.0186 R	< 0.00735 R
boiler outlet gas, 1-L VOST	Toluene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 5-L VOST	Toluene	GCMS	mg/Nm3			0.00372	0.00618	
PJFF inlet gas, 1-L VOST	Toluene	GCMS	mg/Nm3		0.0199	< 0.0106	0.0120	
PJFF inlet gas, 5-L VOST	Toluene	GCMS	mg/Nm3		< 0.00208	0.00298	< 0.00217	
PJFF outlet gas, 1-L VOST	Toluene	GCMS	mg/Nm3		0.0354	0.0123	< 0.0103	
PJFF outlet gas, 5-L VOST	Toluene	GCMS	mg/Nm3		0.00277	0.00531	0.00230	
boiler outlet gas, 1-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.0100	< 0.0103		

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
boiler outlet gas, 20-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	Trichloroethene	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Trichloroethene	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Trichloroethene	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Trichloroethene	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Trichloroethene	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Trichloroethene	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Trichloroethene	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Trichloroethene	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Trichloroethene	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
boiler outlet gas, 1-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3		0.0150	< 0.0103		
boiler outlet gas, 20-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3			0.00350	0.00510	
boiler outlet gas, 5-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3		0.0102	0.00496	0.00556	
PJFF inlet gas, 1-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3		< 0.00950	< 0.0106	0.0219	
PJFF inlet gas, 20-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3		0.000680	0.00636	0.00117	
PJFF inlet gas, 5-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3		0.0178	0.00507	0.00106	
PJFF outlet gas, 5-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
collected fly ash	Tungsten	NAA	ug/g				< 50.0	
fuel oil	Tungsten	NAA	ug/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
limestone	Tungsten	NAA	ug/g				< 1.000	
collected fly ash	Uranium	NAA	ug/g				< 10.4	
fuel oil	Uranium	NAA	ug/g	< 0.0325	< 0.0222	< 0.0274	< 0.0276	< 0.0310
limestone	Uranium	NAA	ug/g				0.356	

PRELIMINARY

DO NOT CITE OR QUOTE

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
collected fly ash	Vanadium	D4326	mg/kg	7612	6979	8046		
collected fly ash	Vanadium	NAA	ug/g				8165	
fuel oil	Vanadium	GFAA	ug/g	5.31	4.52	6.00	4.53	4.94
limestone	Vanadium	NAA	ug/g				4.15	
boiler outlet gas, 1-L VOST	Vinyl acetate	GCMS	mg/Nm3		< 0.100	< 0.103		
boiler outlet gas, 20-L VOST	Vinyl acetate	GCMS	mg/Nm3			< 0.00508	0.0112	
boiler outlet gas, 5-L VOST	Vinyl acetate	GCMS	mg/Nm3		< 0.0201	< 0.0207	< 0.0206	
PJFF inlet gas, 1-L VOST	Vinyl acetate	GCMS	mg/Nm3		< 0.0950	< 0.106	< 0.110	
PJFF inlet gas, 20-L VOST	Vinyl acetate	GCMS	mg/Nm3		< 0.00523	< 0.00530	< 0.00556	
PJFF inlet gas, 5-L VOST	Vinyl acetate	GCMS	mg/Nm3		< 0.0208	< 0.0213	< 0.0217	
PJFF outlet gas, 1-L VOST	Vinyl acetate	GCMS	mg/Nm3		< 0.0985	< 0.102	< 0.103	
PJFF outlet gas, 20-L VOST	Vinyl acetate	GCMS	mg/Nm3		< 0.00494	< 0.00507	0.0128	
PJFF outlet gas, 5-L VOST	Vinyl acetate	GCMS	mg/Nm3		< 0.0198	< 0.0204	< 0.0209	
boiler outlet gas, 1-L VOST	Vinyl chloride	GCMS	mg/Nm3		< 0.0100	< 0.0103		
boiler outlet gas, 20-L VOST	Vinyl chloride	GCMS	mg/Nm3			< 0.000508	< 0.000510	
boiler outlet gas, 5-L VOST	Vinyl chloride	GCMS	mg/Nm3		< 0.00201	< 0.00207	< 0.00206	
PJFF inlet gas, 1-L VOST	Vinyl chloride	GCMS	mg/Nm3		< 0.00950	< 0.0106	< 0.0110	
PJFF inlet gas, 20-L VOST	Vinyl chloride	GCMS	mg/Nm3		< 0.000523	< 0.000530	< 0.000556	
PJFF inlet gas, 5-L VOST	Vinyl chloride	GCMS	mg/Nm3		< 0.00208	< 0.00213	< 0.00217	
PJFF outlet gas, 1-L VOST	Vinyl chloride	GCMS	mg/Nm3		< 0.00985	< 0.0102	< 0.0103	
PJFF outlet gas, 20-L VOST	Vinyl chloride	GCMS	mg/Nm3		< 0.000494	< 0.000507	< 0.000532	
PJFF outlet gas, 5-L VOST	Vinyl chloride	GCMS	mg/Nm3		< 0.00198	< 0.00204	< 0.00209	
fuel oil	Water by distillation	distillation	%wt	0.590	0.740	0.560	0.780	0.670
collected fly ash	Ytterbium	NAA	ug/g				< 7.17	
fuel oil	Ytterbium	NAA	ug/g	< 0.0140	< 0.0174	< 0.0134	< 0.0132	< 0.0195
limestone	Ytterbium	NAA	ug/g				0.0898	
boiler outlet gas, particulate	Zinc	ICPSSNFC	mg/kg		2323		1287	3419
boiler outlet gas, solid phase	Zinc	ICPSSNFC	mg/Nm3		0.105		0.0773	0.182
boiler outlet gas, vapor phase	Zinc	ICPSWNFC	mg/Nm3		< 0.00936 R		0.0280 @R	< 0.00901 R
collected fly ash	Zinc	D4326	mg/kg	883	840	901		
collected fly ash	Zinc	ICPSSNFC	mg/kg	735	782	767		
collected fly ash	Zinc	NAA	ug/g				853	
condensate water	Zinc	ICPSWNFC	mg/L		< 0.0200		< 0.0200	
fuel oil	Zinc	NAA	ug/g	0.809	0.417	0.747	0.640	0.540
limestone	Zinc	ICPSSNFC	mg/kg	< 20.0				
limestone	Zinc	NAA	ug/g				2.38	
PJFF inlet gas, particulate	Zinc	ICPSSNFC	mg/kg		874 @		696	618
PJFF inlet gas, solid phase	Zinc	ICPSSNFC	mg/Nm3		0.0256 @		0.0304	0.0299
PJFF inlet gas, vapor phase	Zinc	ICPSWNFC	mg/Nm3		0.0327 @R		< 0.00747 R	< 0.00819 R
PJFF out gas, particulate (impactor)	Zinc	SW6010	mg/kg	161187 R				
PJFF out gas, solid phase (impactor)	Zinc	SW6010	mg/Nm3	0.0967 R				

Cited name	Substance	Method	UOM	Run A	Run B	Run C	Run D	Run E
PJFF outlet gas, particulate (M5)	Zinc	ICPSSNFC	mg/kg		< 465		< 526	< 460
PJFF outlet gas, solid phase (M5)	Zinc	ICPSSNFC	mg/Nm3		< 0.00195		< 0.00205	< 0.00202
PJFF outlet gas, vapor phase	Zinc	ICPSWNFC	mg/Nm3		< 0.00634 R		< 0.00743 R	< 0.00712 R
collected fly ash	Zirconium	NAA	ug/g				< 1310	
fuel oil	Zirconium	NAA	ug/g	< 5.48	< 5.18	< 5.12	< 4.74	< 6.21
limestone	Zirconium	NAA	ug/g				12.8	

PRELIMINARY

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Appendix D

Low-NO_x Data Used In Calculations

PRELIMINARY

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03-Feb-93

Site 13 Low NOx Data Used in Calculations

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, solid phase	1-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	1-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	1-Naphthylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	1-Naphthylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	1,2-Diphenylhydrazine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	1,2-Diphenylhydrazine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2-Chloronaphthalene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2-Methylnaphthalene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2-Methylnaphthalene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2-Naphthylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2-Naphthylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	3-Methylcholanthrene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	3-Methylcholanthrene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	3,3'-Dichlorobenzidine	827SSNT1	mg/Nm3	< 0.0127	< 0.0127	< 0.0122	< 0.0122	
boiler outlet gas, vapor phase	3,3'-Dichlorobenzidine	827SSNT1	mg/Nm3	< 0.0127	< 0.0127	< 0.0122	< 0.0122	
boiler outlet gas, solid phase	4-Aminobiphenyl	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	4-Aminobiphenyl	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	4-Bromophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	4-Bromophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	4-Chlorophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	4-Chlorophenyl phenyl ether	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	7,12-Dimethylbenz(a)anthracene	827SSNT1	mg/Nm3	< 0.0159	< 0.0159	< 0.0152	< 0.0152	
boiler outlet gas, vapor phase	7,12-Dimethylbenz(a)anthracene	827SSNT1	mg/Nm3	< 0.0159	< 0.0159	< 0.0152	< 0.0152	
boiler outlet gas, solid phase	Acenaphthene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Acenaphthene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Acenaphthylene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Acenaphthylene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Aluminum	ICPSSNFC	mg/kg		14257	14234	10231	
boiler outlet gas, solid phase	Aluminum	ICPSSNFC	mg/Nm3		0.502	0.635	0.428	
boiler outlet gas, vapor phase	Aluminum	ICPSWNFC	mg/Nm3		< 0.0836 R	< 0.0776 R	< 0.0870	
condensate water	Aluminum	ICPSWNFC	mg/L				< 0.200	
fuel oil	Aluminum	NAA	ug/g	9.82	6.71	7.77	6.63	6.64
boiler outlet gas, solid phase	Anthracene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Anthracene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Arsenic	ASGSSA00	mg/kg		103	104	92.4	
boiler outlet gas, solid phase	Arsenic	ASGSSA00	mg/Nm3		0.00362	0.00463	0.00386	
boiler outlet gas, vapor phase	Arsenic	ASGSWA00	mg/Nm3		< 0.000612	< 0.000934	< 0.00103	
condensate water	Arsenic	ASHRWA00	mg/L				< 0.00500	
fuel oil	Arsenic	NAA	ug/g	0.128	0.0916	0.0947	0.116	0.112
fuel oil	Ash	ultimate	%wt	0.0200	0.0200	0.01000	0.0700	

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Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, particulate	Barium	ICPSSNFC	mg/kg		352	253	205	
boiler outlet gas, solid phase	Barium	ICPSSNFC	mg/Nm3		0.0124	0.0113	0.00857	
boiler outlet gas, vapor phase	Barium	ICPSWNFC	mg/Nm3		< 0.00418 R	< 0.00388 R	< 0.00435 R	
condensate water	Barium	ICPSWNFC	mg/L				< 0.01000	
fuel oil	Barium	NAA	ug/g	< 3.46	4.36	< 2.53	< 3.46	< 3.03
boiler outlet gas, 20-L VOST	Benzene	GCMS	mg/Nm3	< 0.000509	0.00138	0.00126	0.00145	
boiler outlet gas, solid phase	Benzidine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Benzidine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Benzo(a)anthracene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Benzo(a)anthracene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Benzo(a)pyrene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Benzo(a)pyrene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Benzo(b)fluoranthene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Benzo(b)fluoranthene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Benzo(g,h,i)perylene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Benzo(g,h,i)perylene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Benzo(k)fluoranthene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Benzo(k)fluoranthene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Beryllium	ICPSSNFC	mg/kg		< 3.10	< 4.66	< 5.17	
boiler outlet gas, solid phase	Beryllium	ICPSSNFC	mg/Nm3		< 0.000109	< 0.000208	< 0.000216	
boiler outlet gas, vapor phase	Beryllium	ICPSWNFC	mg/Nm3		< 0.000836	< 0.000467	< 0.000513	
condensate water	Beryllium	ICPSWNFC	mg/L				< 0.00200	
fuel oil	Beryllium	GFAA	ug/g	< 0.01000	< 0.01000	< 0.01000	< 0.01000	< 0.01000
boiler outlet gas, solid phase	Butylbenzylphthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Butylbenzylphthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Cadmium	CDGSSA00	mg/kg		52.7 @	709	< 5.17	
boiler outlet gas, solid phase	Cadmium	CDGSSA00	mg/Nm3		0.00185 @	0.0316	< 0.000216	
boiler outlet gas, vapor phase	Cadmium	CDGSWA00	mg/Nm3		< 0.000418 R	< 0.000388 R	< 0.000435 R	
condensate water	Cadmium	CDGSWA00	mg/L				< 0.001000	
fuel oil	Cadmium	NAA	ug/g	< 0.410	< 0.251	< 0.281	< 0.359	< 0.304
boiler outlet gas, particulate	Calcium	ICPSSNFC	mg/kg		6044 @	4374 @	4185 @	
boiler outlet gas, solid phase	Calcium	ICPSSNFC	mg/Nm3		0.213 @	0.195 @	0.175 @	
boiler outlet gas, vapor phase	Calcium	ICPSWNFC	mg/Nm3		< 0.418 R	< 0.388	< 0.435 R	
condensate water	Calcium	ICPSWNFC	mg/L				< 1.000	
fuel oil	Calcium	NAA	ug/g	< 80.5	< 88.7	< 44.3	< 78.2	< 76.8
fuel oil	Carbon	ultimate	%wt	86.7	86.4	86.8	86.4	
boiler outlet gas, particulate	Chloride	CLIFWN00	mg/kg		4212	10105	< 54.8	
boiler outlet gas, solid phase	Chloride	CLIFWN00	mg/Nm3		0.138	0.398	< 0.00179	
boiler outlet gas, vapor phase	Chloride	CLIFWN00	mg/Nm3	3.32	3.09	2.43	2.01	
condensate water	Chloride	CLIFWN00	mg/L				< 0.0120	
fuel oil	Chlorine	NAA	ug/g	16.3	15.7	18.9	20.8	23.0

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, particulate	Chromium	ICPSSNFC	mg/kg		93.1 @	83.3 @	62.2 @	
boiler outlet gas, solid phase	Chromium	ICPSSNFC	mg/Nm3		0.00328 @	0.00372 @	0.00260 @	
boiler outlet gas, vapor phase	Chromium	ICPSWNFC	mg/Nm3		< 0.00418 R	< 0.00154	< 0.00178	
condensate water	Chromium	ICPSWNFC	mg/L				< 0.01000	
fuel oil	Chromium	NAA	ug/g	0.284	0.240	0.241	0.177	0.528
boiler outlet gas, solid phase	Chrysene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Chrysene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Cobalt	ICPSSNFC	mg/kg		2087	1739	1688	
boiler outlet gas, solid phase	Cobalt	ICPSSNFC	mg/Nm3		0.0735	0.0776	0.0706	
boiler outlet gas, vapor phase	Cobalt	ICPSWNFC	mg/Nm3		< 0.00265 R	< 0.00154	< 0.00435 R	
condensate water	Cobalt	ICPSWNFC	mg/L				< 0.01000	
fuel oil	Cobalt	NAA	ug/g	2.23	1.98	1.74	2.25	2.37
boiler outlet gas, particulate	Copper	ICPSSNFC	mg/kg		243 @	205 @	176 @	
boiler outlet gas, solid phase	Copper	ICPSSNFC	mg/Nm3		0.00854 @	0.00914 @	0.00738 @	
boiler outlet gas, vapor phase	Copper	ICPSWNFC	mg/Nm3		< 0.00530	< 0.00309	< 0.00513	
condensate water	Copper	ICPSWNFC	mg/L				< 0.0200	
fuel oil	Copper	NAA	ug/g	7.97	6.67	6.06	6.46	9.68
boiler outlet gas, solid phase	Dibenzofuran	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Dibenzofuran	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Dibenz(a,h)anthracene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Dibenz(a,h)anthracene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Dibenz(a,j)acridine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Dibenz(a,j)acridine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Fluoranthene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Fluoranthene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Fluorene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Fluorene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Fluoride	F_SEWS00	mg/kg			< 175	< 222	
boiler outlet gas, solid phase	Fluoride	F_SEWS00	mg/Nm3			< 0.00691	< 0.00728	
boiler outlet gas, vapor phase	Fluoride	SIE	mg/Nm3	0.0205 @R	0.0111 @R	0.0140 @R	0.0120 @R	
condensate water	Fluoride	F_SEWA00	mg/L				< 0.1000	
fuel oil	Fluorine	elemental	mg/kg	7.00	6.00	6.00	7.00	
boiler outlet gas, vapor phase	Formaldehyde	ALDELKAS	mg/Nm3		< 0.00703 R	< 0.00691 R	< 0.00734 R	< 0.00738 R
fuel oil	Heating value	D240	Btu/lb	18978	18986	18982	18853	
fuel oil	Hydrogen	ultimate	%wt	11.2	11.3	11.2	10.9	
boiler outlet gas, solid phase	Indeno(1,2,3-cd)pyrene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Indeno(1,2,3-cd)pyrene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Iron	ICPSSNFC	mg/kg		16945	16815	15399	
boiler outlet gas, solid phase	Iron	ICPSSNFC	mg/Nm3		0.596	0.741	0.644	
boiler outlet gas, vapor phase	Iron	ICPSWNFC	mg/Nm3		< 0.0167 R	< 0.0155	< 0.0174	
condensate water	Iron	ICPSWNFC	mg/L				< 0.0400	

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
fuel oil	Iron	NAA	ug/g	17.2	23.1	18.4	16.6	19.5
boiler outlet gas, particulate	Lead	PBGSSA00	mg/kg		94.7	95.9	180	
boiler outlet gas, solid phase	Lead	PBGSSA00	mg/Nm3		0.00333	0.00428	0.00753	
boiler outlet gas, vapor phase	Lead	PBGSWA00	mg/Nm3		< 0.00125 R	< 0.00116	< 0.00130 R	
condensate water	Lead	PBGSWA00	mg/L				0.00400 @	
fuel oil	Lead	GFAA	ug/g	0.590	1.03	0.190	1.10	2.46
boiler outlet gas, particulate	Magnesium	ICPSSNFC	mg/kg		3314 @	< 2328	< 2584	
boiler outlet gas, solid phase	Magnesium	ICPSSNFC	mg/Nm3		0.117 @	< 0.104	< 0.108	
boiler outlet gas, vapor phase	Magnesium	ICPSWNFC	mg/Nm3		< 0.418 R	< 0.154	< 0.176	
condensate water	Magnesium	ICPSWNFC	mg/L				< 1.000	
fuel oil	Magnesium	NAA	ug/g	< 6.59	< 5.70	< 6.56	< 5.87	< 7.42
boiler outlet gas, particulate	Manganese	ICPSSNFC	mg/kg		134 @	120	122 @	
boiler outlet gas, solid phase	Manganese	ICPSSNFC	mg/Nm3		0.00470 @	0.00537	0.00511 @	
boiler outlet gas, vapor phase	Manganese	ICPSWNFC	mg/Nm3		< 0.00418 R	< 0.00388 R	< 0.00435 R	
condensate water	Manganese	ICPSWNFC	mg/L				< 0.01000	
fuel oil	Manganese	NAA	ug/g	0.0868	0.0714	0.0816	0.0751	0.0917
boiler outlet gas, HNO3 imp	Mercury	HGC_WN00	mg/Nm3		0.0000583 @	< 0.0000467	0.0000392 @	
boiler outlet gas, MnO4 imp	Mercury	HGC_WN00	mg/Nm3		< 0.0000297	< 0.0000291	< 0.0000290	
boiler outlet gas, particulate	Mercury	HGC_SN00	mg/kg		3.00	3.10	3.01	
boiler outlet gas, solid phase	Mercury	HGC_SN00	mg/Nm3		0.000106	0.000138	0.000126	
fuel oil	Mercury	NAA	ug/g	< 0.0328	< 0.0117	< 0.0223	0.0299	< 0.0247
boiler outlet gas, particulate	Molybdenum	ICPSSNFC	mg/kg		< 155	< 116	< 129	
boiler outlet gas, solid phase	Molybdenum	ICPSSNFC	mg/Nm3		< 0.00546	< 0.00519	< 0.00540	
boiler outlet gas, vapor phase	Molybdenum	ICPSWNFC	mg/Nm3		< 0.00765	< 0.0194	< 0.0217	
condensate water	Molybdenum	ICPSWNFC	mg/L				< 0.0500	
fuel oil	Molybdenum	NAA	ug/g	< 0.191	< 0.117	< 0.140	< 0.174	< 0.144
boiler outlet gas, solid phase	Naphthalene	627SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Naphthalene	627SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Nickel	ICPSSNFC	mg/kg		40789	34795	33876	
boiler outlet gas, solid phase	Nickel	ICPSSNFC	mg/Nm3		1.44	1.55	1.42	
boiler outlet gas, vapor phase	Nickel	ICPSWNFC	mg/Nm3		< 0.00530 R	< 0.00776	< 0.00870	
condensate water	Nickel	ICPSWNFC	mg/L				< 0.0200	
fuel oil	Nickel	NAA	ug/g	35.3	39.6	29.4	39.2	37.6
fuel oil	Nitrogen	ultimate	%wt	0.360	0.320	0.290	0.380	
boiler outlet gas, solid phase	N-Nitrosodiphenylamine	627SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	N-Nitrosodiphenylamine	627SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
fuel oil	Oxygen	ultimate	%wt	1.41	1.77	1.43	1.93	
boiler outlet gas, solid phase	Phenanthrene	627SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Phenanthrene	627SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Phosphate	PO4FWN00	mg/kg		< 2744	< 2781	< 3543	
boiler outlet gas, solid phase	Phosphate	PO4FWN00	mg/Nm3		< 0.0900	< 0.110	< 0.116	

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Site 13 Low NOx Data Used in Calculations

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Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
condensate water	Phosphate	PO4FWN00	mg/L				< 0.800	
boiler outlet gas, vapor phase	Phosphorus	P_ESWN00	mg/Nm3	< 0.123	< 0.114	< 0.120	< 0.120	
fuel oil	Phosphorus	elemental	mg/kg	0.450	0.660	0.690	0.650	
boiler outlet gas, solid phase	Pyrene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Pyrene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Selenium	SEHRSN00	mg/kg		18.4 @	26.5 @	< 6.46	
boiler outlet gas, solid phase	Selenium	SEHRSN00	mg/Nm3		0.000649 @	0.00118 @	< 0.000270	
boiler outlet gas, vapor phase	Selenium	SEHRSN00	mg/Nm3		0.00169 @	0.00186 @	0.00171 @	
condensate water	Selenium	SEHRWN00	mg/L				< 0.00500	
fuel oil	Selenium	NAA	ug/g	< 0.0676	< 0.0728	< 0.0538	< 0.0658	0.0753
fuel oil	Specific Gravity	D287	ug/g	0.947	0.944	0.947	0.951	0.955
boiler outlet gas, particulate	Sulfate	SF_FWN00	mg/kg		246341	305436	326248	
boiler outlet gas, solid phase	Sulfate	SF_FWN00	mg/Nm3		8.08	12.0	10.7	
boiler outlet gas, vapor phase	Sulfate	SFIFWN00	mg/Nm3	774	701	718	667	
condensate water	Sulfate	SFIFWN00	mg/L				< 0.0340	
fuel oil	Sulfur	ultimate	%wt	0.250	0.250	0.250	0.270	
boiler outlet gas, 20-L VOST	Toluene	GCMS	mg/Nm3	0.00280	0.00328	0.00178	0.00227	
boiler outlet gas, particulate	Vanadium	ICPSSNFC	mg/kg		5503	4494	4126	
boiler outlet gas, solid phase	Vanadium	ICPSSNFC	mg/Nm3		0.194	0.201	0.173	
boiler outlet gas, vapor phase	Vanadium	ICPSWNFC	mg/Nm3		< 0.00530	< 0.00309	< 0.00357	
condensate water	Vanadium	ICPSWNFC	mg/L				< 0.0200	
fuel oil	Vanadium	NAA	ug/g	6.57	5.82	5.99	5.89	5.58

Appendix E

Low-NO_x Data Not Used In Calculations

03-Feb-93 Site 13 Low NOx Data NOT Used In Calculations 1

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, 1-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	1,1-Dichloroethane	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	1,1-Dichloroethene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3	0.00306	0.00923	0.00838	0.0119	
boiler outlet gas, 5-L VOST	1,1,1-Trichloroethane	GCMS	mg/Nm3	0.00245	0.00618	0.00774	0.0145	
boiler outlet gas, 1-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	1,1,2-Trichloroethane	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	1,1,2,2-Tetrachloroethane	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	1,2-Dichlorobenzene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, solid phase	1,2-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	1,2-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, 1-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	1,2-Dichloroethane	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	1,2-Dichloropropane	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, solid phase	1,2,4-Trichlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	1,2,4-Trichlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	1,2,4,5-Tetrachlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	1,2,4,5-Tetrachlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, 1-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	1,3-Dichlorobenzene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, solid phase	1,3-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	1,3-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, 1-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	1,4-Dichlorobenzene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, solid phase	1,4-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	1,4-Dichlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, 1-L VOST	2-Butanone	GCMS	mg/Nm3	< 0.102	< 0.0985	< 0.104	< 0.103	

