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Field Chemical Emissions Monitoring Project: Site 101 Emissions Report

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EPRI
Electric Power
Research Institute — *Leadership in Electrification through Global Collaboration*

October 26, 1994

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 29 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 101. Site 101 consists of a pulverized coal-fired boiler burning a sub-bituminous coal, low-NOx burners, reverse-gas fabric filter, and a wet limestone flue gas desulfurization system. **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 101 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 and anions material balances, discusses the data quality, identifies suspect data, and offers possible explanations for the questionable data. Because the discussion only focuses 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 101 with the results from previous utility sites. Generic conclusions and recommendations were not drawn concerning the effectiveness of a fabric filter or FGD system as potential control technologies 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.

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
Environmental Control Business Unit

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1

INTRODUCTION

This report summarizes data gathered by Radian Corporation at a coal-fired power plant, designated Site 101, for a program sponsored by the Electric Power Research Institute (EPRI) in collaboration with utility partners. The concentrations of selected inorganic and organic substances were measured in the process and discharge streams of the plant.

Sampling was performed on an opposed wall-fired boiler burning subbituminous coal. Emissions are controlled by fabric filters and a wet lime flue gas desulfurization (FGD) system. The field test was performed January 10 through January 13, 1994. The specific objectives were to:

- Measure the stack emissions of target substances;
- Determine the removal efficiencies of the fabric filter and the FGD system for the target substances;
- Perform material balances around the entire unit, the FGD system, and the boiler/ fabric filter system; and
- Determine the species of mercury present in the FGD inlet and stack gas using the method developed by Frontier Geosciences (Bloom method).

Table 1-1 lists the substances of interest to this program. At this site, formaldehyde and polycyclic organic matter were not measured because they are typically found at low levels at other test sites.

EPRI is cosponsoring the work at Site 101 for several reasons. During the Power Plant Integrated Systems Chemical Emissions Studies (PISCES) project (EPRI RP-2933-1), a number of data gaps were identified for certain streams and substances within specific power plant configurations. The work discussed here was done in response to EPRI member utility concerns about the concentrations of trace substances in process streams, the effectiveness of control technologies in reducing emissions of these substances, and the applicability of the results of previous studies discussed in the literature.

The EPRI sponsored Field Chemical Emissions Monitoring (FCEM) project (EPRI RP-3177) was initiated to generate the missing data identified by the PISCES project. Preliminary reports on many of the plants sampled have been furnished to the U.S.

Table 1-1
FCEM Substances of Interest

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

[a]Not measured at Site 101.

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

Environmental Protection Agency (EPA) to use to study emissions from fossil-fuel-fired power plants, as mandated by the Clean Air Act Amendments of 1990.

Radian Corporation conducted the testing and has prepared this report using the following procedures to evaluate the data:

- The type and quantity of quality assurance samples were reviewed to determine the confidence that can be placed in the results; and

- The QA/QC results were compared with data quality objectives to evaluate precision and accuracy.

The results for each substance are presented by individual run and as averaged totals. To quantify the variability of the data, the 95% confidence interval about the mean is also presented. The confidence interval incorporates the combined process, sampling, and analytical variabilities.

Process Operation

The boiler operated at steady, full load (799 MW $\pm$ 0.4%) during each of the sampling periods. Operating parameters were monitored to verify the process stability during sampling. No unusual process upsets were encountered. Process operation is discussed in more detail in Section 4.

Two minor changes were made to the normal operation of the unit during flue gas sampling: 1) soot was not blown in the superheat section, and 2) the FGD bypass damper was controlled manually at a fixed position. Neither of these changes in operation compromised the representativeness of the samples.

Sampling and Analysis Protocol

Appendix A describes the sampling and analysis protocol for Site 101. The methods used are identical to those used by Radian in the FCEM project.

Quality Assurance/Quality Control (QA/QC) Data Completeness

The completeness of the quality assurance data was reviewed to judge whether the quality of the measurement data could be evaluated with the available information. In general, the results of the QC checks available for Site 101 indicate that the samples are well characterized. An evaluation of the accuracy, precision, and bias of the data, even if only qualitative, is considered to be an important part of the data evaluation. A full discussion of each of these components of quality can be found in Section 4.

Standard QA/QC checks for this type of sampling program involve the use of: 1) replicate tests, duplicate field samples and lab analyses, and matrix spike and lab control duplicates to determine precision; 2) matrix spikes, surrogate spikes, and laboratory control samples to determine accuracy; and 3) field blanks, trip blanks, method blanks, and reagent blanks to determine if any of the samples were contaminated during collection or analysis. All of these standard QA/QC checks were used on various samples from Site 101. The absence of any of these quality control checks for a given measurement does not necessarily reflect poorly on the quality of the data but does limit the ability to measure the various components of measurement error.

Data Quality

The available QA/QC results were compared to the data quality objectives discussed in Section 4. QA/QC results outside the data quality objectives are noted and discussed, other quality assurance values are evaluated, and the potential effect on data quality is noted. From the detailed information in Section 4, several important issues have been identified that may affect the data.

- The FGD inlet sampling location did not meet the specifications of Method 1, because the ports were located immediately downstream of a section of the duct in which the top side and one vertical side converge at approximately 10 degrees. In addition, the location represented only one-fourth of the scrubbed gas. Although the location was not ideal, it was the most suitable among the available options. The FGD inlet gas has a low particulate loading consisting primarily of very fine particles and is expected to be well mixed, which should minimize the effects of the non-ideal location.

- The metals train particulate sample for Run 2 at the stack was lost due to a vessel rupture during the microwave digestion. As a consequence, the confidence intervals for the concentrations of metals in the stack tend to be larger than they might have been if three sample results had been obtained.

- Field blank results indicate that contamination of nitric acid impinger solutions by manganese from the permanganate impinger solutions may be a problem. As a consequence, the vapor-phase manganese results at the FGD inlet and the stack may be biased high.

- Field blank results indicate that lead and molybdenum solid-phase concentrations in the FGD inlet and stack gas may be biased high due to low-level contamination.

- Method blank results for chromium, cobalt, and nickel indicate that low-level laboratory contamination may bias slightly high the solid-phase flue gas results for these metals.

- Matrix spike results for selenium in nitric acid impingers indicate that vapor-phase selenium results in flue gas may be biased approximately 50% low.

Report Organization

Section 2 of this report briefly describes the plant and the sample locations. Section 3 discusses the chemical analyses of the process streams. Section 4 presents engineering and analytical evaluations of the data. Section 5 presents example calculations, and a glossary of terms is provided in Section 6. The appendices contain information on sampling and analytical methods, stream concentrations, error propagation equations, detailed QA/QC data, stream flow rates, and process data.

2

SITE DESCRIPTION

The FCEM project assigns a site code to each plant sampled. The plant covered by this report has been designated Site 101. The test site and sampling locations are described in this section.

Facility Information

The characteristics of the unit are summarized in Table 2-1. The unit tested has a gross generating capacity of approximately 800 MW. Steam is generated in a Babcock & Wilcox, wall-fired boiler burning pulverized coal. The 48 low-NO_x burners (controlled flow/split flame) are arranged on opposing walls with six burners in a row, four rows high. Each mill (eight mills total) feeds the six burners on a single row.

Figure 2-1 is a process flow diagram of the unit. The feedstock is a western region, subbituminous coal. The typical coal composition is 15% moisture, 20-25% ash, 0.8% sulfur, and 8,800 Btu/lb heating value. Bottom ash is removed from the boiler with an ash sluicing system. A fabric filter (baghouse) system removes fly ash from the flue gas. A wet lime scrubber system is used to control sulfur dioxide emissions. The flue gas treatment and solids handling facilities are described in greater detail below.

Flue Gas Treatment Facilities

Particulate matter is removed from the flue gas in Research Cottrell baghouses. There are 4 baghouses, with 12 compartments per baghouse and 414 bags per compartment. The bags operate at an air-to-cloth ratio of about 1.5 $acfm/ft^2$ (vs. 1.75 design). Each bag, 1 foot in diameter and 32 feet long, is constructed of 13 1/2 ounce fiberglass 3 x 1 twill fabric with a Burlington I625 finish. The bags are suspended with the open end down, and high dust gas is introduced on the inside of the bags.

Bag cleaning is accomplished with reverse air. Each compartment is cleaned approximately every four hours. The flange-to-flange pressure drop is normally between 6.5 and 9.0 inches of water.

The flue gas is scrubbed by a Babcock & Wilcox wet lime flue gas desulfurization (FGD) system. The system contains five spray tower modules, with only four in operation at a given time. Each module operates at a liquid/gas ratio of about 55 gal/kacf. Approximately 25% of the flue gas bypasses the FGD system and is remixed with the scrubbed gas before discharge through the stack. The bypass damper is normally controlled

Table 2-1
Unit Summary

Maximum Gross Electrical Output (MW)	800
Boiler Type	Opposed wall-fired
Boiler Additives	None
NO_x Control	Low-NO_x (CFSF) burners
Fuel Type	Subbituminous coal
Fuel Sulfur Content (% dry)	0.79[a]
Fuel Ash Content (% dry)	25[a]
Fuel Heating Value (Btu/lb, dry)	10,200[a]
Particulate Matter Controls	Fabric filters
Particulate Emission Limit (lb/10^6 Btu)	0.04
Air-to-Cloth Ratio (acfm/ft^2)	1.75 design; 1.5 actual
Flue Gas Conditioning	None
SO_2 Emission Limits	72% removal
SO_2 Controls	Wet lime FGD with sulfur addition to form S_2O_3
Number of FGD Modules	Five (typically only four are in operation and one is a spare)
Fly Ash & FGD Solids Disposal	Abandoned mine
Bottom Ash Disposal	Abandoned mine
Bottom Ash Sluice Water Source	Lake
Cooling Water System	Once through
Cooling Water Source	Lake

[a]Mean values measured during sampling.

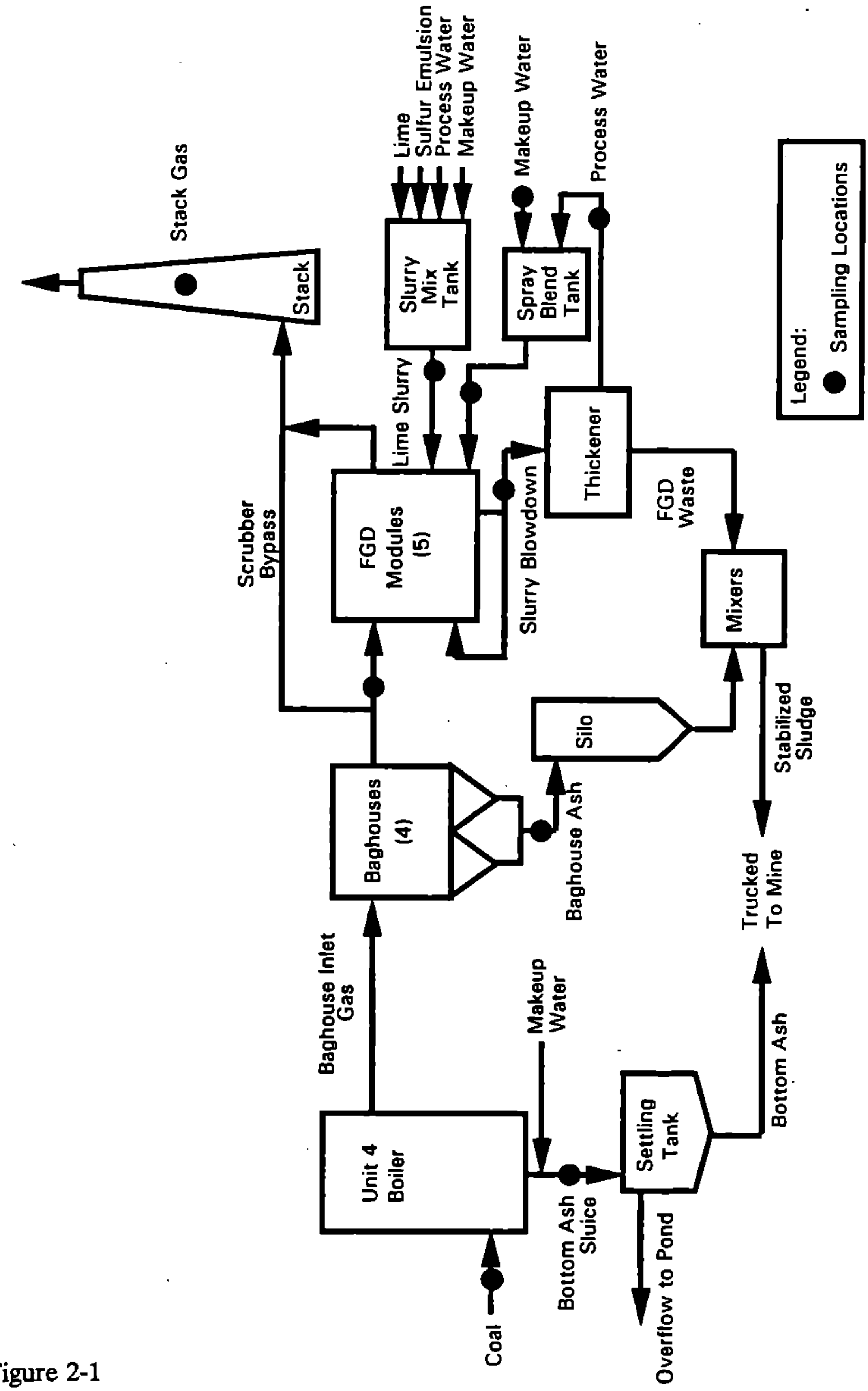

Figure 2-1
Process Flow Diagram for Site 101

automatically, with feedback from the stack SO_2 monitor, to achieve a station-wide 72% SO_2 removal. To prevent varying gas flow rates during flue gas sampling, the bypass damper was set in a fixed position.

The lime feed slurry is prepared in a large batch tank. Fresh lime is slaked with makeup water, then diluted to 15% solids with process (recycle) water. Emulsified sulfur is also added to the slurry. The tank is continually agitated, and the slurry is pumped around to the FGD modules in a loop, with the unused slurry returning to the feed tank. Spent slurry is purged from the recirculation loops of each module.

Two types of water are used within the process. Fresh makeup water is available from an adjacent lake. Process water is available from the FGD sludge thickener overflow. The scrubber modules have mist eliminators that use a mixture of these waters, and this mixture is stored in the spray blend tank.

Solids Handling Facilities

The coal burned at the plant comes from several areas within a single mine. The coal is blended in piles at the plant and transported on conveyor belts into the bunkers.

The bottom ash is sluiced with makeup water about every three hours to a settling tank. The solids are loaded into trucks and hauled to an abandoned mine. The sluice water is sent to a pond, and is eventually discharged through an NPDES outfall into the lake.

Baghouse ash falls into hoppers. There are 12 hoppers per baghouse. The hoppers are periodically pressurized and the ash is pneumatically conveyed to a solids handling area. The baghouse ash is mixed with expended scrubber sludge and hauled to an abandoned mine.

Spent scrubber slurry is dewatered to about 30% solids. The thickener overflow is recycled as FGD process water. The sludge is transported to the solids handling area, where it is mixed with baghouse ash and hauled to an abandoned mine.

Sampling Locations

Samples were collected at several locations, identified on Figure 2-1. Each sampling location is briefly described below:

- Coal composite samples were collected from the coal conveyor belts by the plant's automatic sampler. Plant personnel provided Radian with splits of all coal samples collected during the week of testing.

- FGD inlet gas samples were collected from three four-inch diameter sampling ports on top of the horizontal FGD inlet duct. The ports were installed between the take-offs for Module 4 (out of service) and Module 5. The duct had a rectangular cross-section that measured 15 feet in width and 17 feet in depth at the sampling location.

The gas flow was approximately one-fourth of the total flow to the scrubbers, and the ports were installed immediately downstream of a section of the duct in which the top and one side converged at 10 degrees. Although the location was not ideal, it was selected after considering the distance from upstream and downstream flow disturbances, representativeness, and probe length requirements. Other options considered, but rejected, included sampling the baghouse outlet duct (which would have required vertical sampling with 40-foot probes) and sampling the FGD bypass duct (considered to be less representative because of the 90 degree vertical take off).

- Stack gas samples were collected from four-inch square ports located around the stack every 90 degrees at the 320-foot level. The stack internal diameter was 28 feet.
- Bottom ash samples were collected from the discharge of the sluice pipe as the ash entered the settling tank.
- Baghouse ash samples were collected from one hopper on each of the four baghouses. Plant personnel had determined these hoppers to be representative of the total baghouse catch.
- Lime slurry feed samples were collected through the top of the slurry feed tank.
- Slurry blowdown samples were collected from taps on the slurry recycle pumps for each of the four modules in service.
- Process water samples were collected from a tap near the process water tank.
- Makeup water samples were collected from a tap near the spray blend tank.
- Spray blend water samples were collected from a tap near the spray blend tank.

The procedures for collecting, pretreating, and analyzing the samples are discussed in Appendix A. Table 2-2 presents an overview of the types of analyses performed on these streams.

Table 2-2
Process Stream Analyses Performed

Stream	Metals	Anions	Volatile Organic Compounds	Mercury Speciation
Coal	✓	✓		
FGD Inlet Gas	✓	✓		✓
Stack Gas	✓	✓	✓	✓
Bottom Ash	✓	✓		
Baghouse Ash	✓	✓		
Lime Feed Slurry	✓	✓		
Slurry Blowdown	✓	✓		
Process Water	✓	✓		
Makeup Water	✓	✓		
Spray Blend Water	✓	✓		

3

RESULTS

This section summarizes the results of the stream characterization at Site 101. Sampling, preparation, and analytical methods are summarized in Appendix A. Detailed analytical data can be found in Appendices B and C.

Sampling Schedule

The sampling was conducted the week of January 10, 1994. Figure 3-1 shows the sample collection schedule. Three valid sampling runs were completed on January 11, 12, and 13, 1994.

Multi-metals trains and anions trains were used to traverse the ducts during each sampling run. Volatile organic sampling trains (VOST) and mercury speciation trains were used to collect samples at single points of average velocity. VOST sampling was limited to the stack.

Data Treatment

For the FCEM project, several conventions have been developed for treating the test data and developing average concentrations of substances in the various streams.

For those substances that could not be quantified, the notation "ND(x)" is used. This term means "not detected at a concentration of x." The detection limit can vary according to sample size, sample preparation, and analytical method.

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

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

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

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

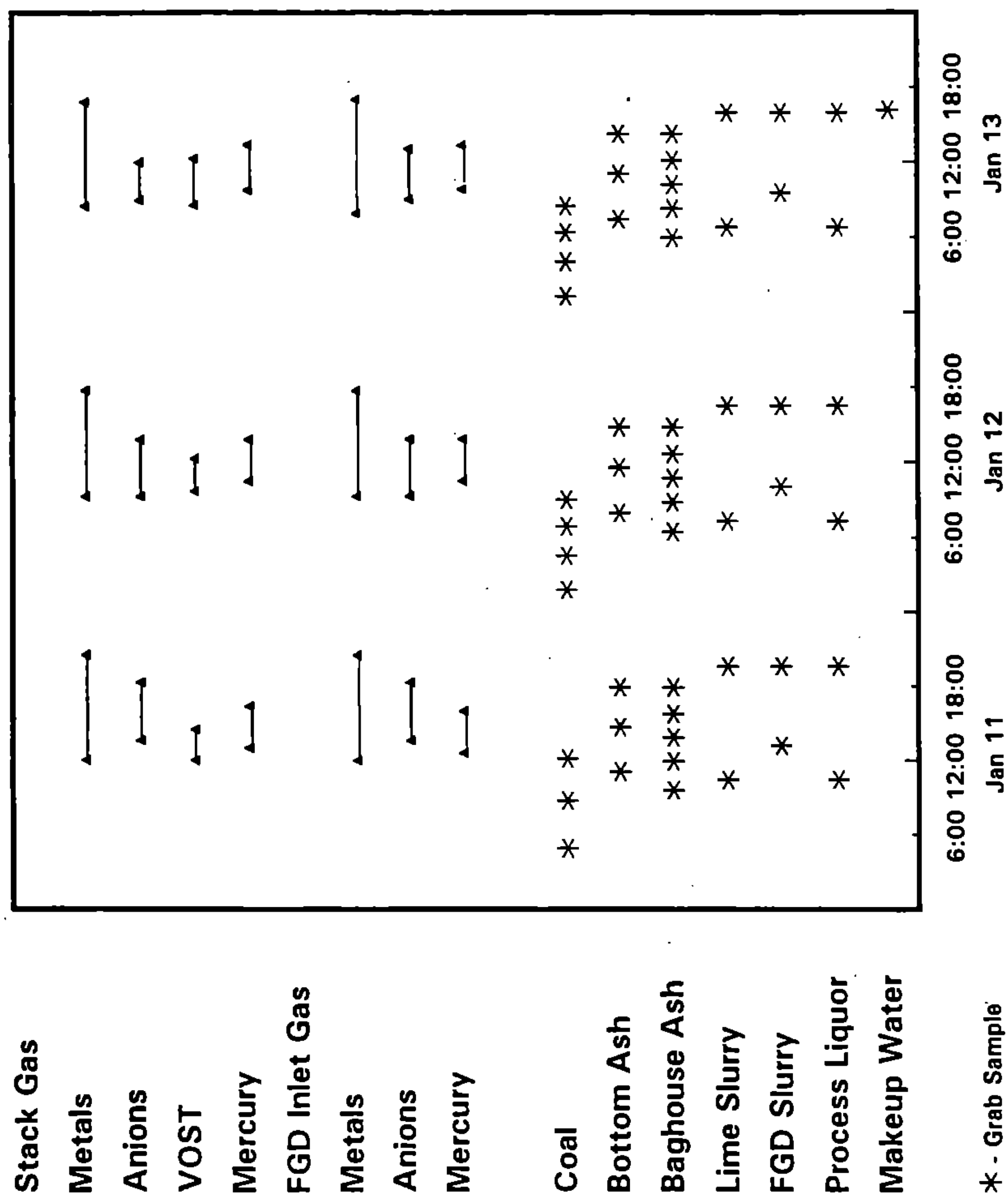

Figure 3-1
Sampling Schedule for Site 101

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

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

- For Case 1, the total concentration is the sum of the concentrations in the vapor and solid phases.

  For example, the total cadmium concentration in the FGD inlet gas for Run 2 is calculated as follows:

  Cadmium in the solid phase = 0.19 $\mu g/Nm^3$

  Cadmium in the vapor phase = 0.12 $\mu g/Nm^3$

  Total cadmium in FGD inlet gas = 0.31 $\mu g/Nm^3$

- For Case 2, the total concentration is considered to be the detection limit in the solid phase. This case is not represented in the Site 101 data.

- For Case 3, the total concentration is considered to be the one above the detection limit, regardless of which phase this represents.

For example, the arsenic concentration in the FGD inlet gas for Run 1 is calculated as follows:

  Arsenic in the solid phase = 0.89 $\mu g/Nm^3$

  Arsenic in the vapor phase = ND(0.15 $\mu g/Nm^3$)

  Total arsenic in the FGD inlet gas = 0.89 $\mu g/Nm^3$

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

Testing at several sites has indicated that HCl, HF, and mercury are present primarily in the vapor phase (although mercury is sometimes also detected in the solid phase). For Case 2, then, the total concentration of each of these species is considered to be the detection 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 different runs:

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

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

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

By convention, the calculated mean is not allowed to be smaller than the largest detection limit value. In the following example, using one-half the detection limit would yield a calculated mean of 2.8. This is less than the highest detection level obtained; therefore, the reported mean is ND(4).

Analytical Values	Calculation	Mean Value
5, ND(4), ND(3)	[5+(4/2)+(3/2)]/3 = 2.8	ND(4)

- When all analytical results for a given variable are below the detection limit, the mean is reported as ND(x), where x is the largest detection limit. The bias estimate (used where calculating confidence intervals for other parameters) is one-half of the detection level, and no confidence interval is reported.

Appendix A describes the analytical methods used for each combination of substance and stream. Measurements of the concentrations reported here were made using what Radian considered to be the best method for each matrix. Typically, the method with the lowest detection limit was chosen, except when the QA/QC results indicated significant problems with precision or bias for a particular technique.

Calculations were performed with unrounded numbers, and the results were rounded for presentation in the table; therefore, slight differences in calculated means and confidence intervals are attributable to round-off errors.

Stream Compositions

Coal

Table 3-1 shows the analytical results for the coal samples collected during the test period. For each substance, a mean concentration was calculated, along with the 95% confidence interval about the mean. The confidence interval is the range about the mean wherein the probability is 95% that the true mean lies. For example, according to the three results shown in Table 3-1, it can be said, with 95% certainty, that the true mean cobalt concentration in the coal was between 1.3 and 4.9 mg/kg. Calculation of this confidence interval is discussed in Section 5.

Table 3-1
Coal Composition (mg/kg dry unless noted)

Substance	Run 1	Run 2	Run 3	Mean	95% CI
Date	1/11/94	1/12/94	1/13/94		
Gross Load (MW)	799	797	797	798	3
Coal Rate (lb/hr, dry)	668,000	653,000	662,000	661,000	19,000
HHV (Btu/lb, dry)	10,210	10,180	10,160	10,190	60
Ash (%, dry)	25	25	25	25	1.0
Moisture (%)	13	14	14	14	1
Sulfur (%, dry)	0.81	0.64	0.92	0.79	0.35
Target Species					
Arsenic	2.5	2.4	3.0	2.6	0.84
Barium	410	1,080	780	760	830
Beryllium	1.5	1.2	1.4	1.4	0.38
Cadmium	ND(0.10)	0.10	ND(0.10)	ND(0.10)	–
Chloride	250	240	220	240	30
Chromium	9.0	6.0	8.0	7.7	3.8
Cobalt	2.6	3.9	2.7	3.1	1.8
Copper	11	10	9.0	10	2.5
Fluoride	150	150	62	120	130
Lead	14	13	13	13	1.4
Manganese	57	66	76	66	24
Mercury	0.070	0.060	0.060	0.063	0.014
Molybdenum	7.6	7.2	3.3	6.1	5.9
Nickel	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	–
Phosphorus	180	260	140	190	150
Selenium	2.5	3.0	2.5	2.7	0.6
Vanadium	27	24	25	25	4.3

Flue Gas Streams

Table 3-2 shows the concentrations of the target substances in the FGD inlet gas. Table 3-3 shows the composition of the stack gas. Results are presented by individual runs, with the mean and 95% confidence interval calculated for the combined vapor and solid phases. Blank contributions for the target analytes were not significant; therefore, no blank corrections were applied.

The metals train particulate sample for Run 2 at the stack was lost during analysis. The vessel containing this sample ruptured during a microwave digestion, and the digestion solution could not be recovered. The particulate mass on this sample was determined before the sample was lost, but no analytical results for metals are available. Because the mean stack gas concentrations for metals involve only two measurements instead of three, the calculated 95% confidence intervals are larger. The agreement between Runs 1 and 3 is very good.

Speciation of Mercury

FGD inlet gas and stack gas samples were collected with the Frontier Geosciences' mercury speciation train. The results are shown in Table 3-4. The Frontier Geosciences' analysis included vapor-phase mercury only (particulate-phase mercury was determined using the Method 29 train).

The method used by Frontier Geosciences for the analysis of Site 101 samples was modified compared to that used on earlier FCEM project samples. The KCl/soda lime traps were dissolved in citric acid (instead of the acetic acid used earlier) to prevent the production of methyl mercury artifacts during the dissolution. No methyl mercury was detected in the flue gas samples from Site 101 using this modified method.

For comparison, the results from the Method 29 multi-metals train impingers are shown. Although this method was not designed for mercury speciation, it may provide information on the forms of mercury present. Elemental mercury is much less soluble in aqueous solutions than is ionic mercury, and it is more likely to pass through the nitric/peroxide impingers to the permanganate impingers, where it is captured through oxidation.

The total concentrations of vapor-phase mercury measured by the Frontier Geosciences method and by Method 29 agree within the uncertainty in the measurements. Both methods also show similar trends in speciation, i.e, ionic mercury is the predominant form in the FGD inlet gas, and it appears to be more effectively removed by the FGD system than the elemental mercury.

Table 3-2
FGD Inlet Gas Composition ($\mu g/Nm^3$ unless noted)

Substance	Solid Phase Run 1	Solid Phase Run 2	Solid Phase Run 3	Vapor Phase Run 1	Vapor Phase Run 2	Vapor Phase Run 3	Mean	95% CI
Gas Flow (dscfm)[a]	1,610,000	1,630,000	1,640,000				1,630,000	38,000
Gas Flow (Nm^3/hr)[a]	2,550,000	2,580,000	2,600,000				2,580,000	60,000
Particulate (lb/hr)	139	136	139				138	3.5
Particulate (mg/Nm^3)	24.7	24.0	24.3				24.3	0.87
Target Species								
Arsenic	0.89	0.52	0.69	ND(0.15)	ND(0.14)	ND(0.14)	0.70	0.46
Barium	49	91	53	2.9	2.2	6.5	68	54
Beryllium	0.11	0.15	0.14	ND(0.12)	ND(0.12)	ND(0.12)	0.13	0.05
Cadmium	1.0	0.19	0.22	0.24	0.12	0.071	0.6	1.4
Chloride	149	129	91	8,812	16,320	9,570	11,700	10,300
Chromium	2.8	2.0	1.8	0.87	0.57	0.78	2.9	1.5
Cobalt	0.35	0.39	0.38	ND(0.76)	ND(0.73)	ND(0.71)	0.37	0.05
Copper	8.0	2.4	2.1	6.4	ND(0.82)	1.5	7	16
Fluoride	199	194	169	14,800	15,500	16,600	15,800	2,200

Table 3-2 (Continued)

Substance	Solid Phase			Vapor Phase			Mean	95% CI
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3		
Lead	2.9	2.5	2.3	ND(0.18)	ND(0.17)	ND(0.17)	2.6	0.7
Manganese	5.1	6.2	4.9	4.9[b]	4.7[b]	4.4[b]	10[b]	2.1
Mercury	0.054	0.015	0.013	3.8	7.2	7.1	6.0	4.8
Molybdenum	2.8	2.1	2.2	1.9	ND(1.0)	ND(0.97)	3.0	3.7
Nickel	2.6	2.1	1.7	ND(0.40)	ND(0.39)	0.73	2.4	0.6
Phosphorus	27	26	30	ND(14)	ND(13)	ND(13)	28	5
Selenium	2.4	1.4	0.42	1.7	1.4	3.0	3.4	1.6
Vanadium	2.7	3.2	3.1	ND(0.53)	ND(0.51)	ND(0.49)	3.0	0.7

[a]Actual gas flow at sample ports was 290,000 scfm. The listed value is the total gas flow measured at the stack and is assumed to equal the flow exiting the fabric filters (i.e., entering the four modules and bypass duct). This entire system is at positive pressure, so leakage is negligible.