DO NOT CITE OR QUOTE

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, 20-L VOST	2-Butanone	GCMS	mg/Nm3	< 0.00509	< 0.00513	< 0.00524	< 0.00517	
boiler outlet gas, 5-L VOST	2-Butanone	GCMS	mg/Nm3	< 0.0204	< 0.0206	< 0.0209	< 0.0207	
boiler outlet gas, solid phase	2-Chlorophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2-Chlorophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, 1-L VOST	2-Hexanone	GCMS	mg/Nm3	< 0.102	< 0.0985	< 0.104	< 0.103	
boiler outlet gas, 20-L VOST	2-Hexanone	GCMS	mg/Nm3	< 0.00509	< 0.00513	< 0.00524	< 0.00517	
boiler outlet gas, 5-L VOST	2-Hexanone	GCMS	mg/Nm3	< 0.0204	< 0.0206	< 0.0209	< 0.0207	
boiler outlet gas, solid phase	2-Methylphenol(o-cresol)	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2-Methylphenol(o-cresol)	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2-Nitroaniline	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, vapor phase	2-Nitroaniline	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, solid phase	2-Nitrophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2-Nitrophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2-Picoline	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2-Picoline	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2,3,4,6-Tetrachlorophenol	827SSNT1	mg/Nm3	< 0.0127	< 0.0127	< 0.0122	< 0.0122	
boiler outlet gas, vapor phase	2,3,4,6-Tetrachlorophenol	827SSNT1	mg/Nm3	< 0.0127	< 0.0127	< 0.0122	< 0.0122	
boiler outlet gas, solid phase	2,4-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2,4-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2,4-Dimethylphenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2,4-Dimethylphenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2,4-Dinitrophenol	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, vapor phase	2,4-Dinitrophenol	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, solid phase	2,4-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2,4-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2,4,5-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2,4,5-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2,4,6-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2,4,6-Trichlorophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2,6-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2,6-Dichlorophenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	2,6-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	2,6-Dinitrotoluene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	3-Nitroaniline	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, vapor phase	3-Nitroaniline	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, solid phase	4-Chloro-3-methylphenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	4-Chloro-3-methylphenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, 1-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3	< 0.102	< 0.0985	< 0.104	< 0.103	
boiler outlet gas, 20-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3	< 0.00509	< 0.00513	< 0.00524	< 0.00517	
boiler outlet gas, 5-L VOST	4-Methyl-2-pentanone	GCMS	mg/Nm3	< 0.0204	< 0.0206	< 0.0209	< 0.0207	
boiler outlet gas, solid phase	4-Methylphenol(p-cresol)	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, vapor phase	4-Methylphenol(p-cresol)	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	4-Nitroaniline	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, vapor phase	4-Nitroaniline	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, solid phase	4-Nitrophenol	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, vapor phase	4-Nitrophenol	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, solid phase	4,6-Dinitro-2-methylphenol	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, vapor phase	4,6-Dinitro-2-methylphenol	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, vapor phase	Acetaldehyde	ALDELKAS	mg/Nm3		0.0193 @R	< 0.00835 R	< 0.00886 R	< 0.00892 R
boiler outlet gas, 1-L VOST	Acetone	GCMS	mg/Nm3	< 0.102	< 0.0985	< 0.104	< 0.103	
boiler outlet gas, 20-L VOST	Acetone	GCMS	mg/Nm3	< 0.00509	< 0.00513	< 0.00524	< 0.00517	
boiler outlet gas, 5-L VOST	Acetone	GCMS	mg/Nm3	< 0.0204	< 0.0206	< 0.0209	< 0.0207	
boiler outlet gas, solid phase	Acetophenone	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Acetophenone	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Acrolein	ALDELKAS	mg/Nm3		< 0.0102	< 0.0101	< 0.0107	< 0.0108
boiler outlet gas, solid phase	Aniline	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Aniline	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, particulate	Antimony	ICPSSNFC	mg/kg		< 310	< 233	< 258	
boiler outlet gas, solid phase	Antimony	ICPSSNFC	mg/Nm3		< 0.0109	< 0.0104	< 0.0108	
boiler outlet gas, vapor phase	Antimony	ICPSWNFC	mg/Nm3		< 0.0418 R	< 0.0154	< 0.0257	
condensate water	Antimony	ICPSWNFC	mg/L				< 0.1000	
fuel oil	Antimony	NAA	ug/g	0.387	0.183	0.136	0.165	0.180
boiler outlet gas, vapor phase	Benzaldehyde	ALDELKAS	mg/Nm3		< 0.0164	< 0.0161	< 0.0171	< 0.0172
boiler outlet gas, 1-L VOST	Benzene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 5-L VOST	Benzene	GCMS	mg/Nm3	0.00307	0.00268	< 0.00209	< 0.00207	
boiler outlet gas, solid phase	Benzoic acid	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, vapor phase	Benzoic acid	827SSNT1	mg/Nm3	0.103 @	0.0435 @	0.0765 @	< 0.0304	
boiler outlet gas, solid phase	Benzyl alcohol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Benzyl alcohol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	bis(2-Chloroethoxy)methane	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	bis(2-Chloroethoxy)methane	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	bis(2-Chloroethyl)ether	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	bis(2-Chloroethyl)ether	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	bis(2-Chloroisopropyl)ether	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	bis(2-Chloroisopropyl)ether	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	bis(2-Ethylhexyl)phthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	bis(2-Ethylhexyl)phthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Boron	ICPSWNFC	mg/Nm3		< 0.159	< 0.140	< 0.154	
condensate water	Boron	ICPSWNFC	mg/L				< 0.600	
fuel oil	Bromine	NAA	ug/g	0.307	0.510	0.205	0.295	0.304
boiler outlet gas, 1-L VOST	Bromodichloromethane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Bromodichloromethane	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, 5-L VOST	Bromodichloromethane	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	Bromoform	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Bromoform	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Bromoform	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	Bromomethane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Bromomethane	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Bromomethane	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
fuel oil	Cadmium	GFAA	ug/g	< 0.01000	< 0.01000	< 0.01000	< 0.01000	< 0.01000
boiler outlet gas, 1-L VOST	Carbon disulfide	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Carbon disulfide	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Carbon disulfide	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	Carbon tetrachloride	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Carbon tetrachloride	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Carbon tetrachloride	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
fuel oil	Cerium	NAA	ug/g	0.0903	0.103	0.0743	0.118	0.104
fuel oil	Cesium	NAA	ug/g	< 0.0165	< 0.0183	< 0.0140	< 0.0170	< 0.0139
fuel oil	Chlorine	elemental	%wt	0.0200	0.0200	0.0200	0.0200	
boiler outlet gas, 1-L VOST	Chlorobenzene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Chlorobenzene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Chlorobenzene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	Chloroethane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Chloroethane	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Chloroethane	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	Chloroform	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Chloroform	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Chloroform	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	Chloromethane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Chloromethane	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Chloromethane	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	cis-1,2-Dichloroethene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	cis-1,3-Dichloropropene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	Dibromochloromethane	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Dibromochloromethane	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Dibromochloromethane	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, solid phase	Dibutylphthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Dibutylphthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Diethylphthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, vapor phase	Diethylphthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Dimethylphenethylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Dimethylphenethylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Dimethylphthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Dimethylphthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Di-n-octylphthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Di-n-octylphthalate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Diphenylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Diphenylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, 1-L VOST	Ethyl benzene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Ethyl benzene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Ethyl benzene	GCMS	mg/Nm3	< 0.00204	< 0.00206	0.00544	< 0.00207	
boiler outlet gas, solid phase	Ethyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Ethyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
fuel oil	Europium	NAA	ug/g	< 0.00300	< 0.00320	< 0.00240	< 0.00290	< 0.00230
fuel oil	Hafnium	NAA	ug/g	< 0.0109	< 0.0122	< 0.00870	< 0.0106	< 0.00890
boiler outlet gas, solid phase	Hexachlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Hexachlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Hexachlorobutadiene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Hexachlorobutadiene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Hexachlorocyclopentadiene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Hexachlorocyclopentadiene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Hexachloroethane	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Hexachloroethane	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
fuel oil	Iodine	NAA	ug/g	< 0.0642	< 0.0466	< 0.0579	< 0.0546	< 0.0632
boiler outlet gas, solid phase	Isophorone	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Isophorone	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
fuel oil	Lanthanum	NAA	ug/g	0.140	0.171	0.143	0.197	0.194
fuel oil	Lutetium	NAA	ug/g	< 0.00150	< 0.00170	< 0.001000	< 0.00150	< 0.00130
fuel oil	Mercury	DGAAA	ug/g		0.130	0.150	0.250	0.160
boiler outlet gas, solid phase	Methyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Methyl methanesulfonate	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, 1-L VOST	Methylene chloride	GCMS	mg/Nm3	2.45 E	0.473	0.198	0.268	
boiler outlet gas, 20-L VOST	Methylene chloride	GCMS	mg/Nm3	0.00204	0.00195	0.00890	0.00227	
boiler outlet gas, 5-L VOST	Methylene chloride	GCMS	mg/Nm3	0.0715	0.00700	0.00669	0.0310	
boiler outlet gas, 1-L VOST	m,p-Xylene	GCMS	mg/Nm3	< 0.0102	< 0.00985	0.0115	< 0.0103	
boiler outlet gas, 20-L VOST	m,p-Xylene	GCMS	mg/Nm3	0.00173	0.000923	0.00183	0.00119	
boiler outlet gas, 5-L VOST	m,p-Xylene	GCMS	mg/Nm3	< 0.00204	< 0.00206	0.0155	< 0.00207	
fuel oil	Neodymium	NAA	ug/g	< 0.524	< 0.553	0.419	< 0.539	0.479
boiler outlet gas, solid phase	Nitrobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Nitrobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, solid phase	N-Nitrosodimethylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	N-Nitrosodimethylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	N-Nitroso-di-n-butylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	N-Nitroso-di-n-butylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	N-Nitrosodipropylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	N-Nitrosodipropylamine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	N-Nitrosopiperidine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	N-Nitrosopiperidine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, 1-L VOST	o-Xylene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	o-Xylene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	o-Xylene	GCMS	mg/Nm3	< 0.00204	< 0.00206	0.00544	< 0.00207	
boiler outlet gas, solid phase	p-Chloroaniline	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	p-Chloroaniline	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	p-Dimethylaminoazobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	p-Dimethylaminoazobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Pentachlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Pentachlorobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Pentachloronitrobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Pentachloronitrobenzene	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Pentachlorophenol	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, vapor phase	Pentachlorophenol	827SSNT1	mg/Nm3	< 0.0318	< 0.0317	< 0.0305	< 0.0304	
boiler outlet gas, solid phase	Phenacetin	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Phenacetin	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Phenol	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Phenol	827SSNT1	mg/Nm3	0.0139 @	0.0113 @	< 0.00609	0.00932 @	
boiler outlet gas, particulate	Potassium	ICPSSNFC	mg/kg		< 9302	< 6985	< 7752	
boiler outlet gas, solid phase	Potassium	ICPSSNFC	mg/Nm3		< 0.327	< 0.312	< 0.324	
boiler outlet gas, vapor phase	Potassium	ICPSWNFC	mg/Nm3		< 0.459	< 0.463	< 0.535	
condensate water	Potassium	ICPSWNFC	mg/L				< 3.00	
fuel oil	Potassium	NAA	ug/g	< 50.0	< 34.7	< 44.2	< 42.9	< 53.1
boiler outlet gas, solid phase	Pronamide	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Pronamide	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, solid phase	Pyridine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
boiler outlet gas, vapor phase	Pyridine	827SSNT1	mg/Nm3	< 0.00636	< 0.00634	< 0.00609	< 0.00609	
fuel oil	Rubidium	NAA	ug/g	< 0.445	< 0.473	< 0.322	< 0.453	< 0.390
fuel oil	Samarium	NAA	ug/g	0.00160	< 0.000500	0.001000	0.00110	< 0.000800
fuel oil	Scandium	NAA	ug/g	0.00130	0.00150	0.00130	0.00170	0.00120
boiler outlet gas, vapor phase	Silicon	ICPSWNFC	mg/Nm3		< 0.418	< 0.388 R	< 0.435 R	
condensate water	Silicon	ICPSWNFC	mg/L				< 1.000	
boiler outlet gas, particulate	Silver	ICPSSNFC	mg/kg		< 15.5	< 23.3	< 25.8	
boiler outlet gas, solid phase	Silver	ICPSSNFC	mg/Nm3		< 0.000546	< 0.00104	< 0.00108	

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, vapor phase	Silver	ICPSWNFC	mg/Nm3		< 0.00418 R	< 0.00154	< 0.00435 R	
condensate water	Silver	ICPSWNFC	mg/L				< 0.01000	
fuel oil	Silver	NAA	ug/g	< 0.0707	< 0.0770	< 0.0537	< 0.0673	< 0.0561
boiler outlet gas, particulate	Sodium	ICPSSNFC	mg/kg		41955	23528	20663	
boiler outlet gas, solid phase	Sodium	ICPSSNFC	mg/Nm3		1.48	1.05	0.864	
boiler outlet gas, vapor phase	Sodium	ICPSWNFC	mg/Nm3		< 0.418 R	< 0.388 R	< 0.435 R	
condensate water	Sodium	ICPSWNFC	mg/L				< 1.000	
fuel oil	Sodium	flame aa	ug/g	24.7	20.4	41.9	47.3	70.6
fuel oil	Sodium	NAA	ug/g	11.9	10.9	10.9	15.9	18.0
boiler outlet gas, particulate	Strontium	ICPSSNFC	mg/kg		201	152	134	
boiler outlet gas, solid phase	Strontium	ICPSSNFC	mg/Nm3		0.00707	0.00676	0.00559	
boiler outlet gas, vapor phase	Strontium	ICPSWNFC	mg/Nm3		< 0.00125 R	< 0.00116 R	< 0.00130 R	
condensate water	Strontium	ICPSWNFC	mg/L				< 0.00300	
fuel oil	Strontium	NAA	ug/g	< 4.62	< 5.21	< 3.72	< 4.73	< 3.76
boiler outlet gas, 1-L VOST	Styrene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Styrene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Styrene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
fuel oil	Tantalum	NAA	ug/g	< 0.0119	< 0.0135	< 0.00930	< 0.0115	< 0.00920
fuel oil	Terbium	NAA	ug/g	< 0.0255	< 0.0419	< 0.0637	< 0.0383	< 0.0633
boiler outlet gas, 1-L VOST	Tetrachloroethene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Tetrachloroethene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Tetrachloroethene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, particulate	Thallium	ICPSSNFC	mg/kg		< 310	< 233	< 129	
boiler outlet gas, solid phase	Thallium	ICPSSNFC	mg/Nm3		< 0.0109	< 0.0104	< 0.00540	
boiler outlet gas, vapor phase	Thallium	ICPSWNFC	mg/Nm3		< 0.0153	< 0.0154	< 0.0257	
condensate water	Thallium	ICPSWNFC	mg/L				< 0.1000	
fuel oil	Thorium	NAA	ug/g	< 0.00890	< 0.00950	< 0.00680	< 0.00870	< 0.00720
fuel oil	Tin	NAA	ug/g	< 5.00	< 1.000	< 1.000	< 1.000	< 1.000
boiler outlet gas, particulate	Titanium	TIESSN00	mg/kg		819	807	607 @	
boiler outlet gas, solid phase	Titanium	TIESSN00	mg/Nm3		0.0288	0.0360	0.0254 @	
boiler outlet gas, vapor phase	Titanium	TIESWN00	mg/Nm3		< 0.0209 R	< 0.0194 R	< 0.00891 R	
fuel oil	Titanium	NAA	ug/g	< 4.51	< 3.51	< 4.33	< 4.10	< 4.76
boiler outlet gas, 1-L VOST	Toluene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	0.0134	
boiler outlet gas, 5-L VOST	Toluene	GCMS	mg/Nm3	0.00613	0.00350	0.00335	0.00269	
boiler outlet gas, 1-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	trans-1,2-Dichloroethene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	trans-1,3-Dichloropropene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	Trichloroethene	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	

Cited name	Substance	Method	UOM	Run J	Run K	Run L	Run M	Run N
boiler outlet gas, 20-L VOST	Trichloroethene	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Trichloroethene	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
boiler outlet gas, 1-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3	< 0.0102	0.0453	0.0375	< 0.0103	
boiler outlet gas, 20-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3	0.00321	0.00431	0.00230	0.00775	
boiler outlet gas, 5-L VOST	Trichlorofluoromethane	GCMS	mg/Nm3	0.00368	0.00309	0.00377	0.00414	
fuel oil	Tungsten	NAA	ug/g	< 0.500	< 0.500	< 0.500	< 0.500	< 0.500
fuel oil	Uranium	NAA	ug/g	< 0.0246	< 0.0205	< 0.0180	< 0.0231	< 0.0188
fuel oil	Vanadium	GFAA	ug/g	4.87	5.33	4.66	4.74	4.02
boiler outlet gas, 1-L VOST	Vinyl acetate	GCMS	mg/Nm3	< 0.102	< 0.0985	< 0.104	< 0.103	
boiler outlet gas, 20-L VOST	Vinyl acetate	GCMS	mg/Nm3	0.0112	< 0.00513	< 0.00524	< 0.00517	
boiler outlet gas, 5-L VOST	Vinyl acetate	GCMS	mg/Nm3	< 0.0204	< 0.0206	< 0.0209	< 0.0207	
boiler outlet gas, 1-L VOST	Vinyl chloride	GCMS	mg/Nm3	< 0.0102	< 0.00985	< 0.0104	< 0.0103	
boiler outlet gas, 20-L VOST	Vinyl chloride	GCMS	mg/Nm3	< 0.000509	< 0.000513	< 0.000524	< 0.000517	
boiler outlet gas, 5-L VOST	Vinyl chloride	GCMS	mg/Nm3	< 0.00204	< 0.00206	< 0.00209	< 0.00207	
fuel oil	Water by distillation	distillation	%wt	0.770	0.750	0.860	0.530	
fuel oil	Ytterbium	NAA	ug/g	< 0.0123	< 0.0133	< 0.00690	< 0.0115	< 0.0116
boiler outlet gas, particulate	Zinc	ICPSSNFC	mg/kg		909	1129	770	
boiler outlet gas, solid phase	Zinc	ICPSSNFC	mg/Nm3		0.0320	0.0504	0.0322	
boiler outlet gas, vapor phase	Zinc	ICPSWNFC	mg/Nm3		< 0.00838 R	< 0.00776	< 0.00870 R	
condensate water	Zinc	ICPSWNFC	mg/L				< 0.0200	
fuel oil	Zinc	NAA	ug/g	0.621	0.604	0.694	0.686	0.859
fuel oil	Zirconium	NAA	ug/g	< 4.67	< 4.94	< 3.54	< 4.42	< 3.89

Appendix F

Process Stream Flows and Flue Gas Sampling Data

Table F-1

Process Stream Flows at Site 13

Stream	Baseline Testing Mean Flow Rate	Baseline Testing Std. Dev.	Low NO_x Testing Mean Flow Rate	Low NO_x Testing Std. Dev.
Fuel Oil (lb/hr)	156,000	11,800	163,000	4,660
Atomizing Steam (lb/hr)	26,400	2,460	28,100	1,120
Fabric Filter Collected Ash (lb/hr)	0.398	0.097	--	--
South Reheat Duct Gas (dscfm)	227,000	4,260	237,000	5,250
Total Boiler Outlet Gas (dscfm)	784,000	14,700	818,000	18,100
Fabric Filter Inlet Gas (dscfm)	2,860	171	--	--
Fabric Filter Outlet Gas (dscfm)	3,300	59	--	--

PRELIMINARY

DO NOT CITE OR QUOTE

Table F-2

Site 13 Sample Times and Comments for Baseline Tests

Sample Dates & Tests Conducted	Boiler Outlet Start Time	Boiler Outlet Stop Time	PJFF Inlet Start Time	PJFF Inlet Stop Time	PJFF Outlet Start Time	PJFF Outlet Stop Time	Comments
Monday, 3/25/91							Unit operated at lower load - 280 MW due to ID fan #24 out of service starting at 0845 and lasting throughout the test day. Resulted in nonuniform gas flow through the boiler exit ducts and higher than normal flue gas temperatures for the south reheat duct.
MM5-A	1317	1633	1309	1622	1317	1656	
Anions-A	1823	2044	1822	2017	1835	2031	
Cyclade	1547	1910	-	-	-	-	
U of W	-	-	1550	1937	1657	2043	
Tuesday, 3/26/91							Unit operated at required test load of 345 MW. Fast load pick-up (increased load due to emergency demand to 357 MW) at 1657. Unit back to original test load at 1715. Opacity spikes during load swing. May affect metals, VOST at PJFF, and PSD at boiler outlet test results.
Aldehydes-B	1004	1028	1000	1024	1003	1027	
MM5-B	1229	1440	1228	1443	1225	1440	
Metals-B	1700	2005	1653	1923	1645	1915	
VOST-B	1750	1851	1650	1752	1651	1750	
Cyclade	1315	1938	-	-	-	-	
U of W	-	-	1046	1339	1124	1918	

Table F-2 (Continued)

Sample Dates & Tests Conducted	Boiler Outlet Start Time	Boiler Outlet Stop Time	PJFF Inlet Start Time	PJFF Inlet Stop Time	PJFF Outlet Start Time	PJFF Outlet Stop Time	Comments
Wednesday, 3/27/91							Unit operation steady at 345 MW except for upset at 1636 - lost main electrical feed which reduced fuel oil header pressure and draft momentarily. Opacity spiked and CO concentration spiked to 540 ppm. May effect VOST and PSD at boiler outlet test results.
MM5-C	0950	1212	0950	1205	0953	1213	
Anions-C	1416	1634	1422	1611	1428	1616	
VOST-C	1531	1642	1530	1717	1535	1717	
Aldehydes-C	1711	1735	1712	1733	1714	1736	
Cyclade	1145	1935	-	-	-	-	
U of W	-	-	1350	1555	1002	1752	
Thursday, 3/28/91							Unit operation steady at 340 MW except for blowing down steam drum from 1330 to 1630 due to high silica levels. Opacity, fuel and air flow rates increased slightly during blowdown period. May effect metals, VOST, and PSD test results.
MM5-D	1038	1256	1023	1238	1020	1235	
Metals-D	1417	1636	1418	1658	1415	1650	
VOST-D	1641	1747	1655	1823	1647	1807	
Cyclade	-	-	-	-	-	-	
U of W	-	-	1100	1248	1015	1836	
U of W	-	-	1550	1747	-	-	

DO NOT CITE OR QUOTE

Table F-2 (Continued)

Sample Dates & Tests Conducted	Boiler Outlet Start Time	Boiler Outlet Stop Time	PJFF Inlet Start Time	PJFF Inlet Stop Time	PJFF Outlet Start Time	PJFF Outlet Stop Time	Comments
Friday, 3/29/91							Unit operation steady at 343 MW throughout testing. Testing started late due to condenser screens plugged at 1020 - required unit to operate at reduced load until problem was fixed.
Metals-E	1334	1551	1335	1705	1342	1607	
Anions-E	1710	1922	1716	1916	1711	1911	
Aldehydes-E	2000	2022	2000	2020	2004	2024	
Cyclade	1358	2045	-	-	-	-	
U of W	-	-	1352	1528	1402	1740	

MM5 = Modified Method 5 Sample Train for Semivolatiles

Cyclade = High Volume Particle Size Determination

U of W = University of Washington Modified Mark V Impactor

Table F-3

Site 13 Sample Times and Comments for Low-NO_x Tests

Sample Dates & Tests Conducted	Boiler Outlet Start Time	Boiler Outlet Stop Time	PJFF Inlet Start Time	PJFF Inlet Stop Time	PJFF Outlet Start Time	PJFF Outlet Stop Time	Comments
Monday, 4/1/91							Unit operated at higher load - 359 MW due to load demand. Four burners out of service during low NO_x firing. Testing stopped early due to high fuel oil header pressure and flames hitting the back wall of the boiler.
MM5-J	1238	1503	-	-	-	-	
VOST-J	1248	1352	-	-	-	-	
Anions-J	1415	1627	-	-	-	-	
Cyclade	1300	1630	-	-	-	-	
U of W	-	-	-	-	-	-	
Tuesday, 4/2/91							Unit operated at 330 to 340 MW. Five burners were out of service - three on superheat furnace and two on reheat furnace. Gas recirculation flow reduced at 1450 due to high gas recirculation fan outlet temperature; resulted in lower load even though the fuel oil flow rate stayed the same.
MM5-K	1340	1612	-	-	-	-	
VOST-K	1350	1457	-	-	-	-	
Anions-K	1515	1738	-	-	-	-	
Metals-K	1715	2004	-	-	-	-	
Aldehydes-K	1807	1837	-	-	-	-	
Cyclade	1402	1934	-	-	-	-	
U of W	-	-	1818	1906	-	-	

DO NOT CITE OR QUOTE

Table F-3 (Continued)

Sample Dates & Tests Conducted	Boiler Outlet Start Time	Boiler Outlet Stop Time	PJFF Inlet Start Time	PJFF Inlet Stop Time	PJFF Outlet Start Time	PJFF Outlet Stop Time	Comments
Wednesday, 4/3/91							Unit operated at 345 MW with four burners out of service.
VOST-L	1142	1251	-	-	-	-	
MM5-L	1145	1411	-	-	-	-	
Anions-L	1259	1515	-	-	-	-	
Metals-L	1510	1750	-	-	-	-	
Aldehydes-L	1532	1600	-	-	-	-	
Cyclade	1204	1822	-	-	-	-	
U of W	-	-	1532	1644	-	-	

Table F-3 (Continued)

Sample Dates & Tests Conducted	Boiler Outlet Start Time	Boiler Outlet Stop Time	PJFF Inlet Start Time	PJFF Inlet Stop Time	PJFF Outlet Start Time	PJFF Outlet Stop Time	Comments
Thursday, 4/4/91							Unit operated at 335 to 340 MW. Five burners were out of service - two on superheat furnace and three on reheat furnace. Reduced load by 4 MW at 1400 due to high fuel oil header pressure.
VOST-M	1305	1409	-	-	-	-	
MM5-M	1306	1529	-	-	-	-	
Anions-M	1417	1624	-	-	-	-	
Aldehydes-M	1634	1700	-	-	-	-	
Metals-M	1640	1909	-	-	-	-	
Aldehydes-N	1708	1734	-	-	-	-	
Cyclade	1313	1902	-	-	-	-	
U of W	-	-	1542	1629	-	-	
U of W	-	-	1726	1813	-	-	

MM5 = Modified Method 5 Sample Train for Semivolatiles.