[b]Contamination of the nitric acid impingers with manganese from the permanganate impingers is suspected. Manganese was also detected in field blank nitric acid impingers.

Table 3-3
Stack Gas Composition ($\mu g/Nm^3$ unless noted)

Substance	Solid Phase			Vapor Phase			Mean	95% CI
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3		
Gas Flow (dscfm)	1,610,000	1,630,000	1,640,000				1,630,000	38,000
Gas Flow (Nm^3/hr)	2,550,000	2,580,000	2,600,000				2,580,000	60,000
Particulate (lb/hr)	49.6	32.3	44.7				42	22
Particulate (mg/Nm^3)	8.83	5.69	7.81				7.4	4.0
Target Species								
Arsenic	0.48	--[a]	0.32	ND(0.12)	ND(0.13)[a]	ND(0.12)	0.4	1
Barium	21	--[a]	19	0.42	0.49[a]	0.70	21	10
Beryllium	0.042	--[a]	0.044	ND(0.10)	ND(0.11)[a]	ND(0.10)	0.043	0.016
Cadmium	0.55	--[a]	0.40	ND(0.059)	0.22[a]	ND(0.056)	0.5	1
Chloride	138	145	34	2,799	3,286	2,651	3,000	900
Chromium	1.8	--[a]	1.6	1.2	0.51[a]	0.55	2.6	5.1
Cobalt	0.17	--[a]	0.14	ND(0.64)	ND(0.66)[a]	ND(0.61)	0.15	0.2
Copper	1.3	--[a]	0.78	1.8	ND(0.74)[a]	1.4	2.6	5.8
Fluoride	164	264	197	4,537	3,126	4,480	4,300	1,900

Table 3-3 (Continued)

Substance	Solid Phase			Vapor Phase			Mean	95% CI
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3		
Lead	0.99	--[a]	0.72	ND(0.15)	ND(0.16)[a]	ND(0.14)	0.85	1.7
Manganese	2.2	--[a]	1.9	3.2[b]	4.0[a,b]	17[b]	12[b]	84
Mercury	0.073	--[c]	0.22	1.8	2.1	2.5	2.3[c]	1.0
Molybdenum	2.4	--[a]	2.5	1.3	ND(0.90)[a]	ND(0.83)	3.1	7.5
Nickel	2.1	--[a]	3.3	0.49	ND(0.41)[a]	0.84	3.4	9.5
Phosphorus	12	--[a]	10	ND(12)	ND(12)[a]	ND(11)	11	7.5
Selenium	1.6	--[a]	0.77	0.41	0.43	0.50	1.6	4.7
Vanadium	1.1	--[a]	1.1	ND(0.45)	ND(0.46)[a]	ND(0.42)	1.1	0.43
Benzene				0.70	ND(0.67)	ND(0.67)	ND(0.67)	--
Toluene				0.80	ND(0.67)	0.66	ND(0.67)	--

[a]Solid portion of sample destroyed prior to analyses; result not included in mean.

[b]Contamination of the nitric acid impingers with manganese from the permanganate impingers is suspected. Manganese was also detected in field blank nitric acid impingers.

[c]Because mercury is present primarily in the vapor phase, Run 2 was included in the mean for mercury by assuming an average solid-phase concentration (0.15 $\mu g/Nm^3$) for Run 2.

Table 3-4
Mercury Speciation Results

Component	Concentrations ($\mu g/Nm^3$)			Mean	95% CI	Percent of Vapor Hg
	Run 1	Run 2	Run 3			
Frontier Geosciences Hg Speciation Train						
FGD Inlet						
Ionic Inorganic Hg	4.6	4.5	4.6	4.6	0.15	81%
Elemental Hg	1.3	1.3	0.59	1.0	1.0	19%
Methyl Hg	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	–	<0.1%
Total Vapor	5.9	5.8	5.1	5.6	1.0	
Stack						
Ionic Inorganic Hg	0.88	1.3	1.6	1.2	0.88	65%
Elemental Hg	0.50	0.66	0.54	0.57	0.21	35%
Methyl Hg	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	--	<0.3%
Total Vapor	1.4	2.0	2.1	1.8	1.0	
Method 29 Multi-Metals Train						
FGD Inlet						
Ionic Hg[a]	3.5	6.8	6.7	5.6	4.6	93%
Elemental Hg[b]	0.26	0.38	0.44	0.36	0.24	7%
Total Vapor	3.8	7.2	7.1	6.0	4.8	
Stack						
Ionic Hg[a]	1.5	1.6	1.9	1.7	0.49	79%
Elemental Hg[b]	0.28	0.49	0.58	0.43	0.39	21%
Total Vapor	1.8	2.1	2.5	2.1	0.9	

[a]Mercury collected in the HNO_3/H_2O_2 impingers.

[b]Mercury collected in the $H_2SO_4/KMnO_4$ impingers.

Emission Factors

Table 3-5 presents the mean fabric filter outlet (FGD inlet) and stack emission factors for the target substances. The mass emission rates (lb/hr) for each substance were divided by the heat input (Btu/hr) of the coal.

Mean particulate matter emissions were 0.020 lb/10^6 Btu at the fabric filter outlet and 0.0063 lb/10^6 Btu at the stack. Chloride and fluoride emission factors are the highest of the target species, but are substantially lower at the stack than at the fabric filter outlet. Most of the target elements show lower emission factors at the stack as well, indicating significant removal in the FGD system.

Control Device Performance

Table 3-6 shows the removal efficiencies of the fabric filter system, the FGD system, and the combined fabric filter/FGD system. Because the baghouse inlet gas was not sampled, the mass rates of target substances in this stream were calculated by subtracting the mass rates of substances in the bottom ash from the mass rates in the coal. The calculations are described in more detail in Section 5.

The removal of particulate matter by the fabric filter is estimated to be 99.89 percent. Most of the target elements are removed with high efficiency as well, with the exception of the predominantly vaporous species chloride, fluoride, and mercury.

The FGD removal efficiencies are for the system as a whole, which includes a bypass of approximately 25 percent. The removal efficiencies of the modules (considering only the gas that was scrubbed) can be approximated by multiplying the FGD system removal by 1.33.

Other Substances Detected

Other substances not on the target analyte list but listed in Title III of the Clean Air Act Amendments of 1990 were also measured as part of the multi-substance techniques used for the target analytes. Additional Title III substances include antimony and organic compounds available from the VOST. Table 3-7 shows the concentrations for substances detected in at least one flue gas sample.

Table 3-5
Fabric Filter Outlet and Stack Emission Factors (lb/10^{12} Btu unless noted)

Substance	Fabric Filter Outlet Mean	Fabric Filter Outlet 95% CI About Mean	Stack Mean	Stack 95% CI About Mean
Gas Flow (dscfm)	1,630,000	38,000	1,630,000	38,000
Gas Flow (Nm^3/hr)	2,580,000	60,000	2,580,000	60,000
Coal Rate (lb/hr, dry)	661,000	19,000	661,000	19,000
HHV (Btu/lb, dry)	10,200	60	10,200	60
Particulate (lb/10^6 Btu)	0.020	0.0012	0.0063	0.0034
Arsenic	0.59	0.39	0.34	0.85
Barium	57	46	18	9.0
Beryllium	0.11	0.043	0.036	0.014
Cadmium	0.52	1.2	0.40	0.82
Chloride	9,800	8,700	2,500	800
Chromium	2.5	1.3	2.2	4.3
Cobalt	0.32	0.043	0.13	0.16
Copper	5.8	14	2.2	4.9
Fluoride	13,300	2,000	3,600	1,600
Lead	2.2	0.60	0.72	1.4
Manganese	8.5	1.8	10	71
Mercury	5.1	4.0	1.9	1.0
Molybdenum	2.5	3.1	2.6	6.4
Nickel	2.0	0.52	2.8	8.0
Phosphorus	23	4.3	9.2	6.4
Selenium	2.9	1.4	1.4	4.0
Vanadium	2.5	0.60	0.93	0.38
Benzene	--	--	ND(0.57)	--
Toluene	--	--	ND(0.57)	--

Table 3-6
Control Device Removal Efficiencies

	Fabric Filter		FGD System[a]		Fabric Filter/FGD	
Substance	Removal (%)	95% CI	Removal (%)	95% CI	Removal (%)	95% CI
Particulate	99.89	0.01	69	16	99.97	0.02
Arsenic	99.7	0.1	43	59	99.85	0.40
Barium	99.91	0.07	69	21	99.97	0.03
Beryllium	99.90	0.03	68	12	99.97	0.01
Cadmium	NC	–	24	92	NC	–
Chloride	57	38	74	15	89	3
Chromium	99.6	0.2	12	73	99.6	0.3
Cobalt	99.88	0.07	60	53	99.95	0.03
Copper	99.3	1.6	61	49	99.7	0.6
Fluoride	0[b]	96	73	12	70	21
Lead	99.82	0.04	67	71	99.94	0.12
Manganese	99.8	0.1	0[b]	839	99.8	1.3
Mercury	15	70	62	20	68	12
Molybdenum	99.6	0.5	0[b]	96	99.5	0.4
Nickel	99.2[c]	0.3	0[b]	412	98.8[c]	3.5
Phosphorus	99.87	0.09	60	11	99.95	0.04
Selenium	98.8	0.5	52	152	99.4	1.6
Vanadium	99.88	0.02	63	7	99.96	0.01

[a]Includes approximately 25% bypass gas.

[b]Zero/negative apparent control efficiencies are attributable to uncertainties in the inlet and outlet concentrations. For manganese, molybdenum, and nickel, the high efficiency of the fabric filter leads to extremely low concentrations entering and exiting the FGD system.

[c]Because nickel was not detected in the coal, the mass rate of nickel entering the baghouse was taken to be the mass rate of nickel in the ash collected by the baghouse.

NC = Not calculated because substance was not detected in inlet stream.

Table 3-7
Other Substances Detected

Substance	Run 1	Run 2	Run 3	Mean	95% CI
Coal (mg/kg)					
Antimony	0.59	0.52	0.73	0.61	0.27
FGD Inlet Gas ($\mu g/Nm^3$)					
Antimony[a]	ND(0.33)	ND(0.28)	ND(0.27)	ND(0.33)	–
Stack Gas ($\mu g/Nm^3$)					
Antimony[a]	ND(0.31)		6.4	3.3	40
Chloromethane				ND(0.67)[c]	–
VOST Pair 1		ND(0.66)	ND(0.66)		
VOST Pair 2	ND(0.67)	ND(0.67)	0.67		
VOST Pair 3	1.0	ND(0.67)	ND(0.61)		
Methylene chloride[b]				1.1[c]	3.4
VOST Pair 1		ND(0.66)	ND(0.66)		
VOST Pair 2	0.67	ND(0.67)	ND(0.67)		
VOST Pair 3	4.8	ND(0.67)	ND(0.61)		

[a]Total of solid- and vapor-phase concentrations.

[b]Substance was detected in field blanks and trip blanks, suspected contaminant.

[c]The VOST tube pairs for a given run were averaged, then the mean of the run averages was calculated.

4

DATA EVALUATION

Several procedures can be used to evaluate the information developed during a field sampling program. In the case of Site 101, three methods were used to evaluate the quality of the data. First, the process data were examined to determine if the unit operated at normal, steady-state conditions during the sampling periods. Second, the QA/QC protocol for sampling and analytical procedures used at Site 101 (i.e., equipment calibration and leak checks, duplicates, blanks, spikes, standards, etc.) was evaluated. Site 101 QA/QC data were compared with project objectives. Third, material balances were calculated around the unit. Material balances involve the summation and comparison of mass flow rates in several streams, often sampled and analyzed by different methods. Closure within an acceptable range can be used as an indicator of accurate results for streams that contribute significantly to the overall inlet or outlet mass rates.

Process Operation

Two changes were made to the normal operation of the unit, neither of which compromises the representativeness of the samples. First, the flue gas desulfurization (FGD) bypass damper was set in a fixed position at the start of each sampling period to maintain a constant gas flow at the FGD inlet sampling location. The damper was manually set in the position where the automatic controller had achieved an SO_2 removal level of 72 percent. Second, the soot blowers in the superheat section, which are normally used twice a day, were not used during the test periods. This change was made to prevent soot blowing during the collection of flue gas samples, some of which have collection times considerably shorter than 12 hours. The wall blowers operated almost continuously, which is normal.

Site 101 is a base load unit, and at the time of testing it was running at full load 24 hours a day. The boiler operated at steady, full load during each of the sampling periods. Table 4-1 summarizes the operating parameters. These parameters were logged every five minutes from the computerized boiler control system. The mean and coefficient of variance (CV) for each parameter were calculated for the sampling periods. The CV is the standard deviation divided by the mean value; it is expressed here as a percentage. The CV indicates the variability of the parameter during the test period.

The CVs for most of the parameters are less than 10% of the mean values, indicating that no large fluctuations occurred during the tests. The process trend plots, which are included in Appendix G, also indicate stable operation.

Table 4-1
Summary of Unit Operating Data [a]

	1/11/94		1/12/94		1/13/94	
	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)
Load (MWe, gross)	799	0.28	797	0.27	797	0.40
Stack NO_x (ppmv)	384	0.90	388	1.1	389	1.7
Stack SO_2 (ppmv)	212	3.7	183	12	216	3.3
Stack O_2 (%)	5.2	3.0	5.3	3.2	5.3	3.2
Boiler Outlet O_2:						
North (%)	2.5	5.7	2.6	8.3	2.6	8.6
Center (%)	2.2	8.9	2.2	8.3	2.2	8.4
South (%)	2.7	8.0	2.4	8.6	2.6	7.5
Average (%)	2.5	6.5	2.4	7.9	2.5	7.7
Baghouse Inlet Gas Temp:						
Northwest (°F)	210	0.24	209	0.32	215	0.45
Northeast (°F)	208	0.39	208	0.61	215	0.43
Southwest (°F)	234	0.50	234	0.65	229	0.48
Southeast (°F)	239	0.35	238	0.47	232	0.50
Average (°F)	223	0.26	222	0.36	223	0.35
Baghouse Outlet Opacity:						
Northwest (%)	23	12	23	6.4	24	11
Northeast (%)	25	11	24	14	25	11
Southwest (%)	30	6.0	29	7.5	29	8.9
Southeast (%)	38	8.5	38	6.0	37	6.0
Average (%)	29	4.4	29	4.3	29	4.7

Table 4-1 (Continued)

	1/11/94		1/12/94		1/13/94	
	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)
Baghouse Pressure Drops:						
Northwest (in. H_2O)	7.2	5.4	7.3	5.5	7.2	6.1
Northeast (in. H_2O)	6.8	5.7	6.9	5.9	7.0	7.9
Southwest (in. H_2O)	6.8	6.9	6.5	8.4	6.3	8.8
Southeast (in. H_2O)	6.6	8.2	6.5	8.6	6.6	8.2
Average (in. H_2O)	6.9	4.7	6.8	5.2	6.8	6.0
Coal Feeders:						
Feeder 4-1 (ton/hr)	48.2	0.44	47.4	0.78	48.1	2.4
Feeder 4-2 (ton/hr)	48.1	0.45	47.4	0.88	48.0	2.4
Feeder 4-3 (ton/hr)	48.1	0.47	47.4	0.81	48.0	2.4
Feeder 4-4 (ton/hr)	48.2	0.43	47.4	0.82	48.1	2.4
Feeder 4-5 (ton/hr)	48.1	0.45	47.4	0.79	48.0	2.4
Feeder 4-6 (ton/hr)	48.1	0.43	47.4	0.84	48.0	2.4
Feeder 4-7 (ton/hr)	48.1	0.44	47.4	0.80	48.1	2.4
Feeder 4-8 (ton/hr)	48.2	0.45	47.4	0.79	48.0	2.4
Total Coal Feed Rate (ton/hr)	385.1	0.43	379.2	0.80	384.3	2.4

[a]Data available in five-minute intervals from the computerized control system.

CV = Coefficient of variation.

Table 4-2 summarizes the parameters available in three-hour intervals from the FGD control room logs. In general, the results show stable operation. The relatively large CV (20%) of the slurry solids content in the north center module on January 11 reflects the slowly increasing solids content throughout the day. This module was brought on line just before midnight on January 10. Because the module had been drained, it was filled with process water for startup, according to the normal procedure. The solids content in the module started out at 0% (normal is about 15%) and slowly increased as fresh slurry was added to control the pH. The pH of the module was maintained at its normal level of 6.0, and it should have been scrubbing at its normal efficiency.

Sample Collection

Several factors indicate the acceptable collection of gas samples. Key components of the sampling equipment--Pitot tubes, thermocouples, orifice meters, dry gas meters, and sampling nozzles--were calibrated before use in the field, and those calibrations were checked at the end of sampling. These calibrations are on file at Radian. The methods used to collect samples were comparable to those used at other sites sampled by Radian in the FCEM project. The sampling runs were well documented, and all flue gas samples were collected at rates between 90 and 110% of isokinesis. Sufficient data were collected using standard sampling and analysis methods to ensure acceptable data completeness and the comparability of the measurements.

Appendix A describes the sampling procedures used at Site 101. Following are some significant observations about sample collection:

- The FGD inlet gas samples were collected from ports in the FGD inlet duct immediately downstream of the take-off for the fourth scrubber module. The gas sampled was essentially that which entered the fifth module and represents approximately one quarter of the scrubbed gas. The fourth module was taken out of service to provide the maximum length of undisturbed flow at the sampling location. The sampling ports were also located immediately downstream of a converging section of the duct, where the top side and one vertical side converge at approximately 10 degrees. This angle represents the maximum error in nozzle angle that might have been incurred at traverse points near the converging sides. Although the location was not ideal, representative samples are expected. The FGD inlet gas has a low particulate loading consisting primarily of very fine particles, and should not be stratified.

- Small tears, one on each filter, were found on the quartz filters used for metals sampling at the FGD inlet for Runs 1 and 3. These tears were identified during sample recovery. The edges of the tears appear to have overlapped, and there were no visible indications of particulate matter downstream of the filters. No substances appear to be present at elevated levels in the impingers relative to Run 2 as shown in Table 3-2.

- There is a substantial residence time in the coal bunkers and, therefore, a lag before the coal which passes the automatic sampler is burned in the boiler. In addition, the

Table 4-2
FGD Process Data Summary [a]

	1/11/94		1/12/94		1/13/94	
	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)
System:						
Bypass Damper (% open) [b]	66	-- [c]	58	-- [c]	70	-- [c]
Inlet Gas Temp (°F)	225	0.3	225	2.2	227	1.3
Pressure Drop (in. H_2O)	3.3	3.5	3.1	1.8	3.3	3.5
Outlet Gas Temp. (°F)	134	0.43	136	0.85	140	0
Feed Slurry Solid (%)	21	2.7	22	2.7	22	0.79
North Module:						
pH	6.1	1.7	6.0	0.84	6.0	0.83
Recirc. Tank Level (ft)	28	1.2	28	2.5	28	3.2
Slurry Solids (%)	14	9.4	13	3.7	13	3.7
Outlet Gas Temp. (°F)	117	1.5	115	0	115	0
Demister Pressure Drop (in. H_2O)	0.21	2.7	0.25	4.6	0.18	3.3
Absorber Pressure Drop (in. H_2O)	1.9	5.3	2.1	2.8	1.6	0
North Center Module:						
pH	6.0	0	5.9	1.9	6.0	2.5
Recirc. Tank Level (ft)	23	0.3	25	0.8	28	3.6
Slurry Solids (%)	6.5	20	11	12	13	5.7
Outlet Gas Temp. (°F)	117	1.5	117	1.0	119	1.3
Demister Pressure Drop (in. H_2O)	0.35	6.7	0.29	3.4	0.28	0
Absorber Pressure Drop (in. H_2O)	2.6	7.7	2.1	2.8	1.9	0

Table 4-2 (Continued)

	1/11/94		1/12/94		1/13/94	
	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)
Center Module:						
pH	6.1	1.3	6.0	0.48	5.9	0.49
Recirc. Tank Level (ft)	28	5.5	27	1.9	27	3.5
Slurry Solids (%)	17	1.7	17	5.4	18	5.5
Outlet Gas Temp. (°F)	115	0	115	0	115	0
Demister Pressure Drop (in. H_2O)	0.21	5.4	0.31	3.2	0.27	4.3
Absorber Pressure Drop (in. H_2O)	1.5	3.9	2.1	0	1.8	0
South Module:						
pH	6.0	3.2	5.8	0.50	5.9	2.2
Recirc. Tank Level (ft)	28	2.1	28	3.6	28	3.7
Slurry Solids (%)	16	3.5	16	4.8	16	3.3
Outlet Gas Temp. (°F)	115	0	115	0	116	0.50
Demister Pressure Drop (in. H_2O)	0.16	0	0.28	0	0.20	2.8
Absorber Pressure Drop (in. H_2O)	1.2	4.7	2.0	0	1.5	0

[a]Data logged every three hours by control room operators.

[b]The bypass flow rate is relatively insensitive to the damper position when the damper is more than 50% open; therefore, the bypass flow rate (not measured directly) is expected to be more consistent from run to run than the damper settings would indicate.

[c]Damper fixed manually at the beginning of each run.

CV = Coefficient of variation.

coal which passes the automatic sampler may actually be destined for another unit. An estimated lag time of eight hours was taken into account when selecting the appropriate sample splits to composite for each run. Despite the uncertainties, the automatic sampler was the best available location to obtain representative coal samples. The coal burned during the test came from a single source, and the consistency of the blend should minimize the effects of uncertainties in the lag time.

Analytical Quality Control Results

Generally, the type of quality control information obtained pertains to measurement precision, accuracy (which includes precision and bias), and blank effects, determined using various types of replicate, spiked, and blank samples. The specific characteristics evaluated depend on the type of quality control checks performed. For example, blanks may be prepared at different stages in the sampling and analysis process to isolate the source of a blank effect. Similarly, replicate samples may be generated at different stages to isolate and measure the sources of variability. The QA/QC measures commonly used as part of the data evaluation protocol, and the characteristic information obtained, are summarized in Table 4-3. The absence of any of these types of quality control checks does not necessarily reflect poorly on the quality of the data but does limit the ability to estimate the magnitude of the measurement error and, hence, prevents estimating the confidence in the results.

As shown in Table 4-3, different QC checks provide different types of information, particularly pertaining to the sources of inaccuracy, imprecision, and blank effects. Measurement precision and accuracy are typically estimated from QC indicators that cover as much of the total sampling and analytical process as feasible. Precision and accuracy measurements are based primarily on the actual sample matrix. The precision and accuracy estimates obtained experimentally during the test program are compared with the established data quality objectives (DQOs).

These DQOs are not intended to be used as validation criteria but as empirical estimates of the precision and accuracy expected from existing reference measurement methods and that would be considered acceptable. Although analytical precision and accuracy are relatively easy to quantify and control, sampling precision and accuracy are unique to each site and each sample matrix. Data that do not meet these DQOs are not necessarily unacceptable; the intent is to document the precision and accuracy actually obtained, and the objectives serve as benchmarks for comparison. The effects of not meeting the objectives are considered in light of the intended use of the data.

Table 4-4 presents the types of quality control information reported for the test. The results for QC sample analyses can be found in Appendix E. Table 4-5 presents summaries of precision and accuracy estimates obtained during the test.

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Sampling data should be comparable with other

Table 4-3
Types of Quality Control Samples

QC Activity	Characteristic Measured
Precision	
Replicate samples collected over time under the same conditions	Total variability, including process or temporal, sampling, and analytical, but not bias.
Duplicate field samples collected simultaneously	Sampling plus analytical variability at the actual sample concentrations.
Duplicate analyses of a single sample	Analytical variability at the actual sample concentrations.
Matrix- or media-spiked duplicates	Sampling plus analytical variability at an established concentration.
Laboratory control sample duplicates	Analytical variability in the absence of sample matrix effects.
Surrogate-spiked sample sets	Analytical variability in the sample matrix but at an established concentration.
Accuracy (Including Bias and Precision)	
Matrix-spiked samples	Analyte recovery in the sample matrix, indicating possible matrix interferences and other effects. In a single sample, includes both random error (imprecision) and systematic error (bias).
Media-spiked samples	Same as matrix-spiked samples. Used where a matrix-spiked sample is not feasible, such as certain stack sampling methods.
Surrogate-spiked samples	Analyte recovery in the sample matrix, to the extent that the surrogate compounds are chemically similar to the compounds of interest. Primarily used as indicator of analytical efficacy.
Laboratory control samples (LCS)	Analyte recovery in the absence of actual sample matrix effects. Used as an indicator of analytical control.
Standard Reference Material	Analyte recovery in a matrix similar to the actual samples.
Blank Effects	
Field Blank	Total sampling plus analytical blank effect, including sampling equipment and reagents, sample transport and storage, and analytical reagents and equipment.
Trip Blank	Blank effects arising from sample transport and storage. Typically used only for volatile organic compound analyses.
Method Blank	Blank effects inherent in analytical method, including reagents and equipment.
Reagent Blank	Blank effects from reagents used.

Table 4-4
Types of Quality Control Data Reported for Site 101

	Precision					Accuracy				Blank			
Analysis	Replicate Runs	Duplicate Field Samples	Duplicate Lab Analysis	MSD	LCSD	MS	Surrogate Spike	LCS	Std. Ref. Mat'l	Field Blank	Trip Blank	Method Blank	Reagent Blank
Gas Samples													
Metals	✓			✓	✓	✓		✓	✓	✓		✓	✓
Anions	✓	✓		✓	✓	✓		✓		✓		✓	✓
Volatile Organic Compounds	✓						✓	✓		✓	✓	✓	
Mercury Speciation	✓							✓		✓			
Coal Samples													
Metals	✓		✓	✓		✓		✓	✓			✓	
Anions	✓	✓	✓	✓		✓		✓				✓	
Ultimate/Proximate	✓		✓						✓				
Ash Samples													
Metals	✓	✓	✓	✓	✓	✓		✓	✓			✓	
Anions	✓	✓	✓	✓	✓	✓		✓				✓	
Slurry Samples													
Metals	✓	✓	✓	✓	✓	✓		✓					
Anions	✓	✓	✓	✓	✓	✓		✓					
Water Samples													
Metals	✓	✓	✓	✓	✓	✓		✓					
Anions	✓	✓	✓	✓	✓	✓		✓					

Table 4-5
Summary of Precision and Accuracy Estimates

Measurement Parameter	How Measured	Objectives		Measured	
		Precision (% RPD)	Accuracy (% Recovery)	Precision (% RPD)	Accuracy (% Recovery)
Metals in Coal by INAA	Precision - Duplicate Samples Accuracy - Standard Reference Material				
Arsenic		20	75-125	19	104
Barium		20	75-125	7.5	98
Cadmium		20	75-125	NC	--[a]
Chromium		20	75-125	1.8	99
Cobalt		20	75-125	8.5	102
Copper		20	75-125	NC	--[a]
Manganese		20	75-125	3.5	102
Mercury		20	75-125	NC	--[a]
Molybdenum		20	75-125	80	94
Nickel		20	75-125	NC	98
Selenium		20	75-125	27	97
Vanadium		20	75-125	0.6	102
Anions in Coal	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes				
Chloride		20	80-120	1.0	98
Fluoride		20	80-120	4.2	96
Metals in Coal by ICP-AES	Precision - Replicate Runs Accuracy - Standard Reference Material				
Beryllium		20	75-125	11% CV	80
Chromium		20	75-125	20% CV	106
Copper		20	75-125	10% CV	78
Manganese		20	75-125	14% CV	108
Nickel		20	75-125	NC	76
Phosphorus		20	75-125	32% CV	116
Metals in Coal by GFAA and CVAA	Precision - Replicate Runs Accuracy - Standard Reference Material				
Arsenic		20	75-125	25% CV	85
Cadmium		20	75-125	NC	--
Lead		20	75-125	4.3% CV	112

Table 4-5 (Continued)

Measurement Parameter	How Measured	Objectives		Measured	
		Precision (% RPD)	Accuracy (% Recovery)	Precision (% RPD)	Accuracy (% Recovery)
Mercury		20	75-125	9.1% CV	108
Selenium		20	75-125	35% CV	--
Metals Particulate by CVAA and GFAA	Precision - Duplicate-Spiked Blank Filters Accuracy - Analytical Spikes				
Arsenic		20	75-125	17% CV	113
Cadmium		20	75-125	6% CV	83
Mercury		20	75-125	11% CV	104
Nickel		20	75-125	4.6% CV	88
Lead		20	75-125	9.3% CV	85
Selenium		20	75-125	4.7% CV	94
Metals Particulate by ICP-AES	Precision - Duplicate-Spiked Blank Filters Accuracy - Analytical Spikes				
Antimony		20	75-125	7.1% CV	100
Barium		20	75-125	4.8% CV	102
Beryllium		20	75-125	2.6% CV	98
Cadmium		20	75-125	2.2% CV	92
Chromium		20	75-125	2.7% CV	103
Cobalt		20	75-125	2.7% CV	97
Copper		20	75-125	3.0% CV	101
Lead		20	75-125	2.3% CV	98
Manganese		20	75-125	2.6% CV	100
Molybdenum		20	75-125	2.6% CV	100
Nickel		20	75-125	3.1% CV	97
Phosphorus		20	75-125	1.8% CV	96
Vanadium		20	75-125	2.3% CV	102
Anions Train	Precision - Matrix Spike Duplicates Accuracy - Matrix Spikes				
Chloride		20	80-120	2.7	112
Fluoride		20	80-120	3	102
Sulfate		20	80-120	1	100