Cyclade = High Volume Particle Size Determination.

U of W = University of Washington Modified Mark V Impactor.

DO NOT CITE OR QUOTE

Table F-4

Site 13 Solid and Liquid Sample Times

Sample Dates	Fuel Oil	Boiler Condensate Water	PJFF Hopper Solids	Limestone	Comments
Monday, 3/25/91, A	1550	1600	-	-	
Tuesday, 3/26/91, B	1600	1610	-	-	Duplicate samples collected
Wednesday, 3/27/91, C	1615	1615	-	-	
Thursday, 3/28/91, D	1630	1640	-	-	Duplicate samples collected
Friday, 3/29/91, E	1535	1535	-	-	
Saturday, 3/30/91	-	-	1000	1100	
Monday, 4/1/91, J	1700	1700	-	-	
Tuesday, 4/2/91, K	1900	1915	-	-	
Wednesday, 4/3/91, L	1615	1615	-	-	
Thursday, 4/4/91, M	1910	1910	-	-	
Friday, 4/5/91, N	2130	-	-	-	

MULTI-METALS

PARAMETER	PJFF Inlet		PJFF Outlet		Boiler Outlet	
Date	3/26/91		3/26/91		3/26/91	
Dry Standard Meter Volume	72.977	DSCF	77.678	DSCF	54.744	DSCF
Percent Flue Gas Moisture	10.11	%	8.51	%	10.41	%
Flue Gas Molecular Weight (wet)	28.82	g/g-mole	28.61	g/g-mole	28.68	g/g-mole
Average Gas Velocity	45	ft/sec	50.61	ft/sec	52.44	ft/sec
Average Flue Gas Flow Rate	4,520	ACFM	5,084	ACFM	367,018	ACFM
Average Flue Gas Flow Rate	2,860	DSCFM	3,312	DSCFM	225,535	DSCFM
Isokinetic Sampling Rate	107.9	%	96.8	%	100.0	%
Oxygen Concentration	7	%	6.00	%	6	%
Total Mass of Particulate Solids	0.0564	grams	0.0086	grams	0.0655	grams
Particulate Concentration	0.0119	gr/DSCF	0.0017	gr/DSCF	0.0184	gr/DSCF
Particulate Emissions	0.29	lb/hr	0.05	lb/hr	35.70	lb/hr
Impinger Volumes (imp 1&2)	715.6	grams	650	grams	676	grams
Impinger Volumes (imp 3&4)	561.2	grams	561.2	grams	568.7	grams

PARAMETER	PJFF Inlet		PJFF Outlet		Boiler Outlet	
Date	3/28/91		3/28/91		3/28/91	
Dry Standard Meter Volume	70.331	DSCF	73.798	DSCF	61.609	DSCF
Percent Flue Gas Moisture	9.56	%	8.66	%	10.32	%
Flue Gas Molecular Weight (wet)	28.82	g/g-mole	28.71	g/g-mole	28.73	g/g-mole
Average Gas Velocity	48.07	ft/sec	50.32	ft/sec	55.87	ft/sec
Average Flue Gas Flow Rate	4,828	ACFM	5,055	ACFM	391,028	ACFM
Average Flue Gas Flow Rate	3,031	DSCFM	3,232	DSCFM	232,039	DSCFM
Isokinetic Sampling Rate	98.1	%	95.7	%	99.4	%
Oxygen Concentration	7	%	7	%	9	%
Total Mass of Particulate Solids	0.0811	grams	0.0076	grams	0.0976	grams
Particulate Concentration	0.0178	gr/DSCF	0.0016	gr/DSCF	0.0244	gr/DSCF
Particulate Emissions	0.46	lb/hr	0.04	lb/hr	48.63	lb/hr
Impinger Volumes (imp 1&2)	693.3	grams	423.8	grams	677.5	grams
Impinger Volumes (imp 3&4)	549.5	grams	569.5	grams	550.2	grams

PARAMETER	PJFF Inlet		PJFF Outlet		Boiler Outlet	
Date	03/29/91		03/29/91		03/29/91	
Dry Standard Meter Volume	68.94	DSCF	75.228	DSCF	62.652	DSCF
Percent Flue Gas Moisture	10.07	%	7.21	%	10.56	%
Flue Gas Molecular Weight (wet)	28.65	g/g-mole	28.91	g/g-mole	28.64	g/g-mole
Average Gas Velocity	42.32	ft/sec	50.5	ft/sec	55.76	ft/sec
Average Flue Gas Flow Rate	4,251	ACFM	5,073	ACFM	390,196	ACFM
Average Flue Gas Flow Rate	2,690	DSCFM	3,347	DSCFM	233,623	DSCFM
Isokinetic Sampling Rate	108.4	%	94.3	%	100.4	%
Oxygen Concentration	6	%	6	%	7.5	%
Total Mass of Particulate Solids	0.0878	grams	0.0087	grams	0.0879	grams
Particulate Concentration	0.0197	gr/DSCF	0.0018	gr/DSCF	0.0217	gr/DSCF
Particulate Emissions	0.45	lb/hr	0.05	lb/hr	43.36	lb/hr
Impinger Volumes (imp 1&2)	745.3	grams	706.2	grams	744.4	grams
Impinger Volumes (imp 3&4)	576.1	grams	575.6	grams	576.6	grams

Multi-Metals

PARAMETER	Boiler Outlet	
Date	04/2/91	
Dry Standard Meter Volume	69.467	DSCF
Percent Flue Gas Moisture	10	%
Flue Gas Molecular Weight (wet)	28.76	g/g-mole
Average Gas Velocity	55.32	ft/sec
Average Flue Gas Flow Rate	235,642	DSCFM
Isokinetic Sampling Rate	101.2	%
Oxygen Concentration	7	%
Total Mass of Particulate Solids	0.0645	grams
Particulate Concentration	0.0143	gr/DSCF
Particulate Emissions	28.95	lb/hr
Impinger Volumes (imp 1&2)	765.7	grams
Impinger Volumes (imp 3&4)	550.6	grams

PARAMETER	Boiler Outlet	
Date	04/03/91	
Dry Standard Meter Volume	72.958	DSCF
Percent Flue Gas Moisture	10.07	%
Flue Gas Molecular Weight (wet)	28.85	g/g-mole
Average Gas Velocity	56.33	ft/sec
Average Flue Gas Flow Rate	241,480	DSCFM
Isokinetic Sampling Rate	101.8	%
Oxygen Concentration	5.5	%
Total Mass of Particulate Solids	0.0859	grams
Particulate Concentration	0.0181	gr/DSCF
Particulate Emissions	37.62	lb/hr
Impinger Volumes (imp 1&2)	746.9	grams
Impinger Volumes (imp 3&4)	560.4	grams

PARAMETER	Boiler Outlet	
Date	04/04/91	
Dry Standard Meter Volume	70.136	DSCF
Percent Flue Gas Moisture	9.86	%
Flue Gas Molecular Weight (wet)	28.87	g/g-mole
Average Gas Velocity	55.06	ft/sec
Average Flue Gas Flow Rate	237,439	DSCFM
Isokinetic Sampling Rate	101.4	%
Oxygen Concentration	5.5	%
Total Mass of Particulate Solids	0.0774	grams
Particulate Concentration	0,0170	gr/DSCF
Particulate Emissions	34.67	lb/hr
Impinger Volumes (imp 1&2)	804.6	grams
Impinger Volumes (imp 3&4)	517.1	grams

MODIFIED METHOD 5

PARAMETER	PJFF Inlet		PJFF Outlet		Boiler Outlet	
Date	3/25/91		3/25/91		3/25/91	
Dry Standard Meter Volume	66.071	DSCF	75.135	DSCF	54.833	DSCF
Percent Flue Gas Moisture	10.11	%	8.51	%	10.41	%
Flue Gas Molecular Weight (wet)	28.55	g/g-mole	28.8	g/g-mole	28.68	g/g-mole
Average Gas Velocity	46.82	ft/sec	51.82	ft/sec	55.85	ft/sec
Average Flue Gas Flow Rate	4,703	ACFM	5,206	ACFM	390,840	ACFM
Average Flue Gas Flow Rate	2,853	DSCFM	3,235	DSCFM	224,852	DSCFM
Isokinetic Sampling Rate	102.3	%	99.0	%	103.4	%

PARAMETER	PJFF Inlet		PJFF Outlet		Boiler Outlet	
Date	3/26/91		3/26/91		3/26/91	
Dry Standard Meter Volume	70.900	DSCF	73.09	DSCF	54.812	DSCF
Percent Flue Gas Moisture	9.56	%	8.51	%	10.41	%
Flue Gas Molecular Weight (wet)	28.89	g/g-mole	28.61	g/g-mole	28.68	g/g-mole
Average Gas Velocity	46.51	ft/sec	50.49	ft/sec	54.12	ft/sec
Average Flue Gas Flow Rate	4,672	ACFM	5,072	ACFM	378,770	ACFM
Average Flue Gas Flow Rate	2,980	DSCFM	3,187	DSCFM	233,536	DSCFM
Isokinetic Sampling Rate	103.9	%	97.8	%	96.7	%

PARAMETER	PJFF Inlet		PJFF Outlet		Boiler Outlet	
Date	3/27/91		3/27/91		3/27/91	
Dry Standard Meter Volume	68.535	DSCF	76.129	DSCF	59.729	DSCF
Percent Flue Gas Moisture	10.07	%	8.66	%	10.41	%
Flue Gas Molecular Weight (wet)	28.65	g/g-mole	28.74	g/g-mole	28.75	g/g-mole
Average Gas Velocity	46.08	ft/sec	52.81	ft/sec	52.94	ft/sec
Average Flue Gas Flow Rate	4,628	ACFM	5,305	ACFM	370,475	ACFM
Average Flue Gas Flow Rate	2,969	DSCFM	3,503	DSCFM	226,518	DSCFM
Isokinetic Sampling Rate	100.8	%	92.6	%	98.8	%

PARAMETER	PJFF Inlet		PJFF Outlet		Boiler Outlet	
Date	3/28/91		3/28/91		3/28/91	
Dry Standard Meter Volume	68.627	DSCF	75.202	DSCF	60.511	DSCF
Percent Flue Gas Moisture	9.56	%	8.66	%	10.56	%
Flue Gas Molecular Weight (wet)	28.82	g/g-mole	28.71	g/g-mole	28.7	g/g-mole
Average Gas Velocity	45.93	ft/sec	51.76	ft/sec	56.48	ft/sec
Average Flue Gas Flow Rate	4,613	ACFM	5,199	ACFM	386,839	ACFM
Average Flue Gas Flow Rate	2,905	DSCFM	3,328	DSCFM	235,075	DSCFM
Isokinetic Sampling Rate	103.2	%	96.3	%	95.7	%

PRELIMINARY

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MODIFIED METHOD 5

PARAMETER	Boiler Outlet	
Date	04/01/91	
Dry Standard Meter Volume	59.6	DSCF
Percent Flue Gas Moisture	10	%
Flue Gas Molecular Weight (wet)	28.76	g/g-mole
Average Gas Velocity	59.52	ft/sec
Average Flue Gas Flow Rate	247,562	DSCFM
Isokinetic Sampling Rate	99.2	%

PARAMETER	Boiler Outlet	
Date	04/02/91	
Dry Standard Meter Volume	59.765	DSCF
Percent Flue Gas Moisture	10	%
Flue Gas Molecular Weight (wet)	28.85	g/g-mole
Average Gas Velocity	55.32	ft/sec
Average Flue Gas Flow Rate	233,415	DSCFM
Isokinetic Sampling Rate	95.9	%

PARAMETER	Boiler Outlet	
Date	04/03/91	
Dry Standard Meter Volume	62.215	DSCF
Percent Flue Gas Moisture	10.07	%
Flue Gas Molecular Weight (wet)	28.85	g/g-mole
Average Gas Velocity	54.86	ft/sec
Average Flue Gas Flow Rate	235,088	DSCFM
Isokinetic Sampling Rate	106.4	%

PARAMETER	Boiler Outlet	
Date	04/04/91	
Dry Standard Meter Volume	62.255	DSCF
Percent Flue Gas Moisture	9.86	%
Flue Gas Molecular Weight (wet)	28.87	g/g-mole
Average Gas Velocity	54.43	ft/sec
Average Flue Gas Flow Rate	234,120	DSCFM
Isokinetic Sampling Rate	99.6	%

VOST DATA

Run No.	Pair No.	Date	Start Time	Stop Time	Volume at Meter (l)	DGMCF	Meter Temp (deg F)	Probe Temp (deg F)	Bar. Pressure (in. Hg)	as Volume Collected (Std l)
Boiler Outlet	A	03/26/91	1750	1830	20.00	1.037	66	263	30.6	21.29
RUN NO.1	B	03/26/91	1834	1844	5.00	1.037	64	270	30.6	5.34
	C	03/26/91	1849	1851	1.00	1.037	63	250	30.6	1.07
Boiler Outlet	A	03/27/91	1531	1611	20.22	1.037	68	288	30.15	21.13
RUN NO.2	B	03/27/91	1618	1628	5.00	1.037	72	270	30.15	5.19
	C	03/27/91	1640	1642	1.00	1.037	71	260	30.15	1.04
Boiler Outlet	A	03/28/91	1641	1721	21.04	1.037	87	259	29.92	21.06
RUN NO.3	B	03/28/91	1729	1739	5.18	1.037	84	260	29.92	5.21
	C	03/28/91	1745	1747	1.00	1.037	83	256	29.92	1.01
Baghouse Outlet	A	03/26/91	1651	1731	20.02	1.038	57	293	30.6	21.71
RUN NO.1	B	03/26/91	1734	1744	5.00	1.038	57	283	30.6	5.42
	C	03/26/91	1748	1750	1.00	1.038	55	291	30.6	1.09
Baghouse Outlet	A	03/27/91	1535	1615	20.00	1.038	62	279	30.15	21.16
RUN NO.2	B	03/27/91	1632	1642	5.00	1.038	66	281	30.15	5.25
	C	03/27/91	1715	1717	1.00	1.038	64	280	30.15	1.05
Baghouse Outlet	A	03/28/91	1647	1727	20.01	1.038	84	281	29.92	20.16
RUN NO.3	B	03/28/91	1734	1744	5.07	1.038	82	280	29.92	5.13
	C	03/28/91	1805	1807	1.02	1.038	80	280	29.92	1.04
Baghouse Inlet	A	03/26/91	1650	1730	20.01	0.996	55	274	30.06	20.53
RUN NO.1	B	03/26/91	1735	1745	5.02	0.996	55	278	30.06	5.15
	C	03/26/91	1750	1752	1.10	0.996	55	278	30.06	1.13
Baghouse Inlet	A	03/27/91	1530	1610	20.00	0.996	64	283	30.15	20.25
RUN NO.2	B	03/27/91	1634	1644	5.00	0.996	66	280	30.15	5.04
	C	03/27/91	1715	1717	1.00	0.996	65	276	30.15	1.01
Baghouse Inlet	A	03/28/91	1655	1735	20.01	0.996	85	281	29.92	19.31
RUN NO.3	B	03/28/91	1800	1810	5.10	0.996	83	280	29.92	4.94
	C	03/28/91	1821	1813	1.01	0.996	82	279	29.92	0.98

PRELIMINARY

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VOST DATA

Run No.	Pair No.	Date	Start Time	Stop Time	Volume at Meter (l)	DGMCF	Meter Temp (deg F)	Probe Temp (deg F)	Bar. Pressure (in. Hg)	as Volume Collected (Std l)
Boiler Outlet	A	04/1/91	1248	1328	20.03	1.037	64	273	30.12	21.07
RUN NO.1	B	04/1/91	1333	1343	4.98	1.037	63	272	30.12	5.25
	C	04/1/91	1350	1352	1.00	1.037	64	277	30.12	1.05
Boiler Outlet	A	04/02/91	1350	1430	20.00	1.037	68	267	30.17	20.93
RUN NO.2	B	04/02/91	1440	1450	5.00	1.037	70	261	30.17	5.21
	C	04/02/91	1455	1457	1.05	1.037	70	264	30.17	1.09
Boiler Outlet	A	04/03/91	1142	1222	20.00	1.037	85	261	30.52	20.50
RUN NO.3	B	04/03/91	1231	1241	5.00	1.037	84	272	30.52	5.13
	C	04/03/91	1249	1251	1.00	1.037	84	264	30.52	1.03
Boiler Outlet	A	04/04/91	1305	1345	20.00	1.037	79	259	30.55	20.76
RUN NO.4	B	04/04/91	1351	1401	5.00	1.037	79	260	30.55	5.19
	C	04/04/91	1407	1409	1.00	1.037	80	268	30.55	1.04

ANIONS

	PJFF Inlet	PJFF Outlet	Boiler Outlet
	Dry Standard Meter Volume	Dry Standard Meter Volume	Dry Standard Meter Volume
03/25/91	64.303 DSCF	66.250 DSCF	60.688 DSCF
03/27/91	64.582 DSCF	63.987 DSCF	60.460 DSCF
03/29/91	62.165 DSCF	71.799 DSCF	58.946 DSCF
	Filter Weight Gain	Filter Weight Gain	Filter Weight Gain
03/25/91	0.0356 gms	0.0027 gms	0.0271 gms
03/27/91	0.0425 gms	0.0013 gms	0.0354 gms
03/29/91	0.0678 gms	0.0025 gms	0.0462 gms
	Impinger volume	Impinger volume	Impinger volume
03/25/91	669.0 g	639.1 g	659.0 g
03/27/91	690.2 g	621.5 g	710.7 g
03/29/91	670.5 g	657.4 g	772.7 g

ALDEHYDES

	Dry Standard Meter Volume	Dry Standard Meter Volume	Dry Standard Meter Volume
03/25/91	14.062 DSCF	13.967 DSCF	10.271 DSCF
03/27/91	12.267 DSCF	12.900 DSCF	10.065 DSCF
03/29/91	11.883 DSCF	12.302 DSCF	9.954 DSCF

PRELIMINARY

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ANIONS

Boiler Outlet

	Dry Standard Meter Volume
04/01/91	61.855 DSCF
04/02/91	62.601 DSCF
04/03/91	63.640 DSCF
04/04/91	59.491 DSCF

	Filter Weight Gain
04/01/91	0.0960 gms
04/02/91	0.0656 gms
04/03/91	0.0791 gms
04/04/91	0.0621 gms

	Impinger volume
04/01/91	670.5 g
04/02/91	628.9 g
04/03/91	673.7 g
04/04/91	626.6 g

ALDEHYDES

	Dry Standard Meter Volume
04/02/91	12.943 DSCF
04/03/91	13.165 DSCF
04/03/91	12.400 DSCF
04/04/91	12.319 DSCF

Operating Summary – Baseline Testing

	3/25/91	3/26/91	3/27/91	3/28/91	3/29/91
Fuel Oil Feed Rate (lb/hr)	135,000	161,000	160,000	162,000	163,000
Gross Load (MW)	282	344	341	339	334
NOx (ppm, from CEM)					
North Superheat	212	190	186	179	223
South Superheat	227	212	205	198	240
North Reheat	195	212	202	202	215
South Reheat	202	215	209	210	225
CO (ppm, from CEM)					
North Superheat	8	12	10	18	13
South Superheat	7	10	6	10	12
North Reheat	10	40	22	70	25
South Reheat	8	12	10	20	13
O2 (%, from CEM)					
North Superheat	4.3	1.7	1.2	1.2	2.3
South Superheat	--	2.8	2.6	2.5	3.1
North Reheat	1.8	0.8	0.7	0.5	1.0
South Reheat	2.0	1.5	1.4	1.2	1.8
Flue Gas Temperature (Deg. F)					
South Reheat	351	307	302	321	314
PJFF Inlet	320	290	285	297	290
PJFF Outlet	285	256	252	367	260

DO NOT CITE OR QUOTE

Operating Summary – Low NOx Testing

	4/1/91	4/2/91	4/3/91	4/4/91
Fuel Oil Feed Rate (lb/hr)	170,000	161,000	163,000	159,000
Gross Load (MW)	358	333	342	338
NOx (ppm, from CEM)				
North Superheat	160	155	151	169
South Superheat	175	165	177	195
North Reheat	177	182	182	170
South Reheat	205	210	208	188
CO (ppm, from CEM)				
North Superheat	15	17	20	8
South Superheat	8	15	5	6
North Reheat	9	8	7	9
South Reheat	10	11	8	10
O2 (%, from CEM)				
North Superheat	2.1	2.3	2.3	2.8
South Superheat	2.5	1.6	2.8	3.1
North Reheat	3.2	3.2	3.3	3.1
South Reheat	1.5	1.3	1.8	3.3
Flue Gas Temperature (Deg. F)				
South Reheat	324	309	311	311

Appendix G

Uncertainty Analysis and Material Balance Tables

PRELIMINARY

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An error propagation analysis was performed on calculated results to determine the contribution of process, sampling, and analytical variability, and measurement bias, to the overall uncertainty in the result. This uncertainty was determined by propagating the bias and precision error of individual parameters through the calculation of the results. This uncertainty does not represent the total uncertainty in the result since many important bias errors are unknown and have been assigned a value of zero for this analysis. Also, this uncertainty is only the uncertainty in the result for the period of time that the measurements were taken.

This method is based on ANSI/ASME PTC 19.1-1985, "Measurement Uncertainty."

Nomenclature

r	=	Calculated result;
S_{pi}	=	Sample standard deviation of parameter i;
θ_i	=	Sensitivity of the result to parameter i;
β_{pi}	=	Bias error estimate for parameter i;
v_i	=	Degrees of freedom in parameter i;
v_r	=	Degrees of freedom in result;
S_r	=	Precision component of result uncertainty;
β_r	=	Bias component of result uncertainty;
t	=	Student "t" factor (two-tailed distribution at 95% confidence);
U_r	=	Uncertainty in r; and
N_i	=	Number of measurements of parameter i.

For a result, r, the uncertainty in r is calculated as:

$$U_r = \sqrt{\beta_r^2 + (S_r * t)^2} \qquad (1)$$

The components are calculated by combining the errors in the parameters used in the result calculation.

$$\beta_r = \sqrt{\sum_{i=1}^{j} (\theta_i * \beta_{\overline{pi}})^2} \tag{2}$$

$$S_r = \sqrt{\sum_{i=1}^{j} (\theta_i * S_{\overline{pi}})^2} \tag{3}$$

The sensitivity of the result to each parameter is found from a Taylor series estimation method:

$$\theta_i = \frac{\partial r}{\partial pi} \tag{4}$$

Or using a perturbation method (useful in computer applications):

$$\theta_i = \frac{r(P_i + \Delta P_i) - r(P_i)}{\Delta P_i} \tag{5}$$

The standard deviation of the average for each parameter is calculated as:

$$S_{\overline{pi}} = \frac{S_{pi}}{\sqrt{N}} \tag{6}$$

The degrees of freedom for each parameter is found from

$$v_i = N_i - 1 \tag{7}$$

and the degrees of freedom for the result is found by weighing the sensitivity and precision error in each parameter.

$$v_r = \frac{S_r^4}{\sum_{i=1}^{j} \left[\frac{(S_{\overline{pi}} \times \theta_i)^4}{v_i} \right]} \tag{8}$$

The student "t" in Equation 1 is associated with the degrees of freedom in the result.