Table 4-5 (Continued)

Measurement Parameter	How Measured	Objectives		Measured	
		Precision (% RPD)	Accuracy (% Recovery)	Precision (% RPD)	Accuracy (% Recovery)
Metals in Nitric Acid Impingers by CVAA and GFAA	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes [b]				
Arsenic		20	75-125	1	100
Cadmium		20	75-125	5.5	109
Nickel		20	75-125	1	96
Lead		20	75-125	1	106
Metals in Nitric Acid Impingers by ICP-AES	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes [b]				
Antimony		20	75-125	8.4	95
Arsenic		20	75-125	2.1	95
Barium		20	75-125	1	98
Beryllium		20	75-125	1	102
Cadmium		20	75-125	1	96
Chromium		20	75-125	1	98
Cobalt		20	75-125	1	96
Copper		20	75-125	1	98
Lead		20	75-125	2.1	97
Manganese		20	75-125	1	98
Molybdenum		20	75-125	2.1	96
Nickel		20	75-125	0	98
Phosphorus		20	75-125	0	103
Selenium		20	75-125	1	96
Vanadium		20	75-125	1	98
Mercury in Permanganate Impingers by CVAA	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes [b]				
Mercury		20	75-125	1.2	86
Metals in Nitric Acid Impingers by CVAA and GFAA	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes [b]				
Mercury		20	75-125	2.4	84
Arsenic		20	75-125	1.0	100
Lead		20	75-125	0.95	106
Selenium		20	75-125	15	51

Table 4-5 (Continued)

Measurement Parameter	How Measured	Objectives		Measured	
		Precision (% RPD)	Accuracy (% Recovery)	Precision (% RPD)	Accuracy (% Recovery)
Metals in Fly Ash by CVAA and GFAA	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Mercury		20	75-125	1	100
Arsenic		20	75-125	2.8	106
Cadmium		20	75-125	4.0	100
Nickel		20	75-125	1.2	84
Lead		20	75-125	3.3	90
Selenium		20	75-125	1	100
Metals in Bottom Ash by CVAA and GFAA	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Mercury		20	75-125	0	107
Arsenic		20	75-125	2.8	108
Cadmium		20	75-125	11	107
Nickel		20	75-125	3.6	84
Lead		20	75-125	1.1	90
Selenium		20	75-125	2.1	94
Metals in Fly Ash by ICP-AES	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Antimony		20	75-125	3.9	91
Barium		20	75-125	120	76
Beryllium		20	75-125	4.6	87
Cadmium		20	75-125	8.1	87
Chromium		20	75-125	5.5	92
Cobalt		20	75-125	5.2	87
Copper		20	75-125	3.9	91
Lead		20	75-125	6.7	90
Manganese		20	75-125	4.6	88
Molybdenum		20	75-125	5.1	88
Nickel		20	75-125	6.3	88
Phosphorus		20	75-125	2.0	102
Vanadium		20	75-125	5.0	90

Table 4-5 (Continued)

Measurement Parameter	How Measured	Objectives		Measured	
		Precision (% RPD)	Accuracy (% Recovery)	Precision (% RPD)	Accuracy (% Recovery)
Metals in Bottom Ash by ICP-AES	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Antimony		20	75-125	4.6	87
Barium		20	75-125	2.1	96
Beryllium		20	75-125	0	85
Cadmium		20	75-125	0	83
Chromium		20	75-125	0	89
Cobalt		20	75-125	0	84
Copper		20	75-125	1.1	88
Lead		20	75-125	1.2	84
Manganese		20	75-125	0	90
Molybdenum		20	75-125	0	87
Nickel		20	75-125	2.4	85
Phosphorus		20	75-125	1	98
Vanadium		20	75-125	0	88
Anions in Fly Ash	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Fluoride		20	80-120	158	36
Chloride		20	80-120	1.2	84
Anions in Bottom Ash	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Chloride		20	80-120	1.1	94
Fluoride		20	80-120	1.1	88
Metals in Lime Liquor by CVAA and GFAA	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Mercury		20	75-125	0	74
Arsenic		20	75-125	0	101
Cadmium		20	75-125	4.7	106
Nickel		20	75-125	0	92
Lead		20	75-125	2.1	95
Selenium		20	75-125	1.4	72

Table 4-5 (Continued)

Measurement Parameter	How Measured	Objectives		Measured	
		Precision (% RPD)	Accuracy (% Recovery)	Precision (% RPD)	Accuracy (% Recovery)
Metals in Lime Liquor by ICP-AES	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Antimony		20	75-125	1.1	94
Barium		20	75-125	5.4	94
Beryllium		20	75-125	4.4	91
Cadmium		20	75-125	2.2	89
Chromium		20	75-125	3.4	90
Cobalt		20	75-125	4.7	85
Copper		20	75-125	4.3	94
Lead		20	75-125	5.8	86
Manganese		20	75-125	3.4	89
Molybdenum		20	75-125	3.4	88
Nickel		20	75-125	3.5	86
Phosphorus		20	75-125	1	96
Vanadium		20	75-125	3.4	90
Anions in Lime Liquor	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Chloride		20	80-120	1	100
Fluoride		20	80-120	1.1	94
Sulfate		20	80-120	4.2	95
Metals in FGD Liquor by CVAA and GFAA	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Mercury		20	75-125	6.1	33
Arsenic		20	75-125	4.4	67
Cadmium		20	75-125	1	104
Nickel		20	75-125	5.1	98
Lead		20	75-125	2.4	83
Selenium		20	75-125	544	0

Table 4-5 (Continued)

Measurement Parameter	How Measured	Objectives		Measured	
		Precision (% RPD)	Accuracy (% Recovery)	Precision (% RPD)	Accuracy (% Recovery)
Metals in FGD Liquor by ICP-AES	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Antimony		20	75-125	8.9	90
Barium		20	75-125	2.3	88
Beryllium		20	75-125	1.1	94
Cadmium		20	75-125	1.2	84
Chromium		20	75-125	1.2	86
Cobalt		20	75-125	1.2	82
Copper		20	75-125	1.1	92
Lead		20	75-125	7.3	82
Manganese		20	75-125	2.4	83
Molybdenum		20	75-125	1.2	84
Nickel		20	75-125	4.8	83
Phosphorus		20	75-125	1	96
Vanadium		20	75-125	0	86
Anions in FGD Liquor	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Chloride		20	80-120	10	106
Fluoride		20	80-120	7	100
Sulfate		20	80-120	14	99
Metals in Process Liquor by GFAA	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Arsenic		20	75-125	9.1	66
Cadmium		20	75-125	5.8	103
Nickel		20	75-125	7.3	109
Lead		20	75-125	1.1	90
Selenium		20	75-125	65	8

Table 4-5 (Continued)

Measurement Parameter	How Measured	Objectives		Measured	
		Precision (% RPD)	Accuracy (% Recovery)	Precision (% RPD)	Accuracy (% Recovery)
Metals in Process Liquor by ICP-AES	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes [b]				
Antimony		20	75-125	6.1	82
Barium		20	75-125	1.1	90
Beryllium		20	75-125	0	94
Cadmium		20	75-125	0	85
Chromium		20	75-125	0	86
Cobalt		20	75-125	1.2	82
Copper		20	75-125	1.1	92
Lead		20	75-125	3.7	80
Manganese		20	75-125	0	84
Molybdenum		20	75-125	1.2	84
Nickel		20	75-125	0	83
Phosphorus		20	75-125	7.2	98
Vanadium		20	75-125	0	87
Anions in Process Liquor	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes [b]				
Chloride		20	80-120	4.4	114
Fluoride		20	80-120	3	100
Sulfate		20	80-120	9.2	98
Metals in FGD Solids by CVAA and GFAA	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes [b]				
Mercury		20	75-125	0	120
Arsenic		20	75-125	14	90
Cadmium		20	75-125	6.1	99
Nickel		20	75-125	17	95
Lead		20	75-125	7.3	55
Selenium		20	75-125	259	10

Table 4-5 (Continued)

Measurement Parameter	How Measured	Objectives		Measured	
		Precision (% RPD)	Accuracy (% Recovery)	Precision (% RPD)	Accuracy (% Recovery)
Metals in FGD Solids by ICP-AES	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Antimony		20	75-125	8.9	90
Barium		20	75-125	3.1	96
Beryllium		20	75-125	2.2	93
Cadmium		20	75-125	2.2	89
Chromium		20	75-125	0	94
Cobalt		20	75-125	4.6	86
Copper		20	75-125	2.2	93
Lead		20	75-125	1.2	80
Manganese		20	75-125	2.2	90
Molybdenum		20	75-125	1.1	92
Nickel		20	75-125	7.4	94
Phosphorus		20	75-125	1.2	84
Vanadium		20	75-125	0	92
Anions in FGD Solids	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Fluoride		20	80-120	4.7	106
Chloride		20	80-120	2.5	81
Metals in Lime Solids by CVAA and GFAA	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Mercury		20	75-125	1	112
Arsenic		20	75-125	14	70
Cadmium		20	75-125	0	108
Nickel		20	75-125	2.3	86
Lead		20	75-125	6.6	61
Selenium		20	75-125	18	70
Metals in Lime Solids by ICP-AES	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Antimony		20	75-125	2.7	74
Barium		20	75-125	0	96
Beryllium		20	75-125	1.1	90

Table 4-5 (Continued)

Measurement Parameter	How Measured	Objectives		Measured	
		Precision (% RPD)	Accuracy (% Recovery)	Precision (% RPD)	Accuracy (% Recovery)
Cadmium		20	75-125	1.1	88
Chromium		20	75-125	1.1	92
Cobalt		20	75-125	1.2	84
Copper		20	75-125	2.2	92
Lead		20	75-125	2.7	74
Manganese		20	75-125	2.2	89
Molybdenum		20	75-125	2.2	93
Nickel		20	75-125	6.8	102
Phosphorus		20	75-125	1.2	86
Vanadium		20	75-125	2.2	90
Anions in Lime Solids	Precision - Matrix-Spiked Duplicates Accuracy - Matrix Spikes[b]				
Chloride		20	80-120	0	89
Fluoride		20	80-120	40	18
Volatile Organics in Stack Gas	Precision - Replicate Runs Accuracy - Method Spike				
Benzene		50	50-150	NC	100
Toluene		50	50-150	20	112

[a]Certified value is below the detection limit.

[b]Average of two matrix spike recoveries reported.

NC = Not calculated; analyte concentration below reporting limit in two or more runs.

RPD = Relative percent difference.

CV = Coefficient of variance.

measurement data for similar samples collected under similar conditions. This goal is achieved using standard techniques to collect and analyze representative samples and by reporting analytical results in appropriate units. Data sets can be compared with confidence when the precision and accuracy are known.

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. The representativeness criterion is based on making certain that sampling locations are properly selected and that a sufficient number of samples are collected. The results obtained for Site 101 are considered representative and comparable.

Key characteristics of the QC results for the test are discussed in the following subsections, including a discussion of the overall measurement precision, accuracy, and blank effects.

Precision is a measure of the reproducibility of measurements under a given set of conditions. It is expressed in terms of the distribution, or scatter, of the data, calculated as the standard deviation or coefficient of variation (CV, standard deviation divided by the mean). For duplicates, precision is expressed as the relative percent difference (RPD).

Accuracy is a measure of the degree of conformity of a value generated by a specific procedure with the assumed or accepted true value, and includes both precision and bias. Bias is the persistent positive or negative deviation of the method average value from the assumed or accepted true value. The efficiency of the analytical procedure for a given sample matrix is quantified by the analysis of spiked samples containing target or indicator analytes or other quality assurance measures, as necessary. However, all spikes, unless made to the flowing stream ahead of sampling, produce only estimates of recovery of the analyte through all of the measurement steps occurring after the addition of the spike. A good spike recovery tells little about the true value of the sample before spiking.

Blank effects, including contamination and other artifacts, contribute to low-level measurement bias, which may or may not be significant, depending on the relative quantity of measure found in the investigative samples.

Two areas of concern that should be considered by the data user involve sample preservation and holding time. All liquor samples were received by the laboratory at a pH of approximately seven instead of the required pH of less than two due to an oversight in the field. Samples were adjusted to pH less than two and logged in for analysis; therefore, data quality should not be adversely affected. In addition, the analysis of six ash samples were performed outside the recommended holding time for anions (28 days) by three to fifteen days. These samples were originally leached with deionized water and analyzed, then were later logged in for sodium fusion with analysis of fluoride by SIE. As a result, fluoride SIE results may be biased slightly low due to analysis outside holding time for the three bottom ash and baghouse ash samples.

The following potential areas of concern were indicated by the quality control data:

Metals

- Matrix spike RPDs for barium in fly ash were well above the project precision objective (<20% RPD) and indicate that field sample results may also have very high variability in this matrix.

- Matrix spike recoveries for lime feed slurry solids showed good repeatability, but were slightly below project accuracy objectives for arsenic, lead, and selenium. Sample results for these analytes may be biased similarly low in this matrix.

- Matrix spike recoveries for blowdown slurry solids were below project objectives for lead and selenium. Matrix spike recoveries for blowdown slurry liquids were below project objectives for arsenic, selenium, and mercury. Matrix spike recoveries for process waters were low for arsenic, selenium, and mercury. Sample results may be biased low for these matrices for arsenic, mercury, and lead. Selenium does not appear to be recovered from these matrices.

- Matrix spike recoveries for stack nitric acid impingers indicate that selenium may be biased approximately 50% low in the sample results for this matrix.

- Method blank data indicate that several low-level metals results for field samples may be due to laboratory contamination. Potentially affected results are listed in Appendix E and include quartz filter blank results for chromium, cobalt, and nickel; nitric acid impinger results for nickel and selenium; blowdown slurry and lime feed slurry solids results for phosphorus; and lime feed slurry solids, blowdown slurry solids, and process waters for cadmium.

- Based on comparisons of field blank ICP-AES metal results and investigative sample ICP-AES metal results, the following FGD inlet and stack gas sample results may be affected by field contamination: manganese in nitric acid impinger samples, lead in the filter samples, and molybdenum in the filter samples.

Anions

- Six anion matrix spike RPDs were above the project objective including fluoride in lime feed slurry solids, blowdown slurry solids, and fly ash. These results indicate that sample results for fluoride in these matrices may have greater than expected variability.

- Twelve anion matrix spike recoveries were below project objectives (80-120%) including fluoride in lime feed slurry solids, bottom ash, and fly ash. These results indicate that sample results for fluoride in these matrices may be biased low.

- Anion method blank results were similar to anion results for several samples and indicated that some sample results may be due to laboratory contamination. Potentially affected results include fluoride in the three bottom ash samples.

- Based on field and trip blank results for volatile organics, two of eight field sample results for methylene chloride (10 ng and 71 ng during Run 1 at the stack) may be due to contamination.