The precision error terms are easily generated using collected data. The bias error terms are more difficult to quantify. The following conventions were used for this report:

- 5% bias on fuel oil and fabric filter collected ash flow rates.
- No bias in gas flow rates.
- No bias in analytical results if the result is greater than the reporting limit. One-half of the reporting limit is used for both the parameter value and its bias in calculations if the result is below the reporting limit.

The flow rate bias values are assigned using engineering judgment. No bias is assigned to the analytical results (above the reporting limit) or gas flow rate since a good estimate for magnitude of these terms is unknown. These bias terms may be very large (relative to the mean values of the parameters) and may represent a large amount of unaccounted uncertainty in each result. Analytical bias near the instrument detection limit may be especially large. The uncertainty values calculated for this report are, therefore, subject to these limitations.

An example of the calculation of confidence intervals is below.

Confidence Interval Calculations

Confidence intervals (CIs) were calculated for the mean concentrations in the oil and all gas streams. In addition, confidence intervals were determined for the stack gas emission factors presented in Table 3-7.

CIs for Stream Concentrations

For cadmium in the boiler outlet gas during low-NO_x operation, the 95% CI is calculated using the equations presented above. The 95% CI about the total mean for the sum of two values can be represented by:

$$U_{r_{TOT}} = \sqrt{\left(U_{r_{PART}}\right)^2 + \left(U_{r_{VAPOR}}\right)^2} \qquad (9)$$

where:

$U_{r\,TOT}$ = 95% CI for the total concentration;

$U_{r\,PART}$ = 95% CI for the particulate phase; and

$U_{r\ VAPOR}$ = 95% CI for the vapor phase.

The 95% CI for each phase is given by:

$$U_r = \sqrt{\beta^2 + \left(t * \frac{S_r}{\sqrt{N}}\right)^2} \qquad (10)$$

where:

U_r = 95% CI for each phase;

β = Bias component;

t = Student's t factor for 97.5 percentile (one-tail) and N-1 degrees of freedom;

S_r = Standard deviation of the individual run measurements; and

N = Number of measurements.

The three sets of concentration data (in $\mu g/Nm^3$) for arsenic in the boiler outlet gas shown in Table 3-3 were:

	Run B	Run D	Run E
Particulate	7.0	8.1	8.0
Vapor	NR(1.1)	NR(0.66)	NR(0.74)
Total	7.0	8.1	8.0

For this set of data, the average value was calculated by adding zero to the particulate concentration and obtaining the mean [7.0 + 8.1 + 8.0] / 3 = 7.7

For the individual run totals, the standard deviation (S_R) equals 0.63.

The bias for the nean is found by roat-sum-squaring the product of bias error and the sensitivity from each run. According to the conventions listed in Section 3, no bias error is assigned to values above reporting limits, whereas a bias error of one-half of the reporting limit is assigned to values below reporting limits. The sensitivities of the mean to each run is this case is 1/N = 1/3.

$$\beta_r = \sqrt{\left(\frac{0}{3}\right)^2 + \left(\frac{0}{3}\right)^2 + \left(\frac{0}{3}\right)^2} \qquad (11)$$

$$= 0$$

The total uncertainty in the result is found from equation 10.

$$\mu_r = \sqrt{(0)^2 + \left(4.3 * \frac{0.63}{\sqrt{3}}\right)^2} \qquad (12)$$

$$= 1.6$$

This is the 95% CI shown in Table 3-3 for arsenic. Similar calculations were performed to determine the confidence intervals for all other values.

In addition to the assumptions about bias error referred to above, the calculations also assume that the population distribution for each measurement is normal and that samples collected reflect the population.

Also, the uncertainty calculated is only for the average value over the sampling period. The uncertainty does not represent long-term process variations. In other words, the calculated uncertainty does not include a bias term to reflect the fact that the sampled system was probably not operating (and emitting) at conditions equivalent to the average conditions for that system over a longer period.

Improvements in bias estimates will be made as more data is collected and the QA/QC database is expanded. Spike and standard recoveries can be used to estimate analytical bias. Also, as the analytical methods improve, accuracy will improve, resulting in the true bias of the analytical results being closer to the zero bias now assigned.

Accounting for long-term system variability will require repeated sampling trips to the same location.

The tables which follow this discussion are the computer-generated results from the material balance error propagation. Three material balances were performed: around the boiler during both baseline and low-NO_x operation and around the fabric filter during baseline operation. Each table provides the results for an individual element. For example, the table on page G-10 shows that the average material balance closure for aluminum around the boiler during baseline operation is 175%, with a total absolute uncertainty of 61%. The individual contributions to the uncertainty are also shown, with the input variables sorted in descending order of error contribution.

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Al Boiler Base Bal	%	174.5658	8.31E+00	6.01E+01	6.1E+01	2.57E+00	5.2E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	1307	PREC	2.03E+03	1.34E-01	5.84E+02	3
2)	XF	Fuel Oil Conc	mg/kg	13.36	PREC	1.35E+03	-1.20E+01	6.86E+00	5
3)	OIL	Oil Flow Rate	lb/hr	155546	PREC	2.11E+02	-1.07E-03	3.04E+04	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	6.89E+01	-1.07E-03	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	2.38E+01	1.38E-04	6.10E+04	3
6)	XS	Condensate Conc	mg/L	.1	BIAS	4.89E-02	-2.21E+00	1.00E-01	-
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	5.63E-04	-8.39E-06	6.32E+03	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	1.23E-04	-8.39E-06	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS
-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5
-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	As Boiler Base Bal	%	107.1235	5.10E+00	1.89E+01	2.0E+01	2.31E+00	8.1E+00

INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1) XF	Fuel Oil Conc	mg/kg	.128	PREC	1.50E+02	-7.93E+02	3.46E-02	5
2) XG	Boiler Out Conc	ug/Nm3	7.7	PREC	1.34E+02	1.39E+01	1.44E+00	3
3) OIL	Oil Flow Rate	lb/hr	155546	PREC	6.38E+01	-6.54E-04	2.73E+04	5
4) OIL	Oil Flow Rate	lb/hr	155546	BIAS	2.59E+01	-6.54E-04	7.78E+03	-
5) GAS	Boiler Out flow rate	m3/hr	1261700	PREC	7.20E+00	8.49E-05	5.47E+04	3
6) XS	Condensate Conc	mg/L	.0025	BIAS	1.24E-01	-1.41E+02	2.50E-03	-
7) STM	Atom. Steam Flow	lb/hr	26400	PREC	1.16E-03	-1.34E-05	5.67E+03	5
8) STM	Atom. Steam Flow	lb/hr	26400	BIAS	3.14E-04	-1.34E-05	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

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*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

PRELIMINARY

DO NOT CITE OR QUOTE

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Cl Boiler Base Bal	%	140.1022	6.67E+00	7.71E+01	7.7E+01	3.18E+00	2.8E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	1192	PREC	4.99E+03	1.18E-01	1.04E+03	3
2)	XF	Fuel Oil Conc	mg/kg	15.2	PREC	7.22E+02	-8.66E+00	6.94E+00	5
3)	OIL	Oil Flow Rate	lb/hr	155546	PREC	2.09E+02	-8.58E-04	3.77E+04	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	4.45E+01	-8.58E-04	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	2.34E+01	1.11E-04	7.55E+04	3
6)	XS	Condensate Conc	mg/L	.006	BIAS	8.81E-05	-1.56E+00	6.00E-03	-
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	1.57E-06	-3.58E-07	7.83E+03	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	2.24E-07	-3.58E-07	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS
- WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5
- THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Cr Boiler Base Bal	%	24.97747	1.19E+00	1.66E+01	1.7E+01	2.57E+00	4.8E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XF	Fuel Oil Conc	mg/kg	.6930001	PREC	2.49E+02	-2.72E+01	1.30E+00	5
2)	XG	Boiler Out Conc	ug/Nm3	9.7	PREC	2.07E+01	2.57E+00	3.06E+00	3
3)	OIL	Oil Flow Rate	lb/hr	155546	PREC	4.33E+00	-1.53E-04	3.04E+04	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	1.41E+00	-1.53E-04	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	4.86E-01	1.98E-05	6.10E+04	3
6)	XS	Condensate Conc	mg/L	.005	BIAS	9.31E-04	-6.10E+00	5.00E-03	-
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	1.07E-05	-1.16E-06	6.32E+03	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	2.34E-06	-1.16E-06	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

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*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Co Boiler Base Bal	%	85.34806	4.06E+00	4.23E+01	4.2E+01	4.30E+00	2.4E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	108	PREC	1.62E+03	7.90E-01	8.82E+01	3
2)	OIL	Oil Flow Rate	lb/hr	155546	PREC	1.42E+02	-5.22E-04	5.10E+04	5
3)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	1.65E+01	-5.22E-04	7.78E+03	-
4)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	1.59E+01	6.76E-05	1.02E+05	3
5)	XF	Fuel Oil Conc	mg/kg	2.26	PREC	1.05E+01	-3.74E+01	1.94E-01	5
6)	XS	Condensate Conc	mg/L	.005	BIAS	1.03E-03	-6.40E+00	5.00E-03	-
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	3.30E-05	-1.21E-06	1.06E+04	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	2.57E-06	-1.21E-06	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Cu Boiler Base Bal	%	3.230607	1.54E-01	2.37E+00	2.4E+00	3.18E+00	2.9E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	17	PREC	4.67E+00	1.90E-01	1.97E+01	3
2)	XF	Fuel Oil Conc	mg/kg	9.399999	PREC	8.34E-01	-3.13E-01	6.52E+00	5
3)	OIL	Oil Flow Rate	lb/hr	155546	PREC	1.11E-01	-1.98E-05	3.77E+04	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	2.37E-02	-1.98E-05	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	1.25E-02	2.56E-06	7.55E+04	3
6)	XS	Condensate Conc	mg/L	.01	BIAS	3.40E-07	-5.83E-02	1.00E-02	-
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	5.95E-09	-2.20E-08	7.83E+03	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	8.46E-10	-2.20E-08	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	F Boiler Base Bal	%	9.533183	4.54E-01	1.62E+01	1.6E+01	4.30E+00	2.4E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	47	PREC	2.39E+02	2.03E-01	1.32E+02	3
2)	XF	Fuel Oil Conc	mg/kg	8.8	PREC	2.27E+01	-9.56E-01	1.11E+01	5
3)	OIL	Oil Flow Rate	lb/hr	155546	PREC	1.77E+00	-5.83E-05	5.10E+04	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	2.06E-01	-5.83E-05	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	1.99E-01	7.56E-06	1.02E+05	3
6)	XS	Condensate Conc	mg/L	.05	BIAS	8.42E-05	-1.84E-01	5.00E-02	-
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	2.71E-06	-3.48E-07	1.06E+04	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	2.10E-07	-3.48E-07	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS
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-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Fe Boiler Base Bal	%	83.86524	3.99E+00	3.41E+01	3.4E+01	2.45E+00	6.0E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XF	Fuel Oil Conc	mg/kg	23	PREC	5.88E+02	-3.21E+00	1.69E+01	5
2)	XG	Boiler Out Conc	ug/Nm3	1081	PREC	5.25E+02	7.76E-02	5.11E+02	3
3)	OIL	Oil Flow Rate	lb/hr	155546	PREC	4.42E+01	-5.13E-04	2.90E+04	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	1.59E+01	-5.13E-04	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	4.97E+00	6.65E-05	5.81E+04	3
6)	XS	Condensate Conc	mg/L	.174	PREC	5.37E-02	-6.17E-01	5.31E-01	2
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	1.20E-04	-4.07E-06	6.02E+03	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	2.88E-05	-4.07E-06	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

PRELIMINARY

DO NOT CITE OR QUOTE

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Pb Boiler Base Bal	%	3.415406	1.63E-01	4.19E+00	4.2E+00	2.57E+00	4.9E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XF	Fuel Oil Conc	mg/kg	4.55	PREC	1.57E+01	-4.12E-01	2.15E+01	5
2)	XG	Boiler Out Conc	ug/Nm3	8.7	PREC	1.73E+00	3.93E-01	5.81E+00	3
3)	OIL	Oil Flow Rate	lb/hr	155546	PREC	8.10E-02	-2.09E-05	3.04E+04	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	2.64E-02	-2.09E-05	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	9.10E-03	2.71E-06	6.10E+04	3
6)	XS	Condensate Conc	mg/L	6.600001E-03					
					PREC	5.15E-07	-1.27E-01	7.97E-03	2
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	8.08E-09	-3.18E-08	6.32E+03	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	1.76E-09	-3.18E-08	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS
-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5
-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Mn Boiler Base Bal	%	131.09	6.27E+00	3.52E+01	3.6E+01	2.37E+00	6.5E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XF	Fuel Oil Conc	mg/kg	.115	PREC	9.15E+02	-1.02E+03	6.62E-02	5
2)	XG	Boiler Out Conc	ug/Nm3	8.5	PREC	2.14E+02	1.54E+01	1.64E+00	3
3)	OIL	Oil Flow Rate	lb/hr	155546	PREC	9.97E+01	-7.97E-04	2.80E+04	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	3.84E+01	-7.97E-04	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	1.13E+01	1.04E-04	5.61E+04	3
6)	XS	Condensate Conc	mg/L	.005	BIAS	9.09E-01	-1.91E+02	5.00E-03	-
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	8.94E-03	-3.63E-05	5.82E+03	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	2.30E-03	-3.63E-05	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS
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*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Ni Boiler Base Bal	%	90.75056	4.32E+00	2.71E+01	2.7E+01	3.18E+00	3.4E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	1979	PREC	5.60E+02	4.59E-02	8.94E+02	3
2)	OIL	Oil Flow Rate	lb/hr	155546	PREC	8.77E+01	-5.56E-04	3.77E+04	5
3)	XF	Fuel Oil Conc	mg/kg	38.96	PREC	7.81E+01	-2.26E+00	8.75E+00	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	1.87E+01	-5.56E-04	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	9.84E+00	7.19E-05	7.55E+04	3
6)	XS	Condensate Conc	mg/L	.01	BIAS	1.56E-05	-3.94E-01	1.00E-02	-
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	2.56E-07	-1.44E-07	7.83E+03	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	3.64E-08	-1.44E-07	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

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*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	S Boiler Base Bal	%	153.366	7.30E+00	4.22E+01	4.3E+01	2.78E+00	3.7E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	244643	PREC	1.28E+03	6.27E-04	9.87E+04	3
2)	XF	Fuel Oil Conc	mg/kg	2850	PREC	2.91E+02	-5.17E-02	6.61E+02	4
3)	OIL	Oil Flow Rate	lb/hr	155546	PREC	1.91E+02	-9.39E-04	3.29E+04	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	5.33E+01	-9.39E-04	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	2.14E+01	1.22E-04	6.59E+04	3
6)	XS	Condensate Conc	mg/L	.006	BIAS	2.10E-09	-7.63E-03	6.00E-03	-
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	1.25E-09	-1.16E-08	6.83E+03	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	2.33E-10	-1.16E-08	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

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*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	V Boiler Base Bal	%	112.6832	5.36E+00	3.15E+01	3.2E+01	2.78E+00	3.9E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	376	PREC	6.90E+02	3.00E-01	1.52E+02	3
2)	XF	Fuel Oil Conc	mg/kg	5.96	PREC	1.86E+02	-1.81E+01	1.69E+00	5
3)	OIL	Oil Flow Rate	lb/hr	155546	PREC	1.03E+02	-6.90E-04	3.29E+04	5
4)	OIL	Oil Flow Rate	lb/hr	155546	BIAS	2.88E+01	-6.90E-04	7.78E+03	-
5)	GAS	Boiler Out flow rate	m3/hr	1261700	PREC	1.15E+01	8.93E-05	6.59E+04	3
6)	XS	Condensate Conc	mg/L	.01	BIAS	1.03E-03	-3.21E+00	1.00E-02	-
7)	STM	Atom. Steam Flow	lb/hr	26400	PREC	1.39E-05	-1.22E-06	6.83E+03	5
8)	STM	Atom. Steam Flow	lb/hr	26400	BIAS	2.59E-06	-1.22E-06	1.32E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Al Boiler LNOx Bal	%	123.2395	5.86E+00	4.79E+01	4.8E+01	2.78E+00	3.9E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	521.6	PREC	1.58E+03	2.36E-01	2.91E+02	3
2)	XF	Fuel Oil Conc	mg/kg	7.511	PREC	6.68E+02	-1.51E+01	3.82E+00	5
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	3.43E+01	-7.18E-04	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	2.16E+01	-7.18E-04	1.29E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	1.91E+01	9.36E-05	8.09E+04	3
6)	XS	Condensate Conc	mg/L	.1	BIAS	7.92E-02	-2.81E+00	1.00E-01	-
7)	STM	Atom. Steam Flow	lb/hr	28100	PREC	2.40E-04	-1.00E-05	3.09E+03	4
8)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	1.99E-04	-1.00E-05	1.41E+03	-

* PRECISION COMPONENT = t*Srbar

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*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

PRELIMINARY

DO NOT CITE OR QUOTE

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	As Boiler LNOx Bal	%	66.27263	3.15E+00	1.66E+01	1.7E+01	2.57E+00	4.6E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	4.04	PREC	1.67E+02	1.64E+01	1.36E+00	3
2)	XF	Fuel Oil Conc	mg/kg	.108	PREC	9.85E+01	-5.76E+02	3.86E-02	5
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	9.88E+00	-3.86E-04	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	5.33E+00	-3.86E-04	1.20E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	4.74E+00	5.03E-05	7.49E+04	3
6)	XS	Condensate Conc	mg/L	.0025	BIAS	6.88E-02	-1.05E+02	2.50E-03	-
7)	STM	Atom. Steam Flow	lb/hr	28100	PREC	1.79E-04	-9.37E-06	2.86E+03	4
8)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	1.73E-04	-9.37E-06	1.41E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS
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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Cl Boiler LNOx Bal	%	268.1095	1.28E+01	8.29E+01	8.4E+01	2.45E+00	5.6E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	2849	PREC	4.76E+03	9.41E-02	1.47E+03	4
2)	XF	Fuel Oil Conc	mg/kg	18.9	PREC	1.97E+03	-1.32E+01	7.51E+00	5
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	1.63E+02	-1.57E-03	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	7.96E+01	-1.57E-03	1.14E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	7.03E+01	2.04E-04	7.13E+04	3
6)	XS	Condensate Conc	mg/L	.006	BIAS	2.15E-04	-2.45E+00	6.00E-03	-
7)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	5.82E-07	-5.43E-07	1.41E+03	-
8)	STM	Atom. Steam Flow	lb/hr	28100	PREC	5.46E-07	-5.43E-07	2.72E+03	4

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Cr Boiler LNOx Bal	%	19.30355	9.18E-01	9.43E+00	9.5E+00	2.45E+00	6.0E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XF	Fuel Oil Conc	mg/kg	.294	PREC	6.52E+01	-5.43E+01	3.33E-01	5
2)	XG	Boiler Out Conc	ug/Nm3	3.2	PREC	2.29E+01	6.03E+00	1.37E+00	3
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	8.40E-01	-1.12E-04	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	4.11E-01	-1.12E-04	1.14E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	3.64E-01	1.47E-05	7.13E+04	3
6)	XS	Condensate Conc	mg/L	.005	BIAS	3.16E-03	-1.12E+01	5.00E-03	-
7)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	7.96E-06	-2.01E-06	1.41E+03	-
8)	STM	Atom. Steam Flow	lb/hr	28100	PREC	7.46E-06	-2.01E-06	2.72E+03	4

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Co Boiler LNOx Bal	%	62.22526	2.96E+00	8.96E+00	9.4E+00	2.37E+00	6.9E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XF	Fuel Oil Conc	mg/kg	2.111	PREC	5.64E+01	-2.80E+01	6.01E-01	5
2)	XG	Boiler Out Conc	ug/Nm3	73.87999	PREC	1.63E+01	8.42E-01	8.30E+00	3
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	8.77E+00	-3.63E-04	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	4.00E+00	-3.63E-04	1.10E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	3.54E+00	4.72E-05	6.89E+04	3
6)	XS	Condensate Conc	mg/L	.005	BIAS	6.44E-04	-5.08E+00	5.00E-03	-
7)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	1.63E-06	-9.10E-07	1.41E+03	-
8)	STM	Atom. Steam Flow	lb/hr	28100	PREC	1.43E-06	-9.10E-07	2.63E+03	4

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

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PRELIMINARY

DO NOT CITE OR QUOTE

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Cu Boiler LNOx Bal	%	1.913349	9.11E-02	4.43E-01	4.5E-01	2.45E+00	6.1E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XF	Fuel Oil Conc	mg/kg	7.77	PREC	1.05E-01	-2.29E-01	3.17E+00	5
2)	XG	Boiler Out Conc	ug/Nm3	8.36	PREC	8.37E-02	2.29E-01	2.19E+00	3
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	8.30E-03	-1.12E-05	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	4.05E-03	-1.12E-05	1.14E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	3.58E-03	1.45E-06	7.13E+04	3
6)	XS	Condensate Conc	mg/L	.01	BIAS	1.80E-07	-4.24E-02	1.00E-02	-
7)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	4.50E-10	-1.51E-08	1.41E+03	-
8)	STM	Atom. Steam Flow	lb/hr	28100	PREC	4.22E-10	-1.51E-08	2.72E+03	4

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	F Boiler LNOx Bal	%	3.946244	1.88E-01	1.70E+00	1.7E+00	2.78E+00	3.6E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	14.44	PREC	2.62E+00	2.73E-01	1.19E+01	4
2)	XF	Fuel Oil Conc	mg/kg	6.5	PREC	2.16E-01	-5.81E-01	1.60E+00	4
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	3.52E-02	-2.30E-05	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	2.22E-02	-2.30E-05	1.29E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	1.96E-02	3.00E-06	8.09E+04	3
6)	XS	Condensate Conc	mg/L	.05	BIAS	2.72E-05	-1.04E-01	5.00E-02	-
7)	STM	Atom. Steam Flow	lb/hr	28100	PREC	8.26E-08	-1.86E-07	3.09E+03	4
8)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	6.84E-08	-1.86E-07	1.41E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Fe Boiler LNOx Bal	%	61.92951	2.95E+00	1.41E+01	1.4E+01	2.57E+00	5.3E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	660.6	PREC	1.06E+02	9.37E-02	1.90E+02	3
2)	XF	Fuel Oil Conc	mg/kg	18.97	PREC	8.34E+01	-3.08E+00	6.64E+00	5
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	8.69E+00	-3.62E-04	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	4.69E+00	-3.62E-04	1.20E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	4.14E+00	4.70E-05	7.49E+04	3
6)	XS	Condensate Conc	mg/L	.02	BIAS	1.26E-04	-5.62E-01	2.00E-02	-
7)	STM	Atom. Steam Flow	lb/hr	28100	PREC	3.26E-07	-3.99E-07	2.86E+03	4
8)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	3.14E-07	-3.99E-07	1.41E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

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*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Pb Boiler LNOx Bal	%	8.353253	3.98E-01	7.45E+00	7.5E+00	2.45E+00	5.5E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XF	Fuel Oil Conc	mg/kg	1.074	PREC	2.89E+01	-5.73E+00	2.10E+00	5
2)	XG	Boiler Out Conc	ug/Nm3	5.047	PREC	2.65E+01	1.66E+00	5.39E+00	3
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	1.58E-01	-4.88E-05	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	7.72E-02	-4.88E-05	1.14E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	6.82E-02	6.34E-06	7.13E+04	3
6)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	7.18E-08	-1.91E-07	1.41E+03	-
7)	STM	Atom. Steam Flow	lb/hr	28100	PREC	6.73E-08	-1.91E-07	2.72E+03	4

* PRECISION COMPONENT = t*Srbar

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*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