Metals

Precision. Precision for metals analyses was estimated for sample and control matrices using field duplicate, matrix spike duplicate, and laboratory control duplicate results. One field duplicate pair was included with each matrix analyzed for metals except coal. Field duplicate results, presented in Table E-1 of Appendix E, indicate relatively low variability in duplicate pairs whose concentrations were above the detection limit. Relative percent differences (RPDs) outside the <20% project objective are not uncommon when sample results are at or near the detection limit; therefore, only field duplicate results that are at least three times the detection limit will be used to estimate precision. Field duplicate RPDs that indicate greater than expected variability include chromium (22%) in feed slurry solids, copper (28%) in feed slurry solids, and phosphorus (33%) in process water. Other sample results in these matrices may have similar variability for these analytes. Nonhomogeneity is a common contributor to variability in solid matrices, and may have been a factor in chromium and copper RPDs being slightly above the project objective.

Matrix spike duplicate results indicate good overall precision for metals, as 297 out of 304 RPDs were within the project objectives. Five RPDs for selenium and two for barium ranged from 65 to 544% RPD and were high in fly ash. Selenium RPDs were high because the matrix spike recoveries were near zero, and relative precision decreases substantially as the detection limit is approached; therefore, selenium results are more indicative of recovery problems instead of actual precision problems. In addition, a large amount of suspended solid was noted after fusion and had to be filtered out before analysis for the Run 2 fly ash sample and may have contributed to the high variability of these selenium results. Matrix spike RPDs for barium and selenium in fly ash may indicate greater than expected variability in field sample results for this matrix.

Laboratory control duplicate results indicate that the analytical systems were in statistical control during sample analysis and that variability was within both laboratory and project objectives.

Accuracy. Accuracy for the metals analyses was estimated in the actual sample matrices using matrix spike results, and in control sample matrices using laboratory control results. Accuracy for INAA and ICP-AES analyses of coal samples was estimated using coal standard reference material results. Tables E-2, E-3, and E-4 in Appendix E list results for matrix spikes, laboratory control samples, and standard reference materials, respectively.

Matrix spike recoveries for the large majority of target analytes were within the project objectives (75-125%) and indicate acceptable overall accuracy. Three streams exhibited somewhat low matrix spike recoveries for arsenic, lead, and selenium. These streams were: lime slurry feed, FGD slurry blowdown, and process water. Spike levels may not have been high enough to differentiate between the spike and the native concentration. A large amount of suspended solid was noted that had to be filtered out before analysis for the selenium analysis of Run 2 fly ash sample. The suspended solid may have contributed to the low selenium recoveries for this sample. Matrix spike results indicate that the analytes listed above may be similarly biased in field sample results for corresponding matrices.

Nitric acid impinger sample results for selenium were obtained using the method of standard addition because of unknown matrix interferences.

Metals in coal reference standard SARM-20 were analyzed by ICP-AES, GFAAS, CVAAS (by Commercial Testing and Engineering Co.) and by INAA (by North Carolina State University). Recoveries for all nine target analytes by ICP-AES, GFAAS, and CVAAS analysis were within the project objectives. As part of the INAA QC program, the laboratory also analyzed coal standard NBS 1632a along with the project samples; all recoveries were within the project objectives, indicating that the analysis was in control.

Blank Effects. Blank effects were estimated for metals using method blank results (to monitor laboratory contamination), quartz filter blank results (to estimate levels of metals endogenous to the filter matrix), and field blank results (to gauge possible field contamination); blank corrections were not made for any sample results. Filter and field blank results are presented in Appendix E Tables E-5 and E-6, respectively. Filter blank results for several metals were not significantly different than one of the field blank sample results. Consequently, the results for selenium, phosphorus, and vanadium in the stack metals particulate field blank (sample FC101R-SG04MMNP,AP,FL) may be due to background metals in the blank filter media.

Filter and field blank results flagged with a "B" also had some level of analyte measured in the corresponding method blank. By referencing Table E-7, the probable source of contamination may be estimated. Any "B-flagged" field blank results that are less than ten times the corresponding method blank result indicate that the field blank results may either be due to, or biased high by laboratory contamination. Any "B-flagged" field blank results that are more than ten times the corresponding method blank result were not statistically affected by that method blank result. Based on comparisons of field blank results and investigative sample results, the following sample results may be affected by field or matrix contamination: manganese in nitric acid impinger samples, lead in the filter samples, and molybdenum in the filter samples.

Method blank results for several analytes were similar to some of the sample results. Table E-7 in Appendix E lists the sample results that may either be due to, or biased slightly high by laboratory contamination based on method blank results. Those results that may be due to contamination include quartz filter blank results for chromium, cobalt, and nickel; nitric acid impinger results for nickel and selenium; blowdown slurry and lime feed slurry solids results for phosphorus; and lime feed slurry solids, blowdown slurry solids, and process waters for cadmium.

Anions

Precision. Precision for metals analyses was estimated using field duplicate, matrix spike duplicate, and laboratory control duplicate results. Just as with the interpretation of metals duplicates, only concentrations three times the detection limit and greater were used to estimate precision. Only the blowdown slurry solids field duplicate RPD for chloride (35%) was greater than the project objective (<20%) and indicated greater than expected variability. All other matrices had field duplicate results that were either within the objective or had concentrations less than three times the detection limit.

Thirty-five out of forty-one matrix spike duplicate RPDs were reported as acceptable and indicate acceptable overall precision. All six of the RPDs above the project objective were for fluoride in the following matrices: lime feed slurry solids (32% and 40%), blowdown slurry solids (45% and 23%), and fly ash (158% and 30%). These results indicate that sample results for fluoride in these matrices may have greater than expected variability.

Laboratory control duplicate results indicate that the analytical systems were in statistical control during sample analysis and that variability was within both laboratory and project objectives.

Accuracy. Accuracy for anions was estimated using matrix spike results and laboratory control sample results. The large majority of matrix spike recoveries were within project specifications (80-120%). The spike recoveries outside the objectives were all for fluoride in various matrices including lime feed slurry solids, bottom ash, blowdown slurry solids, and fly ash. These results indicate that sample results for fluoride in these matrices may be biased low.

Laboratory control sample results were all within laboratory and project objectives, and indicate that the analyses were performed while the system was in statistical control. These results indicate that matrix effects may have caused the low bias in the fluoride recoveries for several matrix spike samples.

Blank Effects. Blank effects for anions were estimated using method blank, filter blank, and field blank results. The method blank results were similar to the results for several samples and indicate that the sample results may be due to laboratory contamination. Potentially affected results include fluoride in the three bottom ash samples (7.2, 5.9, and 12.7 mg/kg); the associated method blank result for fluoride was 9.30 mg/kg.

Filter and field blank results were at least 100 times less than the sample results for anions and should not affect data interpretation.

Volatile Organic Compounds

Precision. Precision was estimated using data from three replicate sampling runs and include an element of intra-day sampling variability. The only results that could be used to calculate a coefficient of variation was for toluene (20%). This estimate indicates that precision was acceptable for this method.

Accuracy. Accuracy was estimated using method spike and surrogate recoveries. Of the 39 volatile organics added to the method spike sample in the laboratory, only three compounds were outside laboratory tolerances (70-130%). Vinyl acetate (218%), o-xylene (60%), and 1,1,2,2-tetrachloroethane (132%) were recovered above laboratory tolerances. None of these compounds was detected in the field samples, so no concern over bias is indicated for the investigative results.

The field samples, method spike, and laboratory blank were spiked with three surrogate compounds (1,2-dichloroethane-d_4, toluene-d_8, and 4-bromofluorobenzene). Out of 42 surrogate recoveries, four were outside laboratory tolerances. Only one sample had more than one surrogate recovery outside lab tolerances. Toluene-d_8 (113%) and 4-bromofluorobenzene (79%) were just outside the tolerances (83-108% and 80-107%, respectively). 1,2-Dichloroethane-d_4 was recovered low (62% and 43%, tolerances 75-111%) in two samples. Because a majority of surrogate recoveries were acceptable, and because those recoveries that were out were just slightly out, data interpretation may be considered unaffected and accuracy acceptable.

Blank Effects. Blank effects for volatile organic analyses were estimated using a laboratory blank, a trip blank, and three field blanks (one for each sample collection day). No compounds were detected in the laboratory blank, indicating that data interpretation should not be affected by bias due to laboratory contamination.

Trichlorofluoromethane and methylene chloride were detected in the trip blank at 19 and 150 ng, respectively (detection limit, 10 ng for both compounds). Field sample results with concentrations of trichlorofluoromethane similar to that reported for the trip blank include FC101R-SG01V09L (38 ng) and FC101R-SG01VO2L (23 ng). Methylene chloride was reported at levels less than that reported for the trip blank in samples FC101R-SG01V01L (10 ng), FC101R-SG01VO2L (71 ng), and field blank FC101R-SG03V09L (12 ng). These results may be due to contamination from shipping or sample storage activities.

Three compounds (trichlorofluoromethane at 38 ng, carbon disulfide at 30 ng, and methylene chloride at 770 ng) were detected in the field blank collected on the first sampling day; no compounds were detected in the field blank collected on the second day of sampling; one compound (methylene chloride at 12 ng) was detected in the field blank collected on the third sampling day. Trichlorofluoromethane was also detected in the trip blank, so the field blank result may be due to sample shipping or storage contamination. Carbon disulfide was not detected in any field samples, so data interpretation was not affected by field contamination for this compound. Methylene chloride was detected in two of three field blanks and the trip blank at concentrations of 12, 150, and 770 ng. Due to the fact that the methylene chloride hits were sporadic, and that methylene chloride is a common laboratory contaminant, it is possible that the blank results were due to sporadic laboratory contamination. However, because the laboratory blank did not have any methylene chloride detected, it is also possible that somehow the sampling activities contaminated two field blanks and the trip blank, although methylene chloride was not used by the field crew at this sampling site. Two of eight field samples had methylene chloride reported as present including FC101R-SG01V01L (at 10 ng) and FC101R-SG01V02L (at 71 ng); these results may be due to contamination.

Mercury Speciation (Frontier Geosciences Method)

Precision. Precision was estimated using data from three replicate sampling runs and include an element of intra-day sampling variability. Precision could not be estimated numerically for methyl mercury because none was detected in any field samples. Coefficients of variation for inlet FGD results for elemental and ionic mercury were 39% and 1.3%, respectively. Outlet FGD coefficients of variation for elemental and ionic mercury were 15% and 28%, respectively. The elemental mercury value from the third inlet FGD run was half that of the first two runs, and the ionic mercury value from the first inlet FGD run was about half that of the last two runs; however, the total mercury values (7.6% CV for inlet FGD and 21% CV for outlet FGD) indicate that overall precision was acceptable.

Accuracy. Accuracy was estimated using laboratory spike recoveries, and was acceptable for both elemental and ionic mercury. No laboratory spike results were reported for methyl mercury, so accuracy could not be estimated for that specie. Elemental and ionic mercury laboratory spike recoveries ranged from 98 to 105% and indicated excellent performance for both species.

Blank Effects. Blank effects were estimated using field blank results for all three mercury species. Results for elemental, ionic, and methyl mercury were corrected for field blank concentrations, so bias due to field or matrix contamination has been accounted for in the sample results. Combined trap A and B field blank results were 21.8 ng/trap for elemental mercury, 1.53 ng/trap for ionic mercury, and <0.54 ng/trap for methyl mercury.

Material Balances

Evaluating data consistency can be another overall data quality evaluation tool. Material balances for major elements can be used to verify the internal consistency of stream flow rates. Material balance closures for trace species can be used to indicate whether the samples collected were representative with respect to the trace element concentrations and can help identify analytical biases in one or more types of samples.

Table 4-6
Material Balance Results

Substance	Out/In (%)	95% CI
Major Species		
Ash	100	--[a]
Aluminum	70	19
Calcium	111	29
Iron	73	35
Sodium	85	10
Sulfur	103	34
Titanium	77	9
Target Species		
Arsenic	83	35
Barium	62	44
Beryllium	66	14
Cadmium	NC[b]	–
Chloride	126	29
Chromium	85	31
Cobalt	50	41
Copper	59	18
Fluoride	150	101
Lead	38	23
Manganese	83	23
Mercury	111	30
Molybdenum	7	7
Nickel	NC	–
Phosphorus	20	26
Selenium	50	24
Vanadium	70	13

[a] Ash balance closure was forced.

[b] NC = Not calculated because the substance was not detected in the coal.

The results of material balances around the unit as a whole are shown in Table 4-6. Closure is defined as the ratio of outlet to inlet mass rates for a particular substance. A 100% closure indicates perfect agreement. When trace substances are analyzed, a closure of between 70 and 130% has been set as a goal for the project. This range reflects the typical level of uncertainty in the measurements and, therefore, allows one to interpret the inlet and outlet mass flow rates as being equivalent. The 95% confidence intervals about the closures have been calculated using an error propagation analysis, which is discussed in detail in Appendix D.

The material balance calculation included the coal, the feed slurry, and the process water as inlet streams. The outlet streams were the bottom ash, the baghouse ash, the blowdown slurry, and the stack gas.

Closures for the major species met the project goal, which supports the stream flow rates used in the material balances. Of the 15 target substances detected in the coal, 6 have closures which meet the project goal. Another six target substances have closures between 50 and 150 percent. The relatively poor closures for lead, molybdenum, and phosphorus may indicate a significant bias in one or more process streams.

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EXAMPLE CALCULATIONS

This section presents selected examples of the calculations used to develop the results shown in Section 3. Specifically, the calculation of stream flow rates, mean concentration values and confidence intervals, emission factors, and removal efficiencies are presented.

Stream Flow Rates

Appendix F contains information about the stream flow rates measured at Site 101 during the sampling period. Coal feeder speeds were obtained from the data acquisition system, and were converted to coal flow rates using a factor of 119 lb/hr per rpm. Stack gas flow rates were measured during sampling, and the flow rate of the FGD inlet gas (or baghouse outlet gas), on a dry basis, was assumed to be equal to that of the stack gas.

The bottom ash and baghouse ash flow rates were calculated from the coal ash rate, using the bottom ash/baghouse ash split determined from truck disposal logs. Because the FGD sludge is mixed with the baghouse ash before being loaded into trucks, its contribution to the disposal rate of baghouse ash was subtracted.

Totalizers were present on the two streams, makeup water and process water, used in the mist eliminator blend tank. These readings (in gallons) were recorded at midnight on the FGD control room logs. The water totals were divided by 24 hours to calculate an average flow rate for each day of testing.

The flow rates of the slurry feed and the blowdown slurry were calculated from material balances around the FGD system on sulfur and calcium. The percent solids of each slurry sample was determined during sample preparation, and these values were used to determine the individual contributions of the solid and liquid fractions of the slurries.

Means and Confidence Intervals for Stream Concentrations

The mean concentrations and 95% confidence intervals (CIs) about the mean were calculated for each target substance in the streams sampled. The means were calculated according to the conventions listed in Section 3. The equations used to calculate the 95% confidence intervals are presented in Appendix D. Example calculations for arsenic in the FGD inlet gas here; these results were shown in Table 3-2.