PRELIMINARY DO NOT CITE OR QUOTE

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Mn Boiler LNOx Bal	%	109.6087	5.29E+00	1.58E+01	1.7E+01	2.37E+00	6.8E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XF	Fuel Oil Conc	mg/kg	.0813	PREC	1.26E+02	-1.28E+03	1.96E-02	5
2)	XG	Boiler Out Conc	ug/Nm3	5.063	PREC	1.00E+02	2.16E+01	8.02E-01	3
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	2.67E+01	-6.34E-04	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	1.22E+01	-6.34E-04	1.10E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	1.10E+01	8.32E-05	6.89E+04	3
6)	XS	Condensate Conc	mg/L	.005	BIAS	1.29E+00	-2.27E+02	5.00E-03	-
7)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	3.30E-03	-4.09E-05	1.41E+03	-
8)	STM	Atom. Steam Flow	lb/hr	28100	PREC	2.89E-03	-4.09E-05	2.63E+03	4

* PRECISION COMPONENT = t*Srbar

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*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	NI Boiler LNOx Bal	%	71.96867	3.43E+00	1.02E+01	1.1E+01	2.37E+00	7.1E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XF	Fuel Oil Conc	mg/kg	36.28	PREC	7.03E+01	-1.89E+00	9.94E+00	5
2)	XG	Boiler Out Conc	ug/Nm3	1468	PREC	2.43E+01	4.90E-02	1.74E+02	3
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	1.17E+01	-4.20E-04	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	5.36E+00	-4.20E-04	1.10E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	4.73E+00	5.46E-05	6.89E+04	3
6)	XS	Condensate Conc	mg/L	.01	BIAS	1.17E-05	-3.42E-01	1.00E-02	-
7)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	3.08E-08	-1.25E-07	1.41E+03	-
8)	STM	Atom. Steam Flow	lb/hr	28100	PREC	2.70E-08	-1.25E-07	2.63E+03	4

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	S Boiler LNOx Bal	%	167.966	8.00E+00	1.50E+01	1.7E+01	2.31E+00	8.2E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	240800	PREC	1.18E+02	6.98E-04	3.11E+04	4
2)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	6.40E+01	-9.81E-04	8.15E+03	-
3)	XF	Fuel Oil Conc	mg/kg	2550	PREC	5.55E+01	-6.46E-02	2.31E+02	4
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	2.78E+01	-9.81E-04	1.07E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	2.45E+01	1.28E-04	6.72E+04	3
6)	XS	Condensate Conc	mg/L	.006	BIAS	3.73E-09	-1.02E-02	6.00E-03	-

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*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	V Boiler LNOx Bal	%	56.24607	2.68E+00	8.62E+00	9.0E+00	2.78E+00	4.4E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XG	Boiler Out Conc	ug/Nm3	188.9	PREC	4.83E+01	2.98E-01	4.04E+01	3
2)	XF	Fuel Oil Conc	mg/kg	5.972	PREC	1.76E+01	-9.16E+00	1.02E+00	5
3)	OIL	Oil Flow Rate	lb/hr	163089	BIAS	7.17E+00	-3.28E-04	8.15E+03	-
4)	OIL	Oil Flow Rate	lb/hr	163089	PREC	4.51E+00	-3.28E-04	1.29E+04	4
5)	GAS	Boiler Out flow rate	m3/hr	1317000	PREC	3.98E+00	4.27E-05	8.09E+04	3
6)	XS	Condensate Conc	mg/L	.01	BIAS	2.63E-04	-1.62E+00	1.00E-02	-
7)	STM	Atom. Steam Flow	lb/hr	28100	PREC	7.97E-07	-5.78E-07	3.09E+03	4
8)	STM	Atom. Steam Flow	lb/hr	28100	BIAS	6.60E-07	-5.78E-07	1.41E+03	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Al PJFF Base Bal	%	117.2106	5.83E+00	5.91E+01	5.9E+01	3.18E+00	3.2E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	2.69E+03	2.91E+02	3.09E-01	3
2)	XI	Inlet Gas Conc	ug/Nm3	917	PREC	4.72E+02	-1.20E-01	3.12E+02	3
3)	XA	Coll Ash Conc	mg/kg	23930	PREC	1.73E+02	4.86E-03	4.69E+03	3
4)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	1.55E+02	-2.46E-02	8.75E+02	3
5)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	3.39E+01	2.91E+02	2.00E-02	-
6)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	1.80E-03	2.44E-04	3.01E+02	3

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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	As PJFF Base Bal	%	89.03433	4.49E+00	5.60E+01	5.6E+01	4.30E+00	2.4E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	2.86E+03	2.22E+02	4.17E-01	3
2)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	1.63E+02	-1.87E-02	1.18E+03	3
3)	XI	Inlet Gas Conc	ug/Nm3	6.56	PREC	7.62E+01	-1.33E+01	1.14E+00	3
4)	XA	Coll Ash Conc	mg/kg	131	PREC	2.96E+01	6.80E-01	1.39E+01	3
5)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	1.97E+01	2.22E+02	2.00E-02	-
6)	XL	Limestone Conc	mg/kg	8	BIAS	4.26E-01	-8.16E-02	8.00E+00	-
7)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	8.21E-04	1.22E-04	4.07E+02	3

* PRECISION COMPONENT = t*Srbar

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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Ba PJFF Base Bal	%	100.1224	4.89E+00	4.93E+01	5.0E+01	3.18E+00	3.2E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	1.89E+03	2.44E+02	3.09E-01	3
2)	XI	Inlet Gas Conc	ug/Nm3	22.5	PREC	3.74E+02	-4.18E+00	8.02E+00	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	1.13E+02	-2.10E-02	8.75E+02	3
4)	XA	Coll Ash Conc	mg/kg	491	PREC	5.30E+01	1.98E-01	6.36E+01	3
5)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	2.38E+01	2.44E+02	2.00E-02	-
6)	XL	Limestone Conc	mg/kg	5	BIAS	1.41E-02	-2.38E-02	5.00E+00	-
7)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	9.32E-03	5.55E-04	3.01E+02	3

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Cl PJFF Base Bal	%	123.6223	1.60E-01	1.58E+02	1.6E+02	3.18E+00	2.6E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XO	Outlet Gas Conc	ug/Nm3	1511	PREC	2.17E+04	8.17E-02	3.12E+03	3
2)	XI	Inlet Gas Conc	ug/Nm3	1407	PREC	2.97E+03	-7.57E-02	1.25E+03	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	1.72E+02	-2.60E-02	8.75E+02	3
4)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	1.65E+01	2.33E-02	3.01E+02	3
5)	XA	Coll Ash Conc	mg/kg	50	BIAS	2.51E-02	3.17E-03	5.00E+01	-
6)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	3.90E-03	3.50E-01	3.09E-01	3
7)	XL	Limestone Conc	mg/kg	50	BIAS	3.62E-04	-3.80E-04	5.00E+01	-
8)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	4.91E-05	3.50E-01	2.00E-02	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS
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PRELIMINARY
DO NOT CITE OR QUOTE

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Cr PJFF Base Bal	%	143.7481	6.01E+00	6.03E+01	6.1E+01	3.18E+00	3.1E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	2.86E+03	3.00E+02	3.09E-01	3
2)	XI	Inlet Gas Conc	ug/Nm3	7.48	PREC	5.15E+02	-1.83E+01	2.15E+00	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	2.32E+02	-3.02E-02	8.75E+02	3
4)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	3.60E+01	3.00E+02	2.00E-02	-
5)	XA	Coll Ash Conc	mg/kg	201	PREC	2.28E+01	5.96E-01	1.39E+01	3
6)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	6.37E-01	4.59E-03	3.01E+02	3
7)	XL	Limestone Conc	mg/kg	5	BIAS	1.28E-01	-7.15E-02	5.00E+00	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

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OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Co PJFF Base Bal	%	136.1842	6.84E+00	6.74E+01	6.8E+01	3.18E+00	2.9E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	3.72E+03	3.42E+02	3.09E-01	3
2)	XI	Inlet Gas Conc	ug/Nm3	85.9	PREC	5.77E+02	-1.50E+00	2.78E+01	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	2.09E+02	-2.86E-02	8.75E+02	3
4)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	4.68E+01	3.42E+02	2.00E-02	-
5)	XA	Coll Ash Conc	mg/kg	2623	PREC	4.03E+01	5.19E-02	2.12E+02	3
6)	XO	Outlet Gas Conc	ug/Nm3	.024	BIAS	1.03E-03	1.34E+00	2.40E-02	-
7)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	1.04E-06	5.86E-06	3.01E+02	3

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Cu PJFF Base Bal	%	146.0902	7.25E+00	7.21E+01	7.2E+01	3.18E+00	3.0E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	4.14E+03	3.61E+02	3.09E-01	3
2)	XI	Inlet Gas Conc	ug/Nm3	8.770001	PREC	7.86E+02	-1.57E+01	3.10E+00	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	2.40E+02	-3.07E-02	8.75E+02	3
4)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	5.22E+01	3.61E+02	2.00E-02	-
5)	XA	Coll Ash Conc	mg/kg	284	PREC	2.18E+01	5.08E-01	1.59E+01	3
6)	XL	Limestone Conc	mg/kg	10	BIAS	3.72E-01	-6.10E-02	1.00E+01	-
7)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	5.75E-03	4.36E-04	3.01E+02	3

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS
-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5
-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	F PJFF Base Bal	%	114.3536	9.16E-02	5.52E+01	5.5E+01	2.78E+00	3.8E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XO	Outlet Gas Conc	ug/Nm3	32.1	PREC	2.01E+03	3.51E+00	2.21E+01	3
2)	XI	Inlet Gas Conc	ug/Nm3	32.8	PREC	9.17E+02	-3.15E+00	1.66E+01	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	1.12E+02	-2.40E-02	7.63E+02	3
4)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	1.04E+01	2.13E-02	2.63E+02	3
5)	XA	Coll Ash Conc	mg/kg	14.7	PREC	7.18E-01	1.36E-01	1.08E+01	3
6)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	5.08E-01	4.58E+00	2.69E-01	3
7)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	8.40E-03	4.58E+00	2.00E-02	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

PRELIMINARY

DO NOT CITE OR QUOTE

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Fe PJFF Base Bal	%	179.9593	8.98E+00	9.32E+01	9.4E+01	3.18E+00	3.4E+00

INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1) ASH	Coll. Ash Flow	lb/hr	.398	PREC	6.40E+03	4.49E+02	3.09E-01	3
2) XI	Inlet Gas Conc	ug/Nm3	875	PREC	1.82E+03	-1.90E-01	3.88E+02	3
3) GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	3.64E+02	-3.78E-02	8.75E+02	3
4) XA	Coll Ash Conc	mg/kg	35130	PREC	1.00E+02	5.10E-03	3.40E+03	3
5) ASH	Coll. Ash Flow	lb/hr	.398	BIAS	8.06E+01	4.49E+02	2.00E-02	-
6) GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	1.73E-03	2.39E-04	3.01E+02	3

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Pb PJFF Base Bal	%	128.9833	6.46E+00	6.48E+01	6.5E+01	2.78E+00	4.0E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	2.52E+03	3.23E+02	2.69E-01	3
2)	XI	Inlet Gas Conc	ug/Nm3	5.65	PREC	1.53E+03	-2.03E+01	3.33E+00	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	1.42E+02	-2.71E-02	7.63E+02	3
4)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	4.17E+01	3.23E+02	2.00E-02	-
5)	XA	Coll Ash Conc	mg/kg	163	PREC	6.40E+00	7.89E-01	5.55E+00	3
6)	XL	Limestone Conc	mg/kg	1.5	BIAS	2.02E-02	-9.47E-02	1.50E+00	-
7)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	1.95E-04	9.21E-05	2.63E+02	3

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS
-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5
-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

PRELIMINARY

DO NOT CITE OR QUOTE

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Mn PJFF Base Bal	%	167.0944	7.66E+00	7.91E+01	7.9E+01	3.18E+00	3.4E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	4.66E+03	3.83E+02	3.09E-01	3
2)	XI	Inlet Gas Conc	ug/Nm3	6.18	PREC	1.26E+03	-2.52E+01	2.43E+00	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	3.14E+02	-3.51E-02	8.75E+02	3
4)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	5.86E+01	3.83E+02	2.00E-02	-
5)	XA	Coll Ash Conc	mg/kg	215	PREC	3.34E+01	7.22E-01	1.39E+01	3
6)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	2.33E-01	2.78E-03	3.01E+02	3

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	Ni PJFF Base Bal	%	115.4992	5.80E+00	5.73E+01	5.8E+01	3.18E+00	2.9E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	2.67E+03	2.90E+02	3.09E-01	3
2)	XI	Inlet Gas Conc	ug/Nm3	1624	PREC	4.39E+02	-6.71E-02	5.41E+02	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	1.50E+02	-2.42E-02	8.75E+02	3
4)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	3.36E+01	2.90E+02	2.00E-02	-
5)	XA	Coll Ash Conc	mg/kg	42030	PREC	2.35E+01	2.75E-03	3.06E+03	3
6)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	1.17E-05	1.97E-05	3.01E+02	3
7)	XL	Limestone Conc	mg/kg	10	BIAS	1.09E-05	-3.30E-04	1.00E+01	-

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS
-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5
-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

PRELIMINARY DO NOT CITE OR QUOTE

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	S PJFF Base Bal	%	106.5831	9.46E-02	2.68E+01	2.7E+01	2.78E+00	3.8E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	XI	Inlet Gas Conc	ug/Nm3	215800	PREC	4.99E+02	-4.57E-04	8.48E+04	3
2)	XO	Outlet Gas Conc	ug/Nm3	196500	PREC	1.12E+02	5.33E-04	3.43E+04	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	9.72E+01	-2.24E-02	7.63E+02	3
4)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	9.01E+00	1.98E-02	2.63E+02	3
5)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	5.41E-01	4.73E+00	2.69E-01	3
6)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	8.95E-03	4.73E+00	2.00E-02	-
7)	XA	Coll Ash Conc	mg/kg	91137	PREC	6.18E-04	2.07E-05	2.08E+03	3

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

OUTPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ABSOLUTE BIAS COMPONENT	ABSOLUTE PRECISION COMPONENT*	ABSOLUTE TOTAL UNC	STUDENT t	DEGREES OF FREEDOM
CLOS	V PJFF Base Bal	%	100.2168	5.04E+00	5.21E+01	5.2E+01	3.18E+00	3.4E+00

	INPUT VARIABLE NAME	DESCRIPTION	UNITS	AVERAGE VALUE	ERROR TYPE	ABSOLUTE CONTRIBUTION **	ABSOLUTE SENSITIVITY (SIGMAp)	ABSOLUTE ERROR OF INPUT***	NUMBER OF SAMPLES
1)	ASH	Coll. Ash Flow	lb/hr	.398	PREC	2.01E+03	2.52E+02	3.09E-01	3
2)	XI	Inlet Gas Conc	ug/Nm3	307	PREC	5.59E+02	-3.02E-01	1.36E+02	3
3)	GIN	Inlet Gas Flow	Nm3/hr	4605	PREC	1.13E+02	-2.10E-02	8.75E+02	3
4)	XA	Coll Ash Conc	mg/kg	6900	PREC	2.71E+01	1.45E-02	6.20E+02	3
5)	ASH	Coll. Ash Flow	lb/hr	.398	BIAS	2.54E+01	2.52E+02	2.00E-02	-
6)	XO	Outlet Gas Conc	ug/Nm3	.0484	BIAS	3.28E-04	3.74E-01	4.84E-02	-
7)	XL	Limestone Conc	mg/kg	10	BIAS	3.04E-04	-1.74E-03	1.00E+01	-
8)	GOUT	Outlet Gas Flow	Nm3/hr	5295	PREC	3.12E-07	3.21E-06	3.01E+02	3

* PRECISION COMPONENT = t*Srbar

** (Bp*SIGMAp)^2 FOR BIAS ERRORS; (t*Spbar*SIGMAp)^2 FOR PRECISION ERRORS

-WHERE Spbar=PRECISION INDEX OF THE MEAN, Sp/(NUMBER OF SAMPLES)^.5

-THE SQUARE ROOT OF THE SUM OF THE ABSOLUTE CONTRIBUTIONS IS EQUAL TO THE TOTAL UNCERTAINTY

*** Bp FOR BIAS ERRORS; Sp*t FOR PRECISION ERRORS

Appendix H

Quality Assurance/Quality Control Data

Section 4

DATA ASSESSMENT

Several procedures can be used to evaluate data quality from a field sampling program. The primary methods to evaluate analytical quality are the traditional QA/QC protocols of laboratory analysis: comparing the results of duplicates, blanks, standards, and spiked samples to the data quality objectives. These procedures are used to assess the effects of analytical precision, bias, and potential contamination. Field QA/QC procedures include the calibration of sampling equipment and the adherence to standard operating procedures.

Data consistency can be used as another evaluation tool, especially in the evaluation of coal, ash, and flue gas flow rates. Material balances for ash and major elements can be used to verify self-consistency of stream flows. Material balance closures for trace species can be used to decide whether the samples collected were representative with respect to the trace element concentrations, and can help to identify analytical biases in one or more types of samples. Closures between 70 and 130% are considered desirable. Closures outside this range indicate a higher degree of uncertainty or bias in the results.

QA/QC Summary

Laboratory Analysis

The laboratory QA/QC data gathered during this field effort are discussed in detail in Appendix H. The results show that the data collected during this field sampling effort are valid and usable for the needs of this project. Data quality objectives--in terms of blank sample purity, accuracy in analyzing standards, spike recoveries, and duplicate precision--were met or exceeded for the target analytes with very few exceptions. The laboratory QA/QC findings which potentially impact the data are:

- Field blank HNO_3/H_2O_2 impinger solutions from the multi-metals trains show low levels of metals (<5x the reporting limit) for nearly all substances.

- The level of target metals in blank Method 5 filters, while near reporting limits, were found to be significant when compared to the low levels found in the gas samples. The PJFF outlet impactor filter had significantly lower blank levels. However, this identified the need to blank correct all particulate phase samples affected, as discussed in Appendix I.

- The recovery of silver and arsenic was low for filters and impingers and high for lead for both quality control check samples and spiked samples.

- The duplicate analysis relative percent difference was above the desired value for the oil ash measurement.

Other less significant deviations from the data quality objectives are discussed in Appendix H. None of these observations are serious enough to discredit the laboratory results.

Sample Collection

Key components of the sampling equipment--pitot tubes, thermocouples, orifice meters, dry gas meters, and sampling nozzles--were calibrated prior to use in the field and those calibrations were checked at the conclusion of sampling. All flue gas samples were collected at rates between 90 and 110% of the isokinetic rates. Grab samples of fuel oil and atomizing steam were obtained from continually flowing pipes. The solids were obtained from the center of the limestone pre-coat bag and the ash hopper.

Process Stream Flows

Process stream flows which are presented in this report appear to be valid. A combustion calculation was performed using the mean oil composition, mean oil flow rate, and the mean oxygen concentration in the outlet gas to predict a "theoretical" flue gas flow. This calculated flow rate agreed with the estimated total outlet flow rate within 10 percent. The mean flow rate measured at the PJFF outlet was 10-15% higher than that measured at the PJFF inlet. Inleakage of air across the PJFF is possible, however, the oxygen measurements for both streams do not substantiate this hypothesis.

Material Balance Results

At Site 13, three key streams define the overall plant material balance: the fuel oil, the steam condensate (used to atomize the fuel oil), and the boiler outlet flue gas. For the pulse-jet fabric filter, the inlet and outlet flue gases and the collected ash define the material balance. For substances of interest, stream flow and concentration distributions (average, standard deviation, and number of measurements) were entered into an error propagation model to estimate the uncertainty in the overall material balance closure. Closure is defined as the ratio of outlet to inlet mass rate. A 100% closure indicates perfect agreement. For trace substances, closures between 70 and 130% are the goal for the FCEM project. This range reflects the typical level of analytical uncertainty and, therefore, allows the investigator to interpret the inlet and outlet stream component mass flow rates as being statistically equivalent. Poor closure values usually indicate an analytical problem with one or more types of sample matrices or problems collecting representative samples.

Table 4-1 presents the results of the material balance error propagation analysis. The detailed calculations appear in Appendix G. Three separate material balances are presented: around the boiler during both baseline and low-NO_x operation and around the fabric filter during baseline operation. In addition to the FCEM elements of

The objective of quality assurance and quality control (QA/QC) efforts associated with the Site 13 study is to ensure that all data collected are of known and sufficient quality to qualitatively and quantitatively characterize the various process streams. This section addresses the QA/QC associated with the chemical analyses of gas, solid, and aqueous samples from the program.

Summary of Data Quality and QA/QC Approach

Quality assurance and quality control procedures used for this program are consistent with those described in Table 4-5 of the Site 13 sampling and analytical plan, February 1991 and the Laboratory Quality Assurance Program Plan (QAPP, revision 2, February, 1990) for Radian's Austin Laboratories. The following key types of QA/QC provide the primary basis for quantitatively evaluating data quality:

- Laboratory and field blank samples;
- Laboratory quality control check samples;
- Laboratory spiked samples;
- Duplicate samples;
- Duplicate analyses; and
- Performance evaluation audit samples.

Quality assurance/quality control data associated with the sampling and analytical procedures for this study indicate that, with the exceptions to be discussed below, the data quality objectives were achieved for all variables. For this reason, most of the data may be considered valid and usable for project needs.

Blank Samples

Blank samples consist of laboratory pure matrices that are subjected to routine sampling and analytical procedures. For this project trip blanks, field blanks, and laboratory blanks were analyzed. Trip blanks consist of blank sampling media that are transported to the field but are not exposed to field conditions. Field blanks are blank sampling media that are placed in the sampling equipment, transported to the sampling location, leak checked, and then recovered immediately into sampling containers. Laboratory blanks consist of laboratory water or sampling media that are prepared and/or digested in the same manner as the samples. Laboratory blank samples are used to control laboratory contamination because corrective action is initiated when results are above acceptable limits. Field blank samples are used to assess sampling contamination.

One set of field blank samples was collected for each gas collection technique except for VOST sampling, where field blanks were collected daily at each sampling site. In addition, trip blanks were collected for each of the gas sampling techniques. Laboratory blanks were analyzed at a frequency of 10% or with each batch of samples analyzed (which ever was greater). Blank results are compared with quality control (QC) limits that are five times the laboratory reporting limit for most analyses. Generally, if laboratory blank results are found above the QC limit, analytical procedures could be contaminating field samples. Similarly, field blank results above the QC limits indicate that sampling procedures may be contaminating field samples.

Table H-1 summarizes the laboratory blank and field blank results. This table shows the total number of blank samples for each method, any compounds detected, and the range of results detected in the blanks. Low levels of chloride were found in the impinger trip blanks; chloride and sulfate were found in the filter trip and field blanks and in the probe/nozzle rinse but were not detected in the lab blanks. Fluoride was detected in the lab blanks analyzed with the solid samples. Low levels of many of the target metals

Table H-1

Summary of Blank Sample Results - FCEM 13

Method	Number of Blanks Analyzed	Number of Detects	Concentration Range of Compounds Detected in Blanks	Reporting Limit
Semivolatile Organics				
Trip Blanks	2			
Butylbenzylphthalate		1	1.50 µg	10 µg
Di-n-octylphthalate		1	0.71 µg	10 µg
Dibutylphthalate		2	0.38-5.93 µg	10 µg
Diethylphthalate		1	1.08 µg	10 µg
Diphenylamine			1.06 µg	10 µg
bis(2-Ethylhexyl)phthalate			10 µg	10 µg
N-Nitrosodiphenylamine			0.90 µg	10 µg
Field Blanks	2			
Benzoic acid		1	8.46 µg	50 µg
Dibutylphthalate		2	1.39-1.87 µg	10 µg
Diethylphthalate		2	0.96-1.96 µg	10 µg
bis(2-Ethylhexyl)phthalate		2	3.45-3.61 µg	10 µg
Naphthalene		1	0.46 µg	10 µg
Phenol		1	2.29 µg	10 µg
Lab Blanks	2			
bis(2-Ethylhexyl)phthalate		1	3.55 µg	10 µg
VOST				
Trip Blanks	2	0		
Field Blanks	10			
Methylene Chloride		4	13-370 ng	10 ng
Lab Blanks	7	0		
Lab Blanks (Acid)	5	0		
Aldehydes				
Trip Blanks	1			
Acetaldehyde		1	0.67 µg	0.58 µg
Formaldehyde		1	5.19 µg	0.48 µg
Field Blanks	1			
Acetaldehyde		1	46.3 µg	0.58 µg
Formaldehyde		1	5.62 µg	0.48 µg
Lab Blanks	2			
Formaldehyde		2	1.92-2.93 µg	0.48 µg
Anions Trip Blanks - Impingers				
Chloride	2	0		
Fluoride				
Phosphate	2	0		
Sulfate	2	0		
Anions Field Blanks - Impingers				
Chloride	1	1	0.145 mg/L	0.012 mg/L
Fluoride				
Phosphate	1	0		

PRELIMINARY

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Table H-1 (Continued)

Method	Number of Blanks Analyzed	Number of Detects	Concentration Range of Compounds Detected in Blanks	Reporting Limit
Anions Field Blanks - Impingers (Cont'd)				
Sulfate	1	0		
Anions Lab Blanks - Impingers				
Chloride	2	0		
Fluoride	1	0		
Phosphate	2	0		
Sulfate	2	0		
Anions Trip Blanks - Filter, Probe and Nozzle Rinse				
Chloride	1	1	0.0066 mg	0.0013 mg
Fluoride	1	0		
Phosphate	1	0		
Sulfate	1	1	0.0275 mg	0.0037 mg
Anions Field Blanks - Filter, Probe and Nozzle Rinse				
Chloride	1	1	0.0837 mg	0.0024 mg
Fluoride	1	0		
Phosphate	1	0		
Sulfate	1	1	1.04 mg	0.0068 mg
Anions Lab Blanks - Filter, Probe, and Nozzle Rinse				
Chloride	1	0		
Fluoride	1	0		
Phosphate	1	0		
Sulfate	1	0		
Anions Lab Blanks - Solids				
Chloride	1	0		
Fluoride	1	1	10.6 mg/kg	5.0 mg/kg
Phosphate	1	0		
Total Sulfur	1	0		
Metals (ICP-AES) - Impinger Solutions				
Trip Blanks	1			
Aluminum		1	0.294 mg/L	0.2 mg/L
Antimony		1	0.0024 mg/L	0.1 mg/L
Barium		1	0.006 mg/L	0.01 mg/L
Beryllium		1	0.004 mg/L	0.002 mg/L
Calcium		1	0.0678 mg/L	1.0 mg/L
Chromium		1	0.002 mg/L	0.01 mg/L
Cobalt		1	0.0014 mg/L	0.01 mg/L
Iron		1	0.0127 mg/L	0.04 mg/L
Magnesium		1	0.0436 mg/L	1 mg/L
Manganese		1	0.534 mg/L	0.01 mg/L
Molybdenum		1	0.0021 mg/L	0.05 mg/L
Potassium		1	0.199 mg/L	3 mg/L

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Table H-1 (Continued)

Method	Number of Blanks Analyzed	Number of Detects	Concentration Range of Compounds Detected in Blanks	Reporting Limit
Metals (ICP-AES) - Impinger Solutions (Cont'd)				
Sodium		1	0.0653 mg/L	1 mg/L
Silicon		1	0.37 mg/L	1 mg/L
Silver		1	0.0007 mg/L	0.01 mg/L
Strontium		1	0.002 mg/L	0.003 mg/L
Titanium		1	0.009 mg/L	0.05 mg/L
Vanadium		1	0.0013 mg/L	0.02 mg/L
Zinc		1	0.0063 mg/L	0.2 mg/L
Field Blanks	2			
Aluminum			0.0212-0.0356 mg/L	0.2 mg/L
Antimony		1	0.0074 mg/L	0.1 mg/L
Barium		2	0.003 mg/L	0.01 mg/L
Calcium		2	0.0405-0.0574 mg/L	1.0 mg/L
Chromium		1	0.0003 mg/L	0.01 mg/L
Cobalt		1	0.0022 mg/L	0.01 mg/L
Iron		2	0.0189-0.0272 mg/L	0.04 mg/L
Magnesium		1	0.0243 mg/L	1 mg/L
Manganese		2	0.0012-0.0017 mg/L	0.01 mg/L
Nickel		2	0.0026-0.0058 mg/L	0.02 mg/L
Potassium		1	0.169 mg/L	3 mg/L
Sodium		2	0.0437-0.0784 mg/L	1 mg/L
Silicon		2	1.11-1.37 mg/L	1 mg/L
Strontium		1	0.0003	0.003 mg/L
Titanium		2	0.005-0.006 mg/L	0.05 mg/L
Zinc		2	0.0065-0.008 mg/L	0.02 mg/L
Lab Blanks	1			
Aluminum		1	0.0188 mg/L	0.2 mg/L
Barium		1	0.0005 mg/L	0.01 mg/L
Calcium		1	0.0294 mg/L	1 mg/L
Chromium		1	0.0029 mg/L	0.01 mg/L
Copper		1	0.003 mg/L	0.02 mg/L
Iron		1	0.0048 mg/L	0.04 mg/L
Magnesium		1	0.0154 mg/L	1 mg/L
Manganese		1	0.001 mg/L	0.01 mg/L
Nickel		1	0.0011 mg/L	0.02 mg/L
Potassium		1	0.225 mg/L	3 mg/L
Sodium		1	0.0228 mg/L	1 mg/L
Silicon		1	0.24 mg/L	1 mg/L
Strontium		1	0.0005 mg/L	0.003 mg/L
Titanium		1	0.003 mg/L	0.05 mg/L
Vanadium		1	0.003 mg/L	0.02 mg/L
Zinc		1	0.0045 mg/L	0.02 mg/L

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Table H-1 (Continued)

Method	Number of Blanks Analyzed	Number of Detects	Concentration Range of Compounds Detected in Blanks	Reporting Limit
Metals (GFAAS, CVAAS) - Impinger Solutions				
Trip Blanks	1			
Arsenic		1	0.002 mg/L	0.004 mg/L
Cadmium		1	0.001 mg/L	0.001 mg/L
Lead		1	0.0015 mg/L	0.003 mg/L
Mercury	2	0		
Field Blanks	2			
Arsenic		2	0.006 mg/L	0.004 mg/L
Cadmium		2	0.009-0.0011 mg/L	0.001 mg/L
Lead		2	0.0017-0.0115 mg/L	0.003 mg/L
Mercury	2	0		
Lab Blanks	1			
Arsenic		1	0.0001 mg/L	0.004 mg/L
Cadmium		1	0.0001 mg/L	0.001 mg/L
Lead		1	0.001 mg/L	0.003 mg/L
Mercury	1	0		
Metals (ICP-AES) - Probe & Nozzle Rinse/Filter				
Trip Blanks	1 ea.			
Aluminum		2	3.5/244 µg	20 µg
Barium		2	0.0562/6.42 µg	1 µg
Calcium		2	10.9/106 µg	100 µg
Chromium		2	0.671/2.27 µg	1 µg
Cobalt		1	0.361 µg	1 µg
Copper		2	0.411/1.52 µg	2 µg
Iron		2	0.992/30.3 µg	4 µg
Magnesium		2	3.85/15.5 µg	100 µg
Manganese		1	0.84 µg	1 µg
Molybdenum		2	4.82/36.1 µg	5 µg
Nickel		2	0.941/1.45 µg	2 µg
Potassium		2	4.64/18.3 µg	300 µg
Sodium		2	44.9/108 µg	100 µg
Strontium		2	0.136/2.37 µg	0.3 µg
Titanium		2	0.60/1.97 µg	5 µg
Vanadium		2	0.61/1.72 µg	2 µg
Zinc		2	1.64/4.37 µg	2 µg
Field Blanks	1 ea.			
Aluminum		2	33.9/241 µg	20 µg
Barium		2	1.56/6.08 µg	1 µg
Calcium		2	50.4/101 µg	100 µg
Chromium		2	1.02/2.39 µg	1 µg
Cobalt		2	0.169/0.99 µg	1 µg
Copper		2	0.85/2.79 µg	2 µg
Iron		2	30.9/31.3 µg	4 µg

Table H-1 (Continued)

Method	Number of Blanks Analyzed	Number of Detects	Concentration Range of Compounds Detected in Blanks	Reporting Limit
Metals (ICP-AES) - Filters Field Blanks (Cont'd)				
Magnesium		2	17.0/21.4 µg	100 µg
Manganese		2	0.781/26 µg	1 µg
Molybdenum		2	4.84/35.5 µg	5 µg
Nickel		2	2.24/11.8 µg	2 µg
Potassium		2	15.5/33.3 µg	300 µg
Sodium		2	107/148 µg	100 µg
Strontium		2	0.982/2.33 µg	0.3 µg
Titanium		2	2.11/2.7 µg	5 µg
Vanadium		2	1.91/4.22 µg	2 µg
Zinc		2	4.24/11.1 µg	2 µg
Lab Blanks (Filter Only)	1			
Calcium		1	1.12 µg	100 µg
Chromium		1	0.12 µg	1 µg
Cobalt		1	0.16 µg	1 µg
Copper		1	0.23 µg	2 µg
Molybdenum		1	4.91 µg	5 µg
Nickel		1	0.54 µg	2 µg
Titanium		1	0.36 µg	5 µg
Vanadium		1	0.46 µg	2 µg
Zinc		1	0.48 µg	2 µg
Metals (GFAAS,CVAAS) - Probe & Nozzle Rinse/Filter				
Trip Blanks	1 ea.			
Arsenic		2	0.22/0.44 µg	0.4 µg
Mercury		2	0.0098/0.012 µg	0.018 µg
Lead		2	0.33/1.21 µg	0.3 µg
Field Blanks	1 ea.			
Arsenic		2	0.1/0.57 µg	0.4 µg
Cadmium		1	2.3 µg	0.5 µg
Mercury		2	0.0028/0.014 µg	0.018 µg
Lead		2	0.73/4.44 µg	0.3 µg
Selenium		1	0.78 µg	0.5 µg
Metals (ICP-AES) - Impactor Filter				
Reagent Blank	1			
Aluminum		1	244 µg	80µg
Antimony		0		10µg
Barium		1	0.93 µg	1.0µg
Beryllium		0		0.20µg
Calcium		1	292 µg	100µg
Chromium		1	0.87 µg	1.0µg
Cobalt		1	0.28 µg	1.0µg
Copper		1	0.073 µg	2.0µg
Iron		1	12.8 µg	5.0µg
Magnesium		1	112 µg	100µg

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Table H-1 (Continued)

Method	Number of Blanks Analyzed	Number of Detects	Concentration Range of Compounds Detected in Blanks	Reporting Limit
Metals (ICP-AES) - Impactor Filter Reagent Blank (Cont'd)				
Manganese		1	0.36 µg	1.0µg
Molybdenum		1	4.2 µg	5.0µg
Nickel		1	0.88 µg	2.0µg
Potassium		1	60 µg	300µg
Sodium		1	771 µg	400µg
Strontium		1	0.69 µg	0.3µg
Titanium		1	1.1 µg	5.0µg
Vanadium		1	0.38 µg	2.0µg
Metals (GFAAS) - Impactor Filter	1			
Arsenic		1	0.16	0.40
Cadmium		1	0.047	0.10
Lead		1	0.2	0.3
Selenium		1	0.09	0.5
Metals (ICP-AES) - Solid Samples				
Lab Blanks	1			
Aluminum		1	691 mg/kg	200 mg/kg
Barium		1	113 mg/kg	10 mg/kg
Beryllium		1	0.1 mg/kg	2 mg/kg
Calcium		1	130 mg/kg	10,000 mg/kg
Chromium		1	4.3 mg/kg	10 mg/kg
Cobalt		1	4.1 mg/kg	10 mg/kg
Copper		1	3.7 mg/kg	20 mg/kg
Iron		1	394 mg/kg	40 mg/kg
Magnesium		1	266 mg/kg	1000 kg/kg
Manganese		1	4.60 mg/kg	10 mg/kg
Molybdenum		1	5.14 mg/kg	50 mg/kg
Nickel		1	511 mg/kg	20 mg/kg
Potassium		1	297 mg/kg	3000 mg/kg
Sodium		1	312 mg/kg	1000 mg/kg
Strontium		1	95 mg/kg	3 mg/kg
Titanium		1	92.4 mg/kg	50 mg/kg
Vanadium		1	10 mg/kg	20 mg/kg
Zinc		1	9.8 mg/kg	20 mg/kg
Metals (GFAAS,CVAAS)- Solid Samples				
Lab Blank	1			
Arsenic		1	1.4 mg/kg	4 mg/kg
Cadmium		1	0.9 mg/kg	5 mg/kg
Lead		1	1.1 mg/kg	3 mg/kg
Metals (ICP-AES) - Water Samples				
Lab Blanks	2			
Aluminum		2	0.0167-0.0301 mg/L	0.2 mg/L
Antimony		1	0.0397 mg/L	0.1 mg/L

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Table H-1 (Continued)

Method	Number of Blanks Analyzed	Number of Detects	Concentration Range of Compounds Detected in Blanks	Reporting Limit
Metals (ICP-AES) - Water Samples				
Lab Blanks (Cont'd)				
Barium		2	0.0008 mg/L	0.01 mg/L
Beryllium		1	0.00014 mg/L	0.002 mg/L
Calcium		2	0.0636-0.0646 mg/L	1.0 mg/L
Copper		1	0.0013 mg/L	0.02 mg/L
Iron		2	0.0031-0.00924 mg/L	0.04 mg/L
Magnesium		2	0.0036-0.00564 mg/L	1 mg/L
Manganese		2	0.0013-0.0058 mg/L	0.01 mg/L
Molybdenum		1	0.00454 mg/L	0.05 mg/L
Potassium		1	0.238 mg/L	3 mg/L
Sodium		1	0.0481 mg/L	1 mg/L
Silicon		2	0.0014-0.00275 mg/L	1 mg/L
Silver		2	0.0595-0.0981 mg/L	0.01 mg/L
Strontium		2	0.0004-0.00132 mg/L	0.003 mg/L
Vanadium		2	0.0002-0.00137 mg/L	0.02 mg/L
Zinc		2	0.00252-0.0052 mg/L	0.2 mg/L
Metals (GFAAS,CVAAS) - Water Samples				
Lab Blank	1			
Cadmium		1	0.0005 mg/L	0.001 mg/L
Lead		1	0.0065 mg/L	0.003 mg/L
Selenium		1	0.0009 mg/L	0.005 mg/L

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were detected (less than the reporting limit) in all blanks associated with the ICP-AES and AAS analyses (trip, field and laboratory). Aluminum, barium, iron, and molybdenum were found in the filter trip blank and aluminum, barium, iron, manganese, molybdenum, nickel, strontium, zinc, and lead were found in the filter field blanks at levels greater than five times the reporting limits. Molybdenum was the only element that appeared to be a significant background contribution when compared to the levels of these elements found in the samples. No metals were found in the impinger field blanks, trip blanks, or lab blanks at levels greater than five times the reporting limit. Barium, iron, nickel, and strontium were found at levels greater than five times the reporting limit in the laboratory blanks associated with the analysis of the solid samples. Of these elements, only strontium was present at significant concentrations in the blanks when compared to the levels found in the samples. Silver was the only element detected at levels above the reporting limit for laboratory blanks prepared and analyzed with the water samples.

Quality Control Check Samples

Quality control check samples (QCCS) are laboratory pure matrices to which known amounts of target analytes have been added. Results from QCCS analyses are used to calculate percent recoveries which are then compared to established acceptance limits to check instrument calibration and/or control analytical performance. Expressed as a percentage of the amount added, QCCS recovery provides an measure of the accuracy of the analysis. For a single sample, this includes the combined effects of bias, or systematic error, and variability due to imprecision. Averaging QCCS recoveries tends to "average out" the random error due to imprecision and provides an estimate of analytical bias. In addition, the laboratory may also analyze standard and reference materials with certified compositions. NBS ash and coal samples were used for this project. Percent recoveries for these materials are also used to indicate overall analytical efficiency.

Table H-2 summarizes the QCCS analyses for organics, anions and metals performed with the sample analysis. The mean percent recovery shown in these tables represent analytical bias which was estimated to be within acceptance limits (90-110 % recovery for the inorganics while limits for the organic analyses vary for each compound) for all compounds analyzed except for 4-chloro-3-methylphenol, 2,4-dinitrotoluene, 4-nitrophenol, phenol, and 1,2,4-trichlorobenzene in the MM5 analysis and trichlorofluoromethane in the VOST analysis. QCCS samples analyzed with the filters from the impinger train showed low recoveries for silver (by ICP-AES) and selenium (by HGAAS) and high recovery for lead (by GFAAS). Zinc recovery was slightly below the acceptance limits for a spike into reagent water that was analyzed with the condensate water samples. NBS 1633a fly ash samples analyzed as laboratory QCCS along with solid samples from the project showed low recoveries in at least one of the four aliquots analyzed for aluminum, antimony, barium, calcium, chromium, magnesium, manganese, nickel, potassium, sodium, strontium, and thallium by ICP-AES and cadmium and selenium by GFAAS and HGAAS, respectively. Cobalt, molybdenum, silicon, and thallium showed high recoveries for the 1633a fly ash samples analyzed as QCCS by ICP-AES.

Spiked Samples

Spiked samples are field samples to which known amounts of the analyte of interest have been added. A spiked and unspiked aliquot were analyzed for this project. The difference in the concentration between the spiked and unspiked aliquots are calculated and compared to the amount of spike added. Since actual samples are used for the determination, any matrix effects can be identified. Like QCCS analyses, spiked sample analyses may be used to estimate analytical bias. The bias estimate generated from the spiked sample analyses includes systematic bias contributed by the sample matrix.

Table H-2

Summary of Quality Control Check Sample Results for Site 13

Compound	No. of OCCS	% Recovery	(Std. Dev.)	No. Below Limits	No. Above Limits
Semivolatile Organics (MM5):					
Acenaphthene	4	102	8.8	0	0
4-Chloro-3-methylphenol	4	100	7.1	0	1
2-Chlorophenol	4	88	4.5	0	0
1,4-Dichlorobenzene	4	87	4.5	0	0
2,4-Dinitrotoluene	4	94	7.1	0	3
N-Nitrosodipropylamine	4	91	7.5	0	0
4-Nitrophenol	4	134	28.3	0	3
Pentachlorophenol	4	78	4.9	0	0
Phenol	4	87	3.4	0	1
Pyrene	4	70	17.9	0	0
1,2,4-Trichlorobenzene	4	102	7.0	0	1
Volatile Organics in Gas (VOST):					
Chloromethane	6	96	28.2	0	0
Vinyl Chloride	6	92	14.7	0	0
Bromomethane	6	91	17.2	0	0
Chloromethane	6	93	15.3	0	0
Trichlorofluoromethane	6	116	45.4	0	1
1,1-Dichloroethene	6	102	16.2	0	0
Carbon Disulfide	6	78	17.6	0	0
Acetone	6	132	56.0	0	0
Methylene Chloride	6	107	18.7	0	0
trans-1,2-Dichloroethene	6	102	16.2	0	0
1,1-Dichloroethane	6	100	19.4	0	0
Vinyl Acetate	6	73	14.3	0	0
2-Butanone	6	140	25.1	0	0
Chloroform	6	100	14.5	0	0
1,1,1-Trichloroethane	6	91	9.0	0	0
Carbon Tetrachloride	6	92	8.3	0	0
Benzene	6	90	7.9	0	0
1,2-Dichloroethane	6	95	7.7	0	0
Trichloroethene	6	94	7.6	0	0

Table H-2 (Continued)

Compound	No. of QCCS	% Recovery	(Std. Dev.)	No. Below Limits	No. Above Limits
Volatile Organics in Gas (VOST) (Cont'd)					
1,2-Dichloropropane	6	88	9.2	0	0
Bromodichloromethane	6	86	7.8	0	0
trans-1,3-Dichloroprppene	6	84	12.1	0	0
4-Methyl-2-Pentanone	6	99	40.3	0	0
Toluene	6	98	9.5	0	0
cis-1,3-Dichloropropene	6	81	15.6	0	0
1,1,2-Trichloroethane	6	85	10.9	0	0
Tetrachloroethene	6	102	8.3	0	0
2-Hexanone	6	87	18.0	0	0
Dibromochloromethane	6	84	13.2	0	0
Chlorobenzene	6	96	6.4	0	0
Ethyl Benzene	6	93	6.8	0	0
m,p-Xylene	6	92	6.2	0	0
o-Xylene	6	92	6.1	0	0
Styrene	6	98	13.4	0	0
Bromoform	6	88	21.6	0	0
1,1,2,2-Tetrachloroethane	6	83	17.8	0	0
1,3-Dichlorobenzene	6	93	12.8	0	0
1,4-Dichlorobenzene	6	95	16.5	0	0
1,2-Dichlorobenzene	6	94	22.8	0	0
Anions in Solids:					
Chloride	1	98.4	-	0	0
Fluoride	1	93.9	-	0	0
Anions in Impinger Samples:					
Phosphate	1	89	-	0	0
Metals by ICP-AES in Impinger Solutions:					
Aluminum	1	97	-	0	0
Antimony	1	101	-	0	0
Barium	1	101	-	0	0
Beryllium	1	100	-	0	0

Table H-2 (Continued)

Compound	No. of QCCS	% Recovery	(Std. Dev.)	No. Below Limits	No. Above Limits
Metals by ICP-AES in Impinger Solutions (Cont'd)					
Calcium	1	101	-	0	0
Chromium	1	101	-	0	0
Cobalt	1	101	-	0	0
Copper	1	101	-	0	0
Iron	1	99	-	0	0
Magnesium	1	97	-	0	0
Manganese	1	100	-	0	0
Molybdenum	1	98	-	0	0
Nickel	1	102	-	0	0
Potassium	1	94	-	0	0
Sodium	1	98	-	0	0
Silicon	1	91	-	0	
Strontium	1	101	-	0	0
Thallium	1	102	-	0	0
Titanium	1	98	-	0	0
Vanadium	1	99	-	0	0
Zinc	1	101	-	0	0
Metals by GFAAS and CVAAS in Impinger Solutions:					
Arsenic	1	90	-	0	0
Cadmium	1	110	-	0	0
Lead	1	100	-	0	0
Selenium	1	88		0	0
Metals by ICP-AES in Filters:					
Aluminum	1	90	-	0	0
Antimony	1	85	-	0	0
Barium	1	96	-	0	0
Beryllium	1	89	-	0	0
Calcium	1	95	-	0	0
Chromium	1	94	-	0	0
Cobalt	1	92	-	0	0

Table H-2 (Continued)

Compound	No. of OCCS	% Recovery	(Std. Dev.)	No. Below Limits	No. Above Limits
Metals by ICP-AES in Filters (Cont'd)					
Copper	1	93	-	0	0
Iron	1	94	-	0	0
Magnesium	1	89	-	0	0
Manganese	1	91	-	0	0
Molybdenum	1	97	-	0	0
Nickel	1	93	-	0	0
Potassium	1	94	-	0	0
Silver	1	15	-	1	0
Sodium	1	94	-	0	0
Strontium	1	96	-	0	0
Thallium	1	94	-	0	0
Titanium	1	94	-	0	0
Vanadium	1	93	-	0	0
Zinc	1	88	-	0	0
Metals by GFAAS and CVAAS in Filters:					
Arsenic	1	105	-	0	0
Cadmium	1	116	-	0	0
Lead	1	138	-	0	1
Selenium	1	61	-	1	0
Metals by ICP-AES in Solids:					
Aluminum	1	82	-	0	0
Antimony	1	80	-	0	0
Barium	1	85	-	0	0
Beryllium	1	81	-	0	0
Cadmium	1	83	-	0	0
Calcium	1	105	-	0	0
Chromium	1	89	-	0	0
Cobalt	1	91	-	0	0
Copper	1	90	-	0	0
Iron	1	87	-	0	0
Magnesium	1	81	-	0	0

Table H-2 (Continued)

Compound	No. of QCCS	% Recovery	(Std. Dev.)	No. Below Limits	No. Above Limits
Metals by ICP-AES in Solids (Cont'd)					
Manganese	1	87	-	0	0
Molybdenum	1	88	-	0	0
Nickel	1	118	-	0	0
Potassium	1	90	-	0	0
Sodium	1	86	-	0	0
Strontium	1	80	-	0	0
Thallium	1	94	-	0	0
Titanium	1	88	-	0	0
Vanadium	1	87	-	0	0
Zinc	1	81	-	0	0
Metals by GFAAS and CVAAS in Solids:					
Arsenic	1	80	-	0	0
Cadmium	1	92	-	0	0
Lead	1	102	-	0	0
Metals by ICP-AES in Waters:					
Aluminum	1	91	-	0	0
Antimony	1	96	-	0	0
Barium	1	90	-	0	0
Beryllium	1	90	-	0	0
Calcium	1	95	-	0	0
Chromium	1	90	-	0	0
Cobalt	1	90	-	0	0
Copper	1	90	-	0	0
Iron	1	93	-	0	0
Magnesium	1	90	-	0	0
Manganese	1	90	-	0	0
Molybdenum	1	92	-	0	0
Nickel	1	91	-	0	0
Potassium	1	94	-	0	0
Silver	1	92	-	0	0
Sodium	1	93	-	0	0

Table H-2 (Continued)

Compound	No. of QCCS	% Recovery	(Std. Dev.)	No. Below Limits	No. Above Limits
Metals by ICP-AES in Waters (Cont'd)					
Strontium	1	91	-	0	0
Thallium	1	91	-	0	0
Vanadium	1	90	-	0	0
Zinc	1	89	-	1	0
Metals by ICP-AES in 1633a Fly Ash:					
Aluminum	5	80	12.5	2	0
Antimony	5	0	0	5	0
Barium	5	74	7.3	3	0
Beryllium	5	95	8.4	0	0
Calcium	5	82	20.2	2	0
Chromium	5	90	19.1	1	0
Cobalt	5	114	6.1	0	1
Copper	5	97	11.2	0	0
Iron	5	91	6.3	0	0
Magnesium	5	66	16.3	3	0
Manganese	5	81	12.5	2	0
Molybdenum	5	275	102	0	4
Nickel	5	78	44.0	1	0
Potassium	5	88	7.6	1	0
Silicon	5	149	12.3	0	5
Sodium	5	90	11.5	1	0
Strontium	4	76	13.0	2	0
Thallium	5	364	364	1	4
Titanium	5	99	4.3	0	0
Vanadium	5	96	6.0	0	0
Zinc	5	94	10.6	0	0
Metals by GFAAS - 1633A Fly Ash					
Arsenic	2	91	1.4	0	0
Cadmium	2	95	35.4	1	0
Lead	2	106	12.7	0	0
Selenium	2	80	10.6	1	0

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Tables H-3, H-4, and H-5 summarize the spiked sample results. The mean percent recovery was within acceptable limits for the aldehyde spiked samples. Fluoride spikes into the solids showed recoveries below the acceptance limits for one of two spiked samples analyzed. Phosphate spikes into the filter, probe/nozzle rinse fraction of the impinger train showed recoveries below objectives for both spikes. The low spike recoveries for fluoride and phosphate may be due to the peroxide in the anions impinger solutions analyzed for phosphate and the NaOH fusion preparation for fluoride. Spikes into impinger solutions showed good recoveries for elements analyzed by ICP-AES. Recoveries were below acceptance limits for arsenic, mercury, and selenium and above limits for lead for analyses performed by GFAAS, CVAAS, or HGAAS. Antimony, beryllium, cobalt, nickel, silver, vanadium, and zinc (ICP-AES) and arsenic and selenium (HGAAS) recoveries were below the 75% recovery objectives for the fly ash spikes. Recoveries for aluminum, barium, beryllium, chromium, iron, magnesium, nickel, silver, sodium, and strontium by ICP-AES and arsenic and selenium by HGAAS were below the 75% QC limits for limestone matrix spikes. One calcium spike recovery exceeded the QC acceptance limits.