The concentration data (in $\mu g/Nm^3$) given for arsenic in Table 3-2 are:

	Run 1	Run 2	Run 3
Solid Phase	0.89	0.52	0.69
Vapor Phase	ND(0.15)	ND(0.14)	ND(0.14)
Total	0.89	0.52	0.69

The mean is calculated from the individual run totals:

$$\text{Mean} = (0.89 + 0.52 + 0.69)/3$$

$$= 0.70$$

The sample standard deviation of the individual run totals is calculated:

$$S_p = \sqrt{\left[(0.89-0.70)^2 + (0.52-0.70)^2 + (0.69-0.70)^2\right] /2} \quad \text{(eq. 1)}$$

$$= 0.185$$

The standard deviation of the average is calculated according to Equation 6 in Appendix D for N = 3:

$$S_{\bar{p}} = 0.185/\sqrt{3} \quad \text{(eq. 2)}$$

$$= 0.107$$

The bias error is found by root-sum-squaring the product of the bias error and the sensitivity from each run (see Equation 2 in Appendix D). According to the conventions listed in Section 3, no bias error is assigned to values above detection limits, whereas a bias error of one-half the detection limit is assigned to values below detection limits. The sensitivity of the mean to each run in this case is 1/3.

$$\beta_r = \sqrt{(1/3 \times 0)^2 + (1/3 \times 0)^2 + (1/3 \times 0)^2} \quad \text{(eq. 3)}$$

$$= 0$$

The total uncertainty in the result is found from Equation 1 in Appendix D:

$$U_r = \sqrt{\beta_r^2 + \left(t \times S_{\bar{r}}\right)^2} \qquad \text{(eq. 4)}$$

$$= \sqrt{0^2 + (4.303 \times 0.107)^2}$$

$$= \quad 0.46$$

Thus, the result is reported as 0.70 ± 0.46 μg/Nm^3.

Unit Energy Emission Factors

In addition to the gas-phase concentrations, unit-energy-based emission factors were developed for each target substance. These values were determined by calculating the mass flow rate of a substance in the stack gas (mean concentration times mean flow rate) and dividing by the mean heat input to the boiler during testing. The mean heat input is the product of the mean coal flow rate and the mean higher heating value (HHV) of the coal.

For example, note the calculation of the stack emission factor for arsenic. The mean coal flow rate is 661,000 lb/hr on a dry basis. The mean HHV of the coal is 10,200 Btu/lb on a dry basis. Multiplying the coal flow rate by the HHV gives a mean heat input of 6.7 x 10^9 Btu/hr. The mean arsenic mass flow through the stack (the product of the mean concentration, 0.40 μg/Nm^3, and the mean gas flow rate, 2,580,000 Nm^3/hr) is 1.0 x 10^6 μg/hr or 0.0023 lb/hr. When the mean mass flow rate is divided by the mean heat input, an emission factor of 0.34 lb/10^{12} Btu is obtained, as shown in Table 3-8.

The 95% confidence intervals for emission factors were calculated according to the equations presented in Appendix D. For each parameter (flue gas flow rate, concentration, coal 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.

Removal Efficiencies

Because the flue gas flow rates at the FGD inlet and the stack were assumed to be the same, the FGD system removal efficiencies were simply calculated from the mean elemental concentrations at the FGD inlet and the stack. For example, for arsenic the mean FGD inlet concentration is 0.70 μg/Nm^3, and the mean stack concentration is

0.40 $\mu g/Nm^3$. The removal efficiency is, therefore, 100*(1-0.40/0.70) = 43%, as shown in Table 3-9.

The composition of the baghouse inlet gas was not measured directly. Instead, the mass rate of elements in this stream were calculated by subtracting the elemental mass rates in the bottom ash from those in the coal. For example, the mass rate of arsenic in the coal (the product of the mean arsenic concentration, 2.6 mg/kg, and the mean flow rate, 661,000 lb/hr) is 1.72 lb/hr. The mass rate of arsenic in the bottom ash (the product of the mean concentration, 4.8 mg/kg, and the mean flow rate, 38,500 lb/hr) is 0.18 lb/hr. Subtracting this mass rate from that in the coal gives a mass rate of 1.54 lb/hr in the baghouse inlet gas.

The fabric filter removal efficiency was calculated from the FGD inlet (equivalent to baghouse outlet) mass rate and the baghouse inlet mass rate. For example, the mass rate of arsenic in the baghouse outlet gas (the product of the mean concentration, 0.70 $\mu g/Nm^3$ and the mean flow rate, 2,580,000 Nm^3/hr) is 0.0040 lb/hr. The fabric filter removal efficiency for arsenic is therefore 100*(1-0.0040/1.54) = 99.7%, as shown in Table 3-9.

The combined fabric filter/FGD removal efficiency was calculated from the stack mass rate and the baghouse inlet mass rate. For example, the mass rate of arsenic in the stack is 0.0023 lb/hr, as calculated in the emission factor example. The combined fabric filter/FGD removal efficiency for arsenic is, therefore, 100*(1-0.0023/1.54) = 99.85%, as shown in Table 3-9.

The 95% confidence intervals for removal efficiencies were calculated according to the equations presented in Appendix D.

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GLOSSARY

Btu	British Thermal Unit
CAAA	Clean Air Act Amendments of 1990
CI	Confidence Interval
CV	Coefficient of Variation
CVAAS	Cold Vapor Atomic Absorption Spectrophotometry
DGA	Double Gold Amalgamation
DQO	Data Quality Objective
dscfm	Dry Standard Cubic Feet per Minute (1 atm, 68°F)
GFAAS	Graphite Furnace Atomic Absorption Spectrophotometry
HGAAS	Hydride Generation Atomic Absorption Spectrophotometry
HHV	Higher Heating Value
IC	Ion Chromatography
ICP-AES	Inductively Coupled Plasma Atomic Emission Spectrometry
INAA	Instrumental Neutron Activation Analysis
ISE	Ion Selective Electrode
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MW	Megawatt or Microwave
NC	Not Calculated
ND	Not Detected (below detection limit)
NIST	National Institute of Standards and Technology (formerly National Bureau of Standards, NBS)
Nm^3	Dry Normal Cubic Meter (0°C, 1 atm)
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference

APPENDIX A: SAMPLE COLLECTION, PREPARATION, AND ANALYSIS

This appendix presents the methods used to collect and analyze each type of sample.

Multi-Metals Sampling Trains

Multi-metals samples were collected according to the procedure described in Section 3.1 of 40 CFR, Part 266, Appendix IX, "Methodology for the Determination of Metals Emissions from Hazardous Waste Incineration and Similar Combustion Processes," with modifications as noted here. This method provides for the collection of a flue gas sample at isokinetic conditions while traversing the duct according to EPA Method 1. Particulate matter is collected on a filter (which is also used to determine particulate loading) and the vapor-phase species are absorbed in an impinger train consisting of:

- Two impingers containing 5% HNO_3/10% H_2O_2, which are analyzed for all metals of interest; and
- Two impingers containing 4% $KMnO_4$/10% H_2SO_4, which are analyzed for mercury only.

The multi-metals method specifies that HNO_3/H_2O_2 impinger solutions be evaporated to near dryness prior to analysis. However, due to concern over the possible loss of volatile metals, this procedure was not followed. Instead, the impinger solutions were analyzed as recovered to avoid any loss of volatile metals.

Stack

Samples were collected at the stack according to the multi-metals method. A Method 5 type train was used, with particulate matter captured on an out-of-stack quartz filter maintained at 250°F during sampling. The glass-lined probe was also maintained at 250°F. A 16-point (4 x 4) traverse was used. After sampling, the glass nozzle and probe liner were rinsed first with acetone, then with 0.1 N nitric acid according to the multi-metals method.

FGD Inlet

The multi-metals method was modified to accommodate the 20-foot, vertical probe required for sampling at the FGD inlet. A small oven (maintained at 250° F) containing the quartz filter was attached directly to the exit of the probe, and a Teflon® transfer line connected the filter holder to the impinger train.

The probe was not equipped with pitot tubes or a thermocouple, so velocity and temperature could not be measured during sample collection. Therefore, velocity and temperature profiles were performed just prior to the sampling each day to determine the isokinetic sampling rate. A second set of velocity and temperature profiles was taken immediately after sampling to verify that the conditions were stable.

A 24-point (3 x 8) traverse of the duct was made in collecting the samples. After sampling, the glass nozzle and probe liner were rinsed first with acetone, then with 0.1 N nitric acid according to the multi-metals method. The Teflon® transfer line was rinsed with 0.1 N nitric acid, and this rinse was added to the contents of the first impinger.

Anions Sampling Trains

Anions samples were collected using a Radian procedure designed for collection of HCl, HF, and SO_2. Particulate matter is captured on a filter and the acid gases are absorbed in an impinger train consisting of two impingers containing a solution of 0.013% Na_2CO_3, 0.013% $NaHCO_3$, and 6% H_2O_2.

Stack

Except for the impinger solutions, the anions train was configured identically to the metals train used at the stack. A 16-point (4 x 4) traverse was used to collect the samples. After sampling, the glass nozzle and probe liner were rinsed with deionized water.

FGD Inlet

Except for the impinger solutions, the anions train was configured identically to the metals train used at the FGD inlet. A 24-point (3 x 8) traverse was used to collect the samples. During sample recovery, the glass nozzle and probe liner were rinsed with deionized water. The Teflon transfer line was also rinsed with deionized water, and this rinse was added to the contents of the first impinger.

Volatile Organic Sampling Train (VOST)

Samples for volatile organic compounds were collected at the stack according to SW-846 Method 0030 "Volatile Organic Sampling Train (VOST)." Volatile organics are captured by a pair of sorbent resin traps in series and maintained at 20° C. The first trap contains Tenax and the second trap contains Tenax followed by petroleum-based charcoal.

Samples are collected at a rate of 0.5 liters per minute from a fixed point in the stack. After sampling, the resin traps are sealed and returned to the laboratory for analysis. Each run included the collection of three 20-L samples.

Mercury Speciation Train

The Frontier Geosciences mercury speciation method was used to collect samples at the stack and the FGD inlet. The solid sorbent technique was developed by Nicholas Bloom, now with Frontier Geosciences, Inc., but formerly with Brooks Rand, Ltd. A quartz-lined probe was inserted into the duct, and flue gas was extracted non-isokinetically from a single point at a rate of 0.5 liters per minute. The flue gas then passed through a series of four solid adsorbent cartridges which were used to trap the various vapor-phase mercury species. The cartridges were maintained at approximately 110°C in a heated jacket outside the duct. The first two cartridges contained KCl-impregnated soda lime which is designed to capture ionic mercury species (Hg^{2+}). The third and fourth cartridges contained iodated carbon, which is designed to capture elemental mercury. A glass wool plug ahead of the adsorbent cartridges prevented particulate from entering the adsorbents. This plug was not analyzed, because the single-point, non-isokinetic sampling does not provide representative particulate capture. Only vapor-phase species were determined.

The KCl/soda lime traps were dissolved in citric acid solutions. (Earlier in the FCEM project, acetic acid solutions were used, but Frontier Geosciences switched to citric acid to avoid the production of methyl mercury artifacts during dissolution.) Ionic and methyl mercury were determined by aqueous-phase ethylation, purging onto a carbotrap, cryogenic GC separation, and detection with cold vapor atomic fluorescence spectrometry (CVAFS). Ionic mercury was determined as diethyl mercury. Elemental mercury on iodated carbon traps was determined by digesting with a mixture of HNO_3/H_2SO_4 and BrCl, reducing with $SnCl_2$, purging and preconcentrating on gold, and detecting with CVAFS.

Process Sample Collection

The details of sample collection at each location are listed below.

Coal

Coal samples were collected by the plant's automatic system, which samples coal from the conveyor belts leading to the bunkers. Forty-pound bags of 8-mesh coal were available every one to two hours. Radian obtained two-pound splits from each sample batch. For each run, the individual splits representative of the flue gas sampling period (accounting for an eight-hour lag time before the coal is burned) were combined into a composite sample and submitted for analysis.

Bottom Ash

Bottom ash samples were collected using a plastic dipper during active sluicing, which occurred for approximately one hour every three hours. Individual grab samples were taken every ten minutes from the discharge of the sluice pipe (at the top of the settling tank) and combined in a plastic bucket. The composite samples were allowed to settle overnight, and the water was decanted before the wet solids were scooped into sample bottles.

Baghouse Ash

Baghouse ash samples were collected with a polyester bag from taps on one hopper for each of the four baghouses. These hoppers were determined by plant personnel to be representative of the total baghouse catch. Equal portions of ash were collected from the hoppers every two hours and combined in a plastic bucket.

Feed Slurry

Lime slurry feed samples were collected from the feed tank by lowering a plastic bucket into the tank with a rope. Grab samples were collected twice a day, near the beginning and the end of each test run, and combined into a single composite for each run.

Slurry Blowdown

Slurry blowdown samples were collected from taps on the slurry recycle pumps for each of the four modules in service. Equal portions of slurry from each module were collected twice a day, near the beginning and the end of each run, and combined into a single composite for each run.

Process Water

Process water samples were collected from a tap near the process water tank. Grab samples were taken twice a day, near the beginning and the end of each run, and combined into a single composite sample for each run.

Makeup Water

Makeup water was collected from a tap near the spray blend tank. A single grab sample was taken near the end of Run 3.

Spray Blend Water

Spray blend water was collected from a tap near the spray blend tank. A single grab sample was taken near the end of Run 3.

Detailed Sample Collection/Preparation/Analysis Tables

Table A-1 lists the techniques used to collect, preserve, and handle the samples at Site 101. Analytical methods applied to coal samples are listed in Table A-2. Analytical methods for inorganic species in other samples are listed in Table A-3. The analytical methods applied to organic compounds are listed in Table A-4.

Table A-1
Sample Collection, Preservation, and Handling Techniques for Site 101

Stream	Collection Method	Fraction Description	Sample Handling and Preservation	Comments
Flue Gas Samples				
ESP Inlet Gas, Stack Gas	Specified in Section 3.1 of 40 CFR, Part 266, Appendix IX[a]	Metals Probe and Nozzle Rinse	Acetone portion dried and weighed; nitric acid portion sealed and kept at ambient temperature.	Digested probe and nozzle rinses combined with digested filters prior to analysis.
		Metals Filter	Desiccated at room temperature to constant weight.	Entire filter was digested and analyzed.
		Metals H_2O_2/HNO_3 Impingers	Sealed and kept at ambient temperature.	Analyzed for all target metals.
		Metals $KMnO_4/H_2SO_4$ Impingers	Sealed and kept at ambient temperature.	Analyzed for mercury only.
	Radian Method for Anions	Anions Train: Filter, $Na_2CO_3/NaHCO_3/H_2O_2$ Impingers, Probe and Nozzle Rinse	Sealed and kept at ambient temperature.	Analyzed for chloride, fluoride, and sulfate.
	SW 0030	VOST	Cooled to 4°C.	Analyzed for volatile organic compounds.
Water Samples				
Process Water	Grab/Composite	Metals Cl,F	Kept in a sealed container.	Two grab samples per run were composited.
Makeup Water, Spray Blend Water	Grab	Metals Cl, F	Kept in sealed container.	Single grab samples were collected during Run 3 only.
Feed Slurry Liquid, Slurry Blowdown Liquid	Grab/Composite/Filtration	Metals Cl, F	Slurry placed in a sealed container in the field. Liquid and solid phases separated with a filter press prior to analysis.	Grab samples were collected twice per run from each of the four FGD modules in service and combined into a single composite for each run.