Surrogate spiked samples are a special type of spiked sample used as a part of the analytical protocol for organic analyses to monitor method performance with each sample. (Surrogate compounds are not expected to be found in the sample and are added to each sample, blank, and standard before sample extraction). Surrogate spike results for the volatile organic analyses are summarized in Table H-4 and surrogate spikes for the semivolatile analyses are summarized in Table H-5. All surrogate recoveries were within the QC acceptance limits, except for one sample of the 20 boiler outlet gas samples analyzed for volatile organics which showed recoveries below the acceptance limits. In four of the 24 gas samples analyzed for semivolatile organics, 2,4,6-tribromophenol exceeded the acceptance limits.

Table H-3

Summary of Spiked Sample Results for Site 13

Compound	No. of Spikes	% Recovery	Std. Dev.	No. Below Limits	No. Above Limits
Aldehydes in Gas:					
Acetaldehyde	4	77	12.2	0	0
Acrolein	4	70	14.8	0	0
Benzaldehyde	4	77	13.5	0	0
Formaldehyde	4	94	7.6	0	0
Anions in Gas (Filter, Probe, and Nozzle Rinses):					
Chloride	2	111	1.8	0	0
Sulfate	2	92	3.3	0	0
Phosphate	2	16	12.5	2	0
Anions in Gas (Impinger Solutions):					
Chloride	3	107	11.5	0	0
Phosphate	2	88	9.1	0	0
Sulfate	2	85	9.4	0	0
Anions in Limestone:					
Chloride	2	106	0.9	0	0
Fluoride	2	70	28.6	1	0
Phosphate	2	92	0	0	0
Anions in PJFF Oil Fly Ash:					
Chloride	2	92	0	0	0
Fluoride	2	85	37.6	1	0
Sulfate	2	90	1.1	0	0
Metals by ICP-AES in Impinger Solutions:					
Aluminum	4	92	1.4	0	0
Antimony	4	92	2.5	0	0
Barium	4	96	1.5	0	0
Beryllium	4	95	2.3	0	0
Calcium	4	97	1.3	0	0
Chromium	4	96	1.2	0	0
Cobalt	4	96	1.5	0	0
Copper	4	96	2.4	0	0
Iron	4	94	1.7	0	0
Magnesium	4	92	1.3	0	0
Manganese	4	95	1.5	0	0
Molybdenum	4	93	1.0	0	0
Nickel	4	97	1.2	0	0
Potassium	4	92	5.4	0	0
Silicon	4	106	13.2	0	0
Silver	4	94	1.5	0	0

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Table H-3 (Continued)

Compound	No. of Spikes	% Recovery	Std. Dev.	No. Below Limits	No. Above Limits
Metals by ICP-AES in Impinger Solutions (Cont'd)					
Sodium	4	94	1.2	0	0
Strontium	4	96	1.5	0	0
Thallium	4	96	1.7	0	0
Titanium	4	93	1.5	0	0
Vanadium	4	94	1.3	0	0
Zinc	4	95	2.1	0	0
Metals by AAS and CVAAS in Impinger Solutions:					
Arsenic	4	76	4.6	2	0
Cadmium	4	109	4.8	0	0
Mercury	6	84	10.2	2	0
Lead	4	116	26.0	0	1
Selenium	2	40	3.5	2	0
Metals by ICP-AES in PJFF Oil Fly Ash:					
Aluminum	2	80	0	0	0
Antimony	2	76	7.9	1	0
Barium	2	86	3.5	0	0
Beryllium	2	74	0	2	0
Calcium	2	110	0	0	0
Chromium	2	80	3.7	0	0
Cobalt	2	18	200	2	0
Copper	2	80	2.5	0	0
Iron	2	82	3.7	0	0
Magnesium	2	82	1.2	0	0
Manganese	2	79	5.1	0	0
Molybdenum	2	80	1.2	0	0
Nickel	2	0	0	2	0
Potassium	2	86	1.2	0	0
Silver	2	36	22.2	2	0
Sodium	2	85	2.4	0	0
Strontium	2	87	2.3	0	0
Thallium	2	82	3.7	0	0
Vanadium	2	48	104	2	0
Zinc	2	69	8.7	2	0
Metals by AAS and CVAAS in PJFF Oil Fly Ash:					
Arsenic	2	76	5.3	1	0
Cadmium	2	92	5.4	0	0
Mercury	2	97	0	0	0
Lead	2	100	4.0	0	0

Table H-3 (Continued)

Compound	No. of Spikes	% Recovery	Std. Dev.	No. Below Limits	No. Above Limits
Metals by AAS and CVAAS in PJFF Oil Fly Ash (Cont'd):					
Selenium	2	27	14.8	2	0
Metals by ICP-AES in Limestone:					
Aluminum	2	42	9.5	2	0
Antimony	2	80	3.7	0	0
Barium	2	73	2.7	2	0
Beryllium	2	71	0	2	0
Calcium	2	112	20.4	0	1
Chromium	2	66	1.5	2	0
Cobalt	2	88	1.1	0	0
Copper	2	87	0	0	0
Iron	2	64	1.6	2	0
Magnesium	2	20	10	2	0
Manganese	2	84	1.2	0	0
Molybdenum	2	83	1.2	0	0
Nickel	2	0	0	2	0
Potassium	2	89	2.2	0	0
Silver	2	22	9.1	2	0
Sodium	2	72	1.4	2	0
Strontium	2	60	0	2	0
Thallium	2	88	5.7	0	0
Vanadium	2	84	1.2	0	0
Zinc	2	80	0	0	0
Metals by AAS and CVAAS in Limestone:					
Arsenic	2	77	3.0	2	0
Cadmium	2	91	1.1	0	0
Mercury	2	106	1.9	0	0
Lead	2	100	3.0	0	0
Selenium	2	68	0	2	0

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Table H-4

Summary of Surrogate Recoveries for Volatile Organic Analyses from Site 13

	No. of Analyses	Mean % Rec.	Std. Dev. (% Rec.)	No. Below Limits	No. Above Limits	QC Limits %
PJFF Inlet Gas:						
1,4-Bromofluorobenzene	9	97	2.7	0	0	70-130
1,2-Dichloroethane-d4	9	97	5.4	0	0	70-130
Toluene-d8	9	96	7.0	0	0	70-130
PJFF Outlet Gas:						
1,4-Bromofluorobenzene	9	101	3.0	0	0	70-130
1,2-Dichloroethane-d4	9	93	3.2	0	0	70-130
Toluene-d8	9	100	2.4	0	0	70-130
Boiler Outlet Gas:						
1,4-Bromofluorobenzene	20	85	34.3	1	0	70-130
1,2-Dichloroethane-d4	20	91	21.8	1	0	70-130
Toluene-d8	20	92	22.9	1	0	70-130
VOST Field Blanks:						
1,4-Bromofluorobenzene	9	97	3.6	0	0	70-130
1,2-Dichloroethane-d4	9	94	4.0	0	0	70-130
Toluene-d8	9	97	2.4	0	0	70-130
VOST Trip Blanks:						
1,4-Bromofluorobenzene	2	92	2.1	0	0	70-130
1,2-Dichloroethane-d4	2	104	7.1	0	0	70-130
Toluene-d8	2	88	4.2	0	0	70-130
VOST Lab Blanks:						
1,4-Bromofluorobenzene	19	96	3.5	0	0	70-130
1,2-Dichloroethane-d4	19	97	3.8	0	0	70-130
Toluene-d8	19	95	4.0	0	0	70-130

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Table H-5

Summary of Surrogate Recoveries for Semivolatile Organic Analyses from Site 13

	No. of Analyses	Mean % Rec.	Std. Dev. (% Rec)	No. Below Limits	No. Above Limits	QC Limits %
Gas Samples:						
2-Fluorobiphenyl	24	93	6.8	0	0	30-115
2-Fluorophenol	24	82	6.2	0	0	25-121
Nitrobenzene-d5	24	95	10.0	0	0	23-120
Phenol-d5	24	93	10.1	0	0	24-114
Terphenyl-d14	24	99	12.8	0	0	18-137
2,4,6-Tribromophenol	24	99	17.8	0	4	19-122
Trip Blanks:						
2-Fluorobiphenyl	2	83	9.9	0	0	30-115
2-Fluorophenol	2	70	3.5	0	0	25-121
Nitrobenzene-d5	2	74	9.2	0	0	23-120
Phenol-d5	2	83	0	0	0	24-114
Terphenyl-d14	2	90	13.4	0	0	18-137
2,4,6-Tribromophenol	2	72	2.1	0	0	19-122
Field Blanks:						
2-Fluorobiphenyl	2	92	1.4	0	0	30-115
2-Fluorophenol	2	88	3.5	0	0	25-121
Nitrobenzene-d5	2	84	2.8	0	0	23-120
Phenol-d5	2	101	2.8	0	0	24-114
Terphenyl-d14	2	96	2.8	0	0	18-137
2,4,6-Tribromophenol	2	81	4.2	0	0	19-122
Lab Blanks:						
2-Fluorobiphenyl	6	95	8.2	0	0	30-115
2-Fluorophenol	6	82	4.3	0	0	25-121
Nitrobenzene-d5	6	90	6.5	0	0	23-120
Phenol-d5	6	99	11.0	0	0	24-114
Terphenyl-d14	6	107	6.8	0	0	18-137
2,4,6-Tribromophenol	6	90	7.1	0	0	19-122

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Duplicate Samples and Duplicate Analyses

Duplicate samples and duplicate analyses are used as indicators of measurement data precision. Precision is a measure of mutual agreement among individual measurements of the same property made under similar conditions. Variability among the measurements is attributable to random error. In the case of duplicate analyses, the analytical process is replicated for separate aliquots of a single sample with prescribed elements of the process held constant. For example, duplicate analyses are usually performed on the same day, by the same analyst, using the same instrument and same calibration. Differences in results for duplicate analyses are attributable to random variability in the analytical process and are a measure of analytical precision.

Duplicate samples provide another measure of precision. Collecting and analyzing duplicate samples involves replicating sample collection (and associated sample handling activities) and analysis, therefore, precision estimates based on duplicate sample results take both sampling variability and analytical variability into account.

Duplicate samples and duplicate analysis results both provide data for precision estimates. Generally, however, duplicate sample data are used in different ways than the results for duplicate analyses. Since analytical precision is primarily a function of the analytical procedures used, precision data for duplicate analysis may be used as an ongoing quality control check, and corrective action can be initiated when results indicate that analytical precision is not within acceptable limits.

Results for duplicate samples, on the other hand, are more often used merely as a data quality assessment tool. There is a lag between sample collection and the availability of analytical results, and it is usually not possible to initiate corrective action based on duplicate sample data because the process would no longer be at the same conditions. Variability in duplicate sample results may also include a component of variability attributable to inherent nonhomogeneity of the sample matrix.

Both types of duplicate data are useful as indicators of the degree to which results may be expected to vary by chance alone. This information is important whenever comparisons are made between measured values. Without this information it is difficult to know when to attribute observed differences to measurement error and when to attribute them to real differences.

Precision estimates for field duplicate samples for the project are presented in Table H-6. The precision objective is expressed in terms of the relative percent difference (RPD) and represents the objective for analytical variability. Duplicate samples were collected only for the solid and liquid streams. The results for the duplicate analyses are also presented in Table H-6. The precision objectives were met for most analytes. Exceptions and limitations are discussed later in this section.

Performance Evaluation Samples

Performance audit samples are samples of known composition which provide a point-in-time assessment of analytical performance. Audit samples were prepared for this study by spiking known concentrations of target analytes from EPA Quality Control Check material, vendor certified standard material, or standards obtained from NIST (formerly NBS). Audit samples are similar to QCCS except that they are submitted "double blind" to the analytical laboratory. That is, the laboratory does not know the identity or composition of the audit samples.

Audit samples were prepared at concentration levels simulating the expected range of the analytes in the field samples when possible. Organic audit samples were not prepared because the laboratories performing organic analyses have consistently shown acceptable performance on surrogate recoveries and internal quality control samples. Tables H-7 through H-9 present the results of the performance evaluation samples. The results for these samples should be considered when comparing the relative accuracies of each method for a particular element.

Table H-6

Summary of Duplicate Sample Results from Site 13

	No. of Pairs	Mean	Relative Percent Difference (RPD)
Chloride and Sulfate in PJFF Outlet Impinger Samples (mg/L):			
Chloride	1	7.78	1.2
Sulfate	2	1,650	1.06
Chloride and Sulfate in Boiler Outlet Impinger Samples (mg/L):			
Chloride	2	5.21	0.5
Sulfate	1	1,542	1.8
Chloride, Fluoride, and Total Sulfur in Limestone (mg/kg):			
Chloride	2	<114	NC
Fluoride	1	40.3	60
Total Sulfur	1	0.009-2%	37
ICP-AES Metals in Limestone Samples:			
Aluminum	1	786	8.1
Antimony	1	<53	NC
Barium	1	<10	0
Beryllium	1	<1.02	NC
Calcium	1	222,000	0.9
Chromium	1	1.58	112
Cobalt	1	<10	0
Copper	1	<20	0
Iron	1	491	15.1
Magnesium	1	100,350	1.3
Manganese	1	30.5	6.6
Molybdenum	1	11.2	16.1

Table H-6 (Continued)

	No. of Pairs	Mean	Relative Percent Difference (RPD)
ICP-AES Metals in Limestone Samples (Cont'd)			
Nickel	1	<20	0
Potassium	1	706	8.1
Silver	1	<10	0
Sodium	1	<1000	0
Strontium	1	<3	0
Thallium	1	27.8	40
Titanium	1	<50	0
Vanadium	1	2.4	33
Zinc	1	<20	0
GFAAS, HGAAS, and CVAAS in Limestone Samples:			
Arsenic	1	2.06	15.1
Cadmium	1	<1	0
Lead	1	<3	0
Mercury	1	<0.045	0
Selenium	1	<4.5	NC
INAA Metals in PJFF Fly Ash (μg/g):			
Aluminum	1	24,249	2.1
Arsenic	1	175	2.1
Chromium	1	237.8	1.7
Cobalt	1	3,875	2.5
Iron	1	45,504	2.3
Magnesium	1	7,388	2.0
Manganese	1	239	0.6
Molybdenum	1	96	5.7

Table H-6 (Continued)

	No. of Pairs	Mean	Relative Percent Difference (RPD)
INAA Metals in PJFF Fly Ash (μg/g) (Cont'd)			
Nickel	1	56,137	4.2
Selenium	1	30.96	8.9
Sodium	1	24,238	.3
Vanadium	1	8,203	0
Zinc	1	853	0.2
INAA Metals in Fuel Oil (μg/g):			
Aluminum	2	12.60	7.9
Antimony	2	0.342	46
Arsenic	2	0.120	9.3
Calcium	2	88.3	13.5
Chromium	2	0.686	9.2
Cobalt	2	2.32	6.4
Copper	2	8.55	8.6
Iron	2	21.88	4.6
Magnesium	2	7.18	12.4
Manganese	2	0.096	9.2
Molybdenum	2	<0.16	NC
Nickel	2	41.48	4.7
Silver	2	<0.08	NC
Sodium	2	12.2	2.4
Titanium	2	5.3	25
Vanadium	2	6.34	8.6
Zinc	2	0.55	7.2

Table H-6 (Continued)

	No. of Pairs	Mean	Relative Percent Difference (RPD)
Mineral Analysis of Fly Ash (%):			
Silica	1	4.88	1.2
Alumina	1	0.73	82
Titania	1	0.03	0
Ferric oxide	1	0.30	67
Calcium oxide	1	54.96	0.5
Magnesia	1	38.5	<0.1
Potassium oxide	1	0.185	27
Sodium oxide	1	0.025	40
Sulfur trioxide	1	0.0285	3.5
Phosphorus pentoxide	1	0.05	0
Strontium oxide	1	0.035	29
Barium oxide	1	<0.01	0
Manganese oxide	1	0.015	67
Loss on Ignition	1	45.725	0
Ultimate and Proximate Analysis of PJFF Oil (%):			
HHV (Btu/lb)	2	19,006	0.85
Water by Distillation	2	0.70	12
Carbon	2	86.82	<1
Hydrogen	2	11.21	<2
Nitrogen	2	0.33	18
Sulfur	2	0.292	1.9
Ash	2	0.028	>75
Oxygen by Difference	2	1.31	34
Chlorine	2	0.02	0
Fluorine	2	10	34
Phosphorus	2	0.41	25

Table H-7

Results of Site 13 PE Sample - Fly Ash 1633a Analyzed by ICP-AES/AAS, Neutron Activation, and X-ray Fluorescence

		ICP-AES/AAS		INAAS		XRF	
Parameter	Certified Value µg/g	Result µg/g	% Rec.	Result	Rec. %	Result %	Rec. %
Aluminum	14.3%	13.0%	91	133,540	93	14.3	102
Antimony	6.8	9.45*	140	6.1995	91		
Barium	0.15%	0.122%	75	1,839	122	0.161	100
Beryllium	12	11.2	92				
Calcium	1.11%	1.29%*	116	14,897	134	1.06	95
Chromium	196	397	202	182	93		
Cobalt	46	54.1	118	53.1	115		
Copper	118	121	102	<418			
Iron	9.4%	8.78%	93	95,786	102	9.81	104
Magnesium	0.455%	0.377%*	84	6,572	114	0.452	100
Manganese	179	198	104	160	89	0.079	440
Molybdenum	29	32.3*	111	<14.4			
Nickel	127	<20	0	162	128		
Potassium	1.88%	1.77%	94	25,299	134	1.88	100
Silicon	22.8%	NA				23.2	101
Sodium	0.17%	128%*	75	1,839	108	0.11	65
Strontium	830	670	81	1,021	123	0.27	320
Titanium	0.8%	0.786%	98	7,259	91	0.82	103
Vanadium	297	280	94	288	97		

Table H-7 (Continued)

Parameter	Certified Value µg/g	ICP-AES/AAS Result µg/g	ICP-AES/AAS % Rec.	INAAS Result	INAAS Rec. %	XRF Result %	XRF Rec. %
Zinc	220	198	90	202	92		
Arsenic	145	133	92	157.49	108		
Cadmium	1.00	0.80*	80	<24.9			
Mercury	0.16	0.125*	78	<3.61			
Lead	72.4	71.4	99				
Selenium	10.3	11.1*	108	10.892	106		

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Table H-8

Limestone 1C - Site 13 PE Sample

		INAA		XRF	
Parameter	Certified Value %	Result %	Rec. %	Result %	Rec. %
Aluminum	0.688	0.6347	92	0.771	112
Calcium	35.9	51.0	142	35.64	99
Iron	0.385	1.06	275	0.37	96
Magnesium	0.253	0.0878	35	0.29	115
Manganese	0.019	0.0144	76	0.014	74
Phosphorus	0.017	--		0.0184	108
Potassium	0.23	0.2186	95	0.2546	111
Silicon	3.197	--		3.297	103
Sodium	0.0148	0.0154	155	0.01336	91
Strontium	0.0254	0.0730	287	0.254	100
Titanium	0.042	<0.0395	>94	0.324	78

Table H-9

Fuel Oil Performance Evaluation QC Sample - Site 13

		NAA	
Parameter	Certified Value µg/g	Result µg/g	Rec. %
Aluminum	16	10.823	68
Barium	1.3	4.428	341
Calcium	15	<117	NC
Chromium	0.7	0.8425	120
Cobalt	0.32	0.3499	109
Iron	31.6	30.327	96
Manganese	0.23	0.1726	75
Nickel	28	32.113	115
Sodium	90	74.97	83
Titanium		<11.95	NC
Vanadium	55.4	56.832	102
Zinc	3.0	2.0679	69
Arsenic	0.12	0.1099	92
Mercury	<0.001	<0.0815	NC
Lead	2.8		
Selenium	0.18	0.1674	93

NC = Not able to calculate.

Table H-7 presents the results for the analysis of NBS fly ash sample 1633A by ICP-AES/AAS following microwave digestion, neutron activation (INAA), and X-ray fluorescence (XRF). Results for the ICP-AES/AAS analyses show recoveries below the 80% objective for barium, nickel, sodium, and mercury. Recoveries were above the 120% objective for antimony and chromium. Recoveries for the neutron activation analyses were above the objective for barium, calcium, nickel, potassium, and strontium. Recoveries for the XRF analyses were above the objective for manganese and strontium and below the objective for sodium.

Table H-8 presents the results for the analysis of a sample of NIST argillaceous limestone 1C by neutron activation (INAA) and X-ray fluorescence (XRF). Results for INAA show recoveries below the acceptance limits for magnesium and manganese. Recoveries for calcium, iron, sodium, and strontium were above the acceptance criteria. Recoveries for the XRF analyses were below the acceptance criteria for manganese and titanium.

Results for the neutron activation analysis of a NBS 1634 B fuel oil sample is presented in Table H-9. Recoveries were below the 80% acceptance limits for aluminum, manganese, and zinc and above the 120% limits for barium.

Summary of Quality Control Results

Semivolatile Organics

All surrogate recoveries associated with the semivolatile organics, except for 2,4,6-tribromophenol in four samples, were within control limits. Surrogate recoveries are summarized in Table H-5. These results show average surrogate recoveries ranging from 70% to 107% and repeatability ranging from 0 to 17.8% standard deviation. Benzoic acid and phenol were the only target analytes detected at concentrations above the method detection limits in any of the gas streams analyzed for semivolatile organics.

Benzoic acid and phenol were also found in one of the two field blank samples, but at levels below the reporting limits.

Volatile Organics

During the VOST sampling, the target compounds were benzene and toluene. For these analyses, surrogate recovery and laboratory system blanks were within control ranges except for one surrogate sample set.

Benzene, trichlorofluoromethane, 1,1,1-trichloroethene, methylene chloride, toluene, and xylene were found in most of the samples from the PJFF inlet, the PJFF outlet, and the boiler outlet gas streams sampled by VOST. Tetrachloroethene, ethylbenzene, and vinyl acetate were found in at least the PJFF outlet and boiler outlet sample but were not found in the PJFF inlet stream. In addition, acetone was found in one boiler outlet sample and 2-butanone was found in one PJFF sample. Methylene chloride was detected in several of the field blanks but was not found in laboratory or trip blanks.

A summary of surrogate spike recoveries for the volatile organic analyses is presented in Table H-4. These summaries indicate that the results are generally within control limits. Surrogate recoveries were outside the acceptance limits for one boiler outlet sample. Mean recoveries ranged from 85% to 104% with a repeatability of ranging from 2.1 to 34.3% standard deviation.

Aldehydes

Acetaldehyde, acrolein, and formaldehyde were detected in at least one of the three PJFF inlet gas samples while only formaldehyde was found in the PJFF outlet stream. Acetaldehyde and formaldehyde were found in the boiler outlet gas samples. Matrix spike recoveries averaged from 70% for acrolein to 94% for formaldehyde. Acetaldehyde and formaldehyde were also detected in the trip and field blank samples at

concentrations greater than five times the method detection limits. Formaldehyde was detected in the lab blank at concentrations less than five times the method detection limits. Acetaldehyde and formaldehyde concentrations in the field samples in many cases are at the same level as found in the field and trip blanks, suggesting that these compounds may be artifacts of sampling or sample handling process.

Anions

Quality control sample results for analyses of fluoride, chloride, sulfate, and phosphorus showed acceptable calibration and instrument control. Spike recoveries for impinger samples averaged 107% for chlorides, 88% for phosphate, and 85% for sulfate. Spikes into fly ash samples showed 92% recovery for chloride, 85% for fluoride, and 90% for sulfate. Results for duplicate sample and duplicate analyses showed good repeatability for chloride and sulfate in the impinger samples. Duplicate results for fluoride and total sulfur analysis of limestone samples were 60% and 37%, respectively.

Metals

All quality control data for metals analyses point to accurate calibration and instrument control. Limitations based on matrix effects and sample preparation techniques are discussed below.

Limestone. Matrix spike results for the limestone samples were outside the 75-125% recovery objectives for aluminum, barium, beryllium, calcium, chromium, iron, magnesium, nickel, silver, sodium,and strontium by ICP-AES analysis and arsenic and selenium by HGAAS analysis. Results for the performance audit sample submitted "double blind" to the laboratories showed recoveries outside the criteria for calcium, iron, magnesium, manganese, sodium, and strontium analyzed by INAA. Manganese and titanium were outside the recovery objectives for the XRF analyses.

Fuel Oil. A NBS 1634b fuel oil performance audit sample was analyzed by neutron activation showed recoveries outside the acceptance criteria for aluminum, barium, manganese, and zinc. Duplicate analyses of fuel oil samples were outside the 20% precision criteria for antimony and titanium by INAA and ash, fluorine and phosphorus by the ultimate/proximate analyses.

Fly Ash and Bottom Ash. Matrix spike results in the fly ash solids were below the 75-125% recovery objectives for antimony, beryllium, cobalt, nickel, silver, vanadium, and zinc by ICP-AES and arsenic and selenium by HGAAS. Nickel spikes were made at too low a level compared to the native concentrations in the samples. Duplicate RPDs (relative percent differences) were within the 20% objective for all elements analyzed by INAA. A NBS 1633a fly ash sample analyzed as a blind performance evaluation sample showed good recoveries except for antimony (140%), barium (75%), chromium (202%), nickel (0%), sodium (75%), and mercury (78%) analyzed by ICP-AES/AAS. Fly ash samples analyzed by INAA showed recoveries within the acceptance criteria for all elements except barium, chromium, nickel, potassium and strontium. Aluminum, barium, iron, nickel, and strontium were detected in the laboratory preparation blank. This could significantly affect results for these elements in the solid samples.

Metals Train Particulate Samples. Several aliquots of a standard fly ash sample (1633a) obtained from the National Institute of Standards and Technology were digested and analyzed in conjunction with the analysis of particulates from the filter and probe and nozzle rinses out of the metals train. Very poor recoveries were obtained on all of the aliquots analyzed for antimony by ICP-AES, recoveries greater than 125% were observed for molybdenum, silicon, and thallium by ICP-AES analysis which indicate a bias for these metals. In addition, one or more of the five fly ash aliquots analyzed showed recoveries below 75% for aluminum, barium, calcium, chromium, magnesium, manganese, nickel, potassium, sodium, and strontium by ICP-AES. Recoveries were also below criteria for cadmium and selenium which were analyzed by GFAAS/HGAAS.

The results for the trip and field blanks showed aluminum, barium, iron, manganese, molybdenum (field blank only), and strontium at levels greater than five times the method detection limits in the filter samples. However, the concentrations of these elements found in the samples were at least 5 to 10 times the background contributed by the filter except for molybdenum. The concentration of molybdenum in the blanks and samples were near the same levels, suggesting that the filter may be a significant contribution of molybdenum in these samples.

Metals Train Impinger Solutions. Spike recoveries for all elements were within control limits in the PJFF inlet impinger samples analyzed by ICP-AES. Recoveries for arsenic and selenium analyzed by HGAAS were outside limits. Trip blanks, field blanks, and lab blanks for the impinger samples did not show any elements at concentrations above five times the detection limits.

Condensate Water. Spike recovery data for QCCS prepared in reagent water showed recoveries ranging from 89% to 96% for all elements analyzed by ICP-AES. Laboratory blanks analyzed with the water samples showed trace levels of many of the target elements. However, only silver was detected at levels greater than the reported detection limits. Silver was not detected in any of the condensate water samples.

Appendix I

Blank Correction Data

PRELIMINARY DO NOT CITE OR QUOTE

For most of the metallic elements of interest to this program, small traces are present in both the reagents and filter media used in sampling and analyses. In some instances, the total mass present in these materials prior to sampling is equivalent to that measured after sampling. Consequently, we routinely use a blank correction in the calculation of gas stream concentrations for metals and anions. Semivolatile gas analyses have not indicated the presence of semivolatile organic compounds in the blanks. Aldehyde samples occasionally require blank correction. In the following tables, the mass or concentrations reported by the laboratory are presented for those substances for which concentrations were reported in the blank. The ratio of the blank value to the measured value is then calculated. Instances where the blank values are equal to or greater than 50% of the measured values are denoted with a "B". As shown in Appendix H, for the large majority of substances, the blank levels detected are below the reporting limit or less than five times the reporting limit, indicating that the substance levels in the reagent and filter media are low.

Table I-1 presents the metals train probe and nozzle rinse and filter blank corrections for Site 13. Thirteen substances were reported in the field blanks. Of the 45 values which were blank corrected, corrections of 50% or more were only made to the levels of mercury in the PJFF outlet gas, molybdenum in the PJFF inlet gas and boiler outlet gas (both baseline and low NO_x test), cadmium in the PJFF inlet gas and boiler outlet gas (low NO_x), and selenium in the boiler outlet gas (low NO_x).

Table I-2 presents the metal impinger blank corrections for Site 13. Only lead was present above reporting limits in the field blank impinger solution. Many of the sample train impingers contained substances at concentrations that were below the reporting limits (arsenic, barium, cadmium, chromium, cobalt, manganese and nickel); these data are marked with a "J" flag. In all cases, the uncorrected sample results were below reporting limits; therefore, the blank correction has no effect on the reported results.

Tables I-3 and I-4 summarize blank correction data for anions (solid and vapor phase) and aldehydes. Chloride was present above reporting limits in both the particulate and vapor phase blanks. Blank correction was greater than 50% for many of the particulate phase

samples. Fluoride was present in the vapor phase blank; however, blank corrections were less than 50% of the measured sample values. Both formaldehyde and acetaldehyde were present in the aldehydes field blank. Formaldehyde and acetaldehyde blank corrections were greater than 50% for the boiler outlet gas during both the baseline and low NO_x tests.

Table I-1

Metals Train Particulate*
Blank Corrections for Site 13

Stream	Substance	Run B (or K) Uncorr. µg	Run B (or K) % Blank	Run D (or L) Uncorr. µg	Run D (or L) % Blank	Run E (or M) Uncorr. µg	Run E (or M) % Blank	Field Blank, µg
PJFF Inlet, Baseline	Arsenic	12.8	5.2	13.0	5.2	13.0	5.1	0.67
PJFF Outlet, Baseline	Arsenic	0.92	17	--	--	--	--	0.16
Boiler Outlet, Baseline	Arsenic	10.8	6.2	13.9	4.8	13.9	4.8	0.67
Boiler Outlet, Low NO_x	Arsenic	7.30	9.1	9.59	7.0	7.82	8.6	0.67
PJFF Inlet, Baseline	Mercury	0.159	10.8	0.139	12.3	0.144	11.9	0.172
PJFF Outlet, Baseline	Mercury	<0.054	32	0.0264 B	65	0.0238 B	61	0.0172
Boiler Outlet, Baseline	Mercury	0.149	11.6	0.228	7.5	0.292	5.9	0.0172
Boiler Outlet, Low NO_x	Mercury	0.211	8.2	0.283	6.1	0.250	6.9	0.0172
PJFF Inlet, Baseline	Barium	45.6	17	51.1	15	52.2	15	7.6
PJFF Outlet, Baseline	Barium	12.8	7.3	--	--	--	--	0.16
Boiler Outlet, Baseline	Barium	40.6	19	55.5	14	50.7	15	7.6
Boiler Outlet, Low NO_x	Barium	30.5	25	29.5	26	23.5	33	7.6
PJFF Inlet, Baseline	Chromium	16.4	21	17.7	19	18	19	3.4
PJFF Outlet, Baseline	Chromium	33.6	2.6	--	--	--	--	0.87
Boiler Outlet, Baseline	Chromium	16.0	21	21.3	16	19.1	18	3.4
Boiler Outlet, Low NO_x	Chromium	9.5	36	10.6	32	8.2	41	3.4

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Table I-1 (Continued)

Stream	Substance	Run B (or K) Uncorr. µg	Run B (or K) % Blank	Run D (or L) Uncorr. µg	Run D (or L) % Blank	Run E (or M) Uncorr. µg	Run E (or M) % Blank	Field Blank, µg
PJFF Inlet, Baseline	Cobalt	147	0.8	168	0.7	169	0.7	1.2
Boiler Outlet, Baseline	Cobalt	131	0.9	213	0.5	172	0.7	1.2
Boiler Outlet, Low NO_x	Cobalt	136	0.9	151	0.8	132	0.9	1.2
PJFF Inlet, Baseline	Copper	18.4	20	20.9	17	20.8	17	3.6
PJFF Outlet, Baseline	Copper	3.70	2.0	--	--	--	--	0.073
Boiler Outlet, Baseline	Copper	23.7	15	26.5	14	25.5	14	3.6
Boiler Outlet, Low NO_x	Copper	19.4	19	21.3	17	17.3	21	3.6
PJFF Inlet, Baseline	Manganese	11.4	9.1	12.6	8.2	13.4	7.6	1.0
PJFF Outlet, Baseline	Manganese	16.7	2.2	--	--	--	--	0.36
Boiler Outlet, Baseline	Manganese	12.2	8.5	15.8	6.6	15.3	6.8	1.0
Boiler Outlet, Low NO_x	Manganese	9.68	11	11.4	9.1	10.5	9.9	1.0
PJFF Inlet, Baseline	Molybdenum	47.2 B	85	47.6 B	85	46.6 B	87	40.3
Boiler Outlet, Baseline	Molybdenum	45.4 B	89	48.0 B	84	45.5 B	89	40.3
Boiler Outlet, Low NO_x	Molybdenum	45.0 B	89	45.0 B	89	43.1 B	94	40.3
PJFF Inlet, Baseline	Nickel	2,765	0.5	3,197	0.4	3,159	0.4	14.0
PJFF Outlet, Baseline	Nickel	31.2	2.7	--	--	--	--	0.85
Boiler Outlet, Baseline	Nickel	2,493	0.6	3,640	0.4	3,220	0.4	14.0
Boiler Outlet, Low NO_x	Nickel	2,645	0.5	3,003	0.5	2,636	0.5	14.0
PJFF Inlet, Baseline	Vanadium	503	1.2	608	1.0	621	1.0	6.1

Table I-1 (Continued)

Stream	Substance	Run B (or K) Uncorr. µg	Run B (or K) % Blank	Run D (or L) Uncorr. µg	Run D (or L) % Blank	Run E (or M) Uncorr. µg	Run E (or M) % Blank	Field Blank, µg
Boiler Outlet, Baseline	Vanadium	470	1.3	706	0.9	630	1.0	6.1
Boiler Outlet, Low NO_x	Vanadium	361	1.7	392	1.6	326	1.9	6.1
PJFF Inlet, Baseline	Lead	17.2	30	13.1	39	16.9	31	5.2
PJFF Outlet, Baseline	Lead	0.70	29	--	--	--	--	0.20
Boiler Outlet, Baseline	Lead	16.8	31	23.5	22	16.6	31	5.2
Boiler Outlet, Low NO_x	Lead	11.3	46	13.4	39	19.1	27	5.2
PJFF Inlet, Baseline	Cadmium	1.06 B	217	1.23 B	190	1.02 B	225	2.3
Boiler Outlet, Baseline	Cadmium	10.7	22	6.2	37	64	3.6	2.3
Boiler Outlet, Low NO_x	Cadmium	5.7	40	63.2	3.6	1.6 B	144	2.3
Boiler Outlet, Low NO_x	Selenium	1.97	40	3.06	25	0.87 B	87	0.78

*Particulate includes both filter and probe/nozzle rinse fractions.

"B" indicates blank exceeds 50% of uncorrected result.

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Table I-2

Site 13 Metals Train Impinger Blank Corrections

Substance	Stream	Run	Sample Result, µg	Field Blank, µg	% Blank
Arsenic	PJFF Inlet, Baseline	B	0.64 J	0.32 J	50%
Arsenic	PJFF Inlet, Baseline	D	0.33 JB	0.32 J	95%
Arsenic	PJFF Inlet, Baseline	E	0.59 JB	0.32 J	54%
Arsenic	PJFF Outlet, Baseline	B	0.28 JB	0.32 J	114%
Arsenic	PJFF Outlet, Baseline	D	0.55 JB	0.32 J	57%
Arsenic	PJFF Outlet, Baseline	E	0.34 JB	0.32 J	92%
Arsenic	Boiler Outlet, Baseline	B	0.0082 JB	0.32 J	3845%
Arsenic	Boiler Outlet, Baseline	D	<1.07	0.32 J	30%
Arsenic	Boiler Outlet, Baseline	E	<1.22	0.32 J	26%
Arsenic	Boiler Outlet, Low NO_x	K	<1.12	0.32 J	28%
Arsenic	Boiler Outlet, Low NO_x	L	<1.80	0.32 J	18%
Arsenic	Boiler Outlet, Low NO_x	M	<1.90	0.32 J	17%
Barium	PJFF Inlet, Baseline	B	1.36 J	0.16 J	12%
Barium	PJFF Inlet, Baseline	D	0.31 JB	0.16 J	51%
Barium	PJFF Inlet, Baseline	E	0.40 J	0.16 J	40%
Barium	PJFF Outlet, Baseline	B	1.07 J	0.16 J	15%
Barium	PJFF Outlet, Baseline	D	0.19 JB	0.16 J	84%
Barium	PJFF Outlet, Baseline	E	0.30 JB	0.16 J	52%
Barium	Boiler Outlet, Baseline	B	1.17 J	0.16 J	14%
Barium	Boiler Outlet, Baseline	D	1.07 J	0.16 J	15%
Barium	Boiler Outlet, Baseline	E	0.38 J	0.16 J	42%
Barium	Boiler Outlet, Low NO_x	K	0.60 J	0.16 J	26%
Barium	Boiler Outlet, Low NO_x	L	0.66 J	0.16 J	24%
Barium	Boiler Outlet, Low NO_x	M	0.51 J	0.16 J	31%
Cadmium	PJFF Inlet, Baseline	B	0.50 JB	0.53 J	105%
Cadmium	PJFF Inlet, Baseline	D	0.22 JB	0.53 J	239%
Cadmium	PJFF Inlet, Baseline	E	0.04 JB	0.53 J	1287%
Cadmium	PJFF Outlet, Baseline	B	0.23 JB	0.53 J	234%
Cadmium	PJFF Outlet, Baseline	D	0.09 JB	0.53 J	576%
Cadmium	PJFF Outlet, Baseline	E	0.19 JB	0.53 J	273%

Table I-2. (Continued)

Substance	Stream	Run	Sample Result, µg	Field Blank, µg	% Blank
Cadmium	Boiler Outlet, Baseline	D	<0.68 B	0.53 J	78%
Cadmium	Boiler Outlet, Baseline	E	0.11 JB	0.53 J	481%
Cadmium	Boiler Outlet, Low NO_x	K	0.070 JB	0.53 J	754%
Cadmium	Boiler Outlet, Low NO_x	L	0.11 JB	0.53 J	471%
Cadmium	Boiler Outlet, Low NO_x	M	0.18 JB	0.53 J	287%
Chromium	PJFF Inlet, Baseline	B	1.49 J	0.077 J	5%
Chromium	PJFF Inlet, Baseline	D	<4.24	0.077 J	2%
Chromium	PJFF Inlet, Baseline	E	0.37 J	0.077 J	21%
Chromium	PJFF Outlet, Baseline	B	0.0591 JB	0.077 J	131%
Chromium	PJFF Outlet, Baseline	D	0.26 J	0.077 J	30%
Chromium	PJFF Outlet, Baseline	E	0.047 JB	0.077 J	164%
Chromium	Boiler Outlet, Baseline	B	0.82 J	0.077 J	9%
Chromium	Boiler Outlet, Baseline	D	5.86 J	0.077 J	1%
Chromium	Boiler Outlet, Baseline	E	0.69 J	0.077 J	11%
Chromium	Boiler Outlet, Low NO_x	K	0.95 J	0.077 J	8%
Chromium	Boiler Outlet, Low NO_x	L	0.42 J	0.077 J	19%
Chromium	Boiler Outlet, Low NO_x	M	0.26 J	0.077 J	29%
Cobalt	PJFF Inlet, Baseline	B	1.03 JB	0.57 J	55%
Cobalt	PJFF Inlet, Baseline	D	0.59 JB	0.57 J	96%
Cobalt	PJFF Inlet, Baseline	E	0.12 JB	0.57 J	459%
Cobalt	PJFF Outlet, Baseline	B	0.12 JB	0.57 J	490%
Cobalt	PJFF Outlet, Baseline	D	0.21 JB	0.57 J	274%
Cobalt	PJFF Outlet, Baseline	E	1.12 JB	0.57 J	51%
Cobalt	Boiler Outlet, Baseline	B	0.94 JB	0.57 J	60%
Cobalt	Boiler Outlet, Baseline	D	0.47 JB	0.57 J	121%
Cobalt	Boiler Outlet, Baseline	E	<7.44	0.57 J	8%
Cobalt	Boiler Outlet, Low NO_x	K	0.55 JB	0.57 J	103%
Cobalt	Boiler Outlet, Low NO_x	L	1.01 JB	0.57 J	56%
Cobalt	Boiler Outlet, Low NO_x	M	0.58 JB	0.57 J	98%
Lead	PJFF Inlet, Baseline	B	<2.15 B	3.42	159%
Lead	PJFF Inlet, Baseline	D	<2.08 B	3.42	164%

Table I-2. (Continued)

Substance	Stream	Run	Sample Result, µg	Field Blank, µg	% Blank
Lead	PJFF Outlet, Baseline	D	<2.17 B	3.42	158%
Lead	PJFF Outlet, Baseline	E	<2.12 B	3.42	161%
Lead	Boiler Outlet, Baseline	B	<2.03 B	3.42	169%
Lead	Boiler Outlet, Baseline	D	<2.03 B	3.42	169%
Lead	Boiler Outlet, Baseline	E	<2.23 B	3.42	153%
Lead	Boiler Outlet, Low NO_x	K	0.11 JB	3.42	3155%
Lead	Boiler Outlet, Low NO_x	L	<2.24 B	3.42	153%
Lead	Boiler Outlet, Low NO_x	M	1.56 JB	3.42	219%
Manganese	PJFF Inlet, Baseline	B	4.52 J	0.76 J	17%
Manganese	PJFF Inlet, Baseline	D	0.28 JB	0.76 J	271%
Manganese	PJFF Inlet, Baseline	E	2.05 J	0.76 J	37%
Manganese	PJFF Outlet, Baseline	B	2.02 J	0.76 J	38%
Manganese	PJFF Outlet, Baseline	D	0.68 JB	0.76 J	113%
Manganese	PJFF Outlet, Baseline	E	0.84 JB	0.76 J	91%
Manganese	Boiler Outlet, Baseline	B	2.52 J	0.76 J	30%
Manganese	Boiler Outlet, Baseline	D	1.89 J	0.76 J	40%
Manganese	Boiler Outlet, Baseline	E	3.23 J	0.76 J	24%
Manganese	Boiler Outlet, Low NO_x	K	1.40 JB	0.76 J	54%
Manganese	Boiler Outlet, Low NO_x	L	0.84 JB	0.76 J	91%
Manganese	Boiler Outlet, Low NO_x	M	0.62 JB	0.76 J	123%
Nickel	PJFF Inlet, Baseline	B	0.42 JB	2.24 J	534%
Nickel	PJFF Inlet, Baseline	D	<13.87	2.24 J	16%
Nickel	PJFF Inlet, Baseline	E	0.54 JB	2.24 J	416%
Nickel	PJFF Outlet, Baseline	B	<13.00	2.24 J	17%
Nickel	PJFF Outlet, Baseline	D	<8.46	2.24 J	26%
Nickel	PJFF Outlet, Baseline	E	< 5.84	2.24 J	38%
Nickel	Boiler Outlet, Baseline	B	0.53 JB	2.24 J	420%
Nickel	Boiler Outlet, Baseline	D	78.04	2.24 J	3%
Nickel	Boiler Outlet, Baseline	E	0.08 JB	2.24 J	2837%
Nickel	Boiler Outlet, Low NO_x	K	0.30 JB	2.24 J	743%
Nickel	Boiler Outlet, Low NO_x	L	<14.94	2.24 J	15%
Nickel	Boiler Outlet, Low NO_x	M	<16.09	2.24 J	14%

"J" indicates value below reporting limit.

"B" indicates blank exceeds 50% of uncorrected result.

Table I-3

Anions Blank Corrections for Site 13

Stream	Substance	Run A (or J) Uncorr.µg	Run A (or J) % Blank	Run C (or K) Uncorr.µg	Run C (or K) % Blank	Run E (or L) Uncorr.µg	Run E (or L) % Blank	Run M Uncorr.µg	Run M % Blank	Field Blank, µg
PJFF Inlet, Particulate	Chloride	75.7 B	110	41.4 B	202	62.4 B	134	--	--	83.7
PJFF Outlet, Particulate	Chloride	9.9 B	850	55.4 B	151	77.5 B	108	--	--	83.7
Boiler Outlet, Baseline (Part.)	Chloride	259	32	211	40	132 B	63	--	--	83.7
Boiler Outlet, Low NO_x (Part.)	Chloride	3.8 B	2.200	360	23	833	10	85.3 B	98	83.7
PJFF Inlet, Vapor	Chloride	3,211	2.3	1,946	4.0	2,171	3.5	--	--	77
PJFF Outlet, Vapor	Chloride	1,610	4.8	1,791	4.3	5,079	1.5	--	--	77
Boiler Outlet, Baseline (vap.)	Chloride	1,423	5.4	1,841	4.2	2,427	3.1	--	--	77
Boiler Outlet, Low NO_x (vap.)	Chloride	5,495	1.4	5,189	1.5	4,159	1.9	3,235	2.4	77
PJFF Inlet, Vapor	Fluoride	74.3	10	49.7	15	53.0	14	--	--	7.4
PJFF Outlet, Vapor	Fluoride	73.5	10	64.1	12	51.9	14	--	--	7.4
Boiler Outlet, Baseline (vap.)	Fluoride	139	5.3	47.6	16	60.3	12	--	--	7.4
Boiler Outlet, Low NO_x (vap.)	Fluoride	40.9	18	25.8	29	31.0	24	26.3	28	7.4

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Table I-4

Aldehydes Blank Corrections for Site 13

		Run C (or K)		Run C (or L)		Run E (or M)		Run N		
Stream	Substance	Uncorr.,µg	% Blank	Uncorr.,µg	% Blank	Uncorr.,µg	% Blank	Uncorr.,µg	% Blank	Field Blank, µg
PJFF Inlet,	Acetaldehyde	<2.9 B	1,620	870	5.3	<2.9 B	1,620	--	--	46.3
PJFF Outlet,	Acetaldehyde	<2.9 B	1,620	<2.9 B	1,620	<2.9 B	1,620	--	--	46.3
Boiler Outlet, Baseline	Acetaldehyde	14	30	<2.9 B	1,620	18.6 B	250	--	--	46.3
Boiler Outlet, Low NO_x	Acetaldehyde	52.9 B	87	41.8 B	111	45.1 B	103	<2.9 B	1,620	46.3
PJFF Inlet,	Formaldehyde	17.8	32	661	0.9	16.8	33	--	--	5.62
PJFF Outlet,	Formaldehyde	16.7	34	15	37	19.2	29	--	--	5.62
Boiler Outlet, Baseline	Formaldehyde	6.6 B	85	5.9 B	95	8.3 B	68	--	--	5.62
Boiler Outlet, Low NO_x	Formaldehyde	4.7 B	120	3.6 B	156	4.6 B	122	5.9 B	95	5.62