Table A-1
Sample Collection, Preservation, and Handling Techniques for Site 101

Stream	Collection Method	Fraction Description	Sample Handling and Preservation	Comments
Solid Samples				
Coal	Grab/Composite	Ultimate, Proximate Mercury Metals Cl, F	Placed in sealed container in the field; air dried, ground prior to analysis.	Multiple sample splits were collected from the plan's autosampler. Splits representing the coal burned during the runs were combined into a single composite for each run.
Bottom Ash Solids	Grab/Composite	Metals Cl, F	Placed in sealed container in the field; dried at 105°C and ground prior to analysis.	Multiple grab samples taken during bottom ash sluicing were composited in a large plastic container. Solids were allowed to settle and the water was decanted.
Baghouse Ash	Grab/Composite	Metals Cl, F	Kept in sealed container; submitted "as collected."	Multiple grab samples taken from one hopper on each of the four baghouses were combined into a single composite for each run.
Feed Slurry Solids, Slurry Blowdown Solids	Grab/Composite/Filtration	Metals Cl, F	Slurry placed in a sealed container in the field. Liquid and solid phases separated with a filter press prior to analysis.	Grab samples were collected twice per run from each of the four FGD modules in service and combined into a single composite for each run.

[a]40 CFR, Part 266, Appendix IX, Section 3.1, "Methodology for the Determination of Metals Emissions from Hazardous Waste Incineration and Similar Combustion Processes," 1991.

Table A-2
Preparation Procedures and Chemical Analysis Methods
Applied to Coal at Site 101

Component	Method Reference
Ultimate Analysis of Coal	
Ash	ASTM D3174
Carbon	ASTM D3178
Hydrogen	ASTM D3178
Nitrogen	ASTM D3179
Sulfur	ASTM D4239
Heating Value	ASTM D2015
Proximate Analysis of Coal	
Moisture	ASTM D3173
Ash	ASTM D3174
Volatiles	ASTM D3175
Fixed Carbon	Calculated
Target Elements by INAA	
Preparation - None	
Analysis by INAA	
Arsenic	Karr, Chapters 12 and 46
Barium	Karr, Chapters 12 and 46
Cadmium	Karr, Chapters 12 and 46
Chlorine	Karr, Chapters 12 and 46
Chromium	Karr, Chapters 12 and 46
Cobalt	Karr, Chapters 12 and 46
Copper	Karr, Chapters 12 and 46
Manganese	Karr, Chapters 12 and 46
Mercury	Karr, Chapters 12 and 46
Molybdenum	Karr, Chapters 12 and 46
Nickel	Karr, Chapters 12 and 46
Selenium	Karr, Chapters 12 and 46
Vanadium	Karr, Chapters 12 and 46

Table A-2 (Continued)

Component	Method Reference
Chlorine and Fluorine in Coal	
Preparation	
Oxygen Bomb Digestion	ASTM D2361/ASTM D3761
Analysis by Potentiometric Titration	
Chloride	SM 4500
Analysis by Ion Selective Electrode	
Fluoride	ASTM D3761
Be, Cr, Cu, Mn, Ni, and P in Coal	
Preparation	
Ashing at 500° C/Acid Digestion	ASTM D3683
Analysis by ICP-AES	
Beryllium	SW 6010
Chromium	SW 6010
Copper	SW 6010
Manganese	SW 6010
Nickel	SW 6010
Phosphorus	SW 6010
As, Cd, Pb, and Se in Coal	
Preparation	
Oxygen Bomb Combustion/Acid Digestion	ASTM D3684
Analysis by GFAAS	
Arsenic	SW 7060
Cadmium	SW 7131
Lead	SW 7421
Selenium	SW 7740
Mercury in Coal	
Preparation	
Double Gold Amalgamation	Karr, Chapter 14
Analysis by CVAAS	
Mercury	Karr, Chapter 14

Table A-2 (Continued)

Component	Method Reference
Additional Inorganic Analytes in Coal	
Preparation - None	
Analysis by INAA	
Aluminum	Karr, Chapters 12 and 46
Antimony	Karr, Chapters 12 and 46
Iron	Karr, Chapters 12 and 46
Sodium	Karr, Chapters 12 and 46
Titanium	Karr, Chapters 12 and 46

Karr, C. Jr., (ed)., "Analytical Methods for Coal and Coal Products."

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

SM is "Standard Methods for the Examination of Water and Wastewater," 16th Edition.
ASTM is American Society for Testing and Materials.

Table A-3
Preparation Procedures and Chemical Analysis Methods for Inorganic Chemical Components in Non-Coal Solids, Water Samples, and Flue Gas at Site 101

Component	Method Reference	Non-Coal Solids	Water Samples	Flue Gas Solids	Metals HNO_3/H_2O_2 Impingers	Metals $KMnO_4/H_2SO_4$ Impingers	Anions Impingers
Target Elements by ICP-AES							
Preparation							
Water Digestion	SW 3005		X		X		
MW Digestion for Filters	CEM-F			X			
MW Digestion for Solids	CEM-FA	X					
Analysis by ICP-AES							
Barium	SW 6010	X	X	X	X		
Beryllium	SW 6010	X	X	X	X		
Chromium	SW 6010	X	X	X	X		
Cobalt	SW 6010	X	X	X	X		
Copper	SW 6010	X	X	X	X		
Manganese	SW 6010	X	X	X	X		
Molybdenum	SW 6010	X	X	X	X		
Nickel	SW 6010	X	X	X	X		
Phosphorus	SW 6010	X		X	X		
Vanadium	SW 6010	X	X	X	X		
Target Elements by GFAAS							
Preparation							
Water Digestion	CLP 3/90D-5		X		X		
MW Digestion for Filters	CEM-F			X			
MW Digestion for Solids	CEM-FA	X					

Table A-3 (Continued)

Component	Method Reference	Non-Coal Solids	Water Samples	Flue Gas Solids	Metals HNO_3/H_2O_2 Impingers	Metals $KMnO_4/H_2SO_4$ Impingers	Anions Impingers
Analysis by GFAAS							
Arsenic	SW 7060	X	X	X	X		
Cadmium	SW 7131	X	X	X	X		
Nickel	SW 7520	X	X	X	X		
Lead	SW 7421	X	X	X	X		
Selenium	SW 7740	X	X	X	X		
Mercury by CVAAS							
Preparation							
MW Digestion for Filters	CEM-F			X			
MW Digestion for Solids	CEM-FA	X					
Analysis by CVAAS							
Mercury	SW 7470	X	X	X	X	X	
Acid-Forming Anions							
Preparation							
Aqueous Extraction of Solids (Cl,F)	Radian	X		X			
Sodium Hydroxide Fusion (F)	McQuaker and Gurney	X					
Chloride by IC	EPA 300.0	X	X	X			X
Chloride by Pot. Titr.	SM 407C	X					
Fluoride by ISE	EPA 340.2	X	X	X			X

Table A-3 (Continued)

Component	Method Reference	Non-Coal Solids	Water Samples	Flue Gas Solids	Metals HNO_3/H_2O_2 Impingers	Metals $KMnO_4/H_2SO_4$ Impingers	Anions Impingers
Total Sulfur Analysis							
Sulfur by Leco	ASTM D4239	X					
Additional Inorganic Analytes by ICP-AES							
Preparation							
Water Digestion	SW 3005		X		X		
MW Digestion for Filters	CEM-F			X			
MW Digestion for Solids	CEM-FA	X					
Analysis by ICP-AES							
Aluminum	SW 6010	X	X	X	X		
Antimony	SW 6010	X	X	X	X		
Iron	SW 6010	X	X	X	X		
Sodium	SW 6010	X	X	X	X		
Titanium	SW 6010	X	X	X	X		

ASTM is American Society for Testing and Materials.
EPA is EPA Methods for Chemical Analysis of Water and Wastes, 1983.
SW is EPA SW-846, "Test Methods for Evaluating Solid Waste", 3rd ed.
CEM-FA CEM Corporation, Matthews, NC Procedure for microwave digestion of coal fly ash.
CEM-F CEM Corporation, Matthews, NC Procedure for microwave digestion of glass or quartz filters.
CLP is EPA Contract Laboratory Program SOW 3/90.
McQuaker, N. R., and M. Gurney. "Determination of Total Fluoride in Soil and Vegetation Using An Alkali Fusion-Selective Ion Electrode Technique", *Analytical Chemistry*, Vol. 49, No. 1, January 1977, pp. 53-56.
SM is "Standard Methods for the Examination of Water and Wastewater", 16th Edition.

Table A-4
Preparation Procedures and Chemical Analysis Methods Used to Measure Organic Compounds at Site 101

Component	Method Reference	Flue Gas	Ashes	Water Samples
Volatile Organic Compounds				
Sample Collection				
VOST	SW 0030	X,O		
Analysis by GC-MS				
Benzene	SW 8240	X,O		
Toluene	SW 8240	X,O		

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

APPENDIX B: ANALYTICAL DATA USED IN CALCULATIONS

Key to Data Flags:

Flag	Description
@	Concentration is less than five times the detection limit.
<	Less than the detection limit.

04-Apr-94 Table B-1: Site 101 Data Used In Calculations 1

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Aluminum	Baghouse ash	ICP-AES	mg/kg	107000	76700	95750
Aluminum	Blowdown slurry liquid	ICP-AES	mg/L	3.61	2.53	2.39
Aluminum	Blowdown slurry solids	ICP-AES	mg/kg	665	654	648
Aluminum	Bottom ash	ICP-AES	mg/kg	92200	69400	103500
Aluminum	Coal	INAA	mg/kg, dry	34403	31850	33198
Aluminum	Feed slurry liquid	ICP-AES	mg/L	< 0.0284	< 0.0284	< 0.0284
Aluminum	Feed slurry solids	ICP-AES	mg/kg	764	738	775
Aluminum	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	1558	2644	1920
Aluminum	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	77.9	68.6	106
Aluminum	FGD inlet particulate	ICP-AES	ug/g	63122	110246	79128
Aluminum	Makeup water	ICP-AES	mg/L			0.0286 @
Aluminum	Process water	ICP-AES	mg/L	1.77	1.27	3.91
Aluminum	Spray blend water	ICP-AES	mg/L			0.521
Aluminum	Stack gas, solid phase	ICP-AES	ug/Nm3	753		797
Aluminum	Stack gas, vapor phase	ICP-AES	ug/Nm3	9.85 @	10.4 @	8.41 @
Aluminum	Stack particulate	ICP-AES	ug/g	85321		101837
Arsenic	Baghouse ash	GFAAS	mg/kg	12.5	8.85	7.92
Arsenic	Blowdown slurry liquid	GFAAS	mg/L	< 0.000984	0.00448 @	0.00873
Arsenic	Blowdown slurry solids	GFAAS	mg/kg	1.76	1.21	1.47
Arsenic	Bottom ash	GFAAS	mg/kg	8.47	1.92 @	3.95
Arsenic	Coal	INAA	mg/kg, dry	2.46	2.43	3.03
Arsenic	Feed slurry liquid	GFAAS	mg/L	< 0.00197	< 0.00197	< 0.00394
Arsenic	Feed slurry solids	GFAAS	mg/kg	< 0.242	0.463 @	0.566 @
Arsenic	FGD inlet gas, solid phase	GFAAS	ug/Nm3	0.895	0.523	0.690
Arsenic	FGD inlet gas, vapor phase	GFAAS	ug/Nm3	< 0.146	< 0.142	< 0.138
Arsenic	FGD inlet particulate	GFAAS	ug/g	36.3	21.8	28.4

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Table B-1: Site 101 Data Used in Calculations

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Arsenic	Makeup water	GFAAS	mg/L			0.00135 @
Arsenic	Process water	GFAAS	mg/L	0.0311	0.0290	0.0245
Arsenic	Spray blend water	GFAAS	mg/L			0.0128
Arsenic	Stack gas, solid phase	GFAAS	ug/Nm3	0.483		0.324
Arsenic	Stack gas, vapor phase	GFAAS	ug/Nm3	< 0.124	< 0.128	< 0.118
Arsenic	Stack particulate	GFAAS	ug/g	54.7		41.4
Ash	Coal	Proximate	%, dry	25.3	24.6	25.2
Barium	Baghouse ash	ICP-AES	mg/kg	1750	2350	1770
Barium	Blowdown slurry liquid	ICP-AES	mg/L	0.225	0.214	0.234
Barium	Blowdown slurry solids	ICP-AES	mg/kg	21.2	19.8	19.2
Barium	Bottom ash	ICP-AES	mg/kg	1450	2020	1375
Barium	Coal	INAA	mg/kg, dry	413	1079	781
Barium	Feed slurry liquid	ICP-AES	mg/L	0.543	0.582	0.309
Barium	Feed slurry solids	ICP-AES	mg/kg	5.94	5.66	7.28
Barium	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	48.7	90.5	53.3
Barium	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	2.91	2.20	6.47
Barium	FGD inlet particulate	ICP-AES	ug/g	1975	3775	2196
Barium	Makeup water	ICP-AES	mg/L			0.128
Barium	Process water	ICP-AES	mg/L	0.503	0.258	0.674
Barium	Spray blend water	ICP-AES	mg/L			0.196
Barium	Stack gas, solid phase	ICP-AES	ug/Nm3	21.4		19.5
Barium	Stack gas, vapor phase	ICP-AES	ug/Nm3	0.422 @	0.494 @	0.698
Barium	Stack particulate	ICP-AES	ug/g	2422		2490
Benzene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Benzene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Benzene	Stack gas, VOST pair 3	GCMS	ug/Nm3	1.07 @	< 0.670	< 0.610

04-Apr-94 Table B-1: Site 101 Data Used In Calculations 3

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Beryllium	Baghouse ash	ICP-AES	mg/kg	3.94	3.48	3.57
Beryllium	Blowdown slurry liquid	ICP-AES	mg/L	0.00165 @	0.00126 @	0.00160 @
Beryllium	Blowdown slurry solids	ICP-AES	mg/kg	< 0.471	< 0.446	< 0.435
Beryllium	Bottom ash	ICP-AES	mg/kg	2.99	3.58	3.42
Beryllium	Coal	ICP-AES	mg/kg, dry	1.50	1.20	1.40
Beryllium	Feed slurry liquid	ICP-AES	mg/L	< 0.000554	< 0.000554	< 0.000554
Beryllium	Feed slurry solids	ICP-AES	mg/kg	< 0.403	< 0.460	< 0.448
Beryllium	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	0.111	0.151	0.137
Beryllium	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 0.123	< 0.119	< 0.116
Beryllium	FGD inlet particulate	ICP-AES	ug/g	4.51	6.29	5.65
Beryllium	Makeup water	ICP-AES	mg/L			< 0.000554
Beryllium	Process water	ICP-AES	mg/L	0.000760 @	0.000830 @	0.00206 @
Beryllium	Spray blend water	ICP-AES	mg/L			0.000660 @
Beryllium	Stack gas, solid phase	ICP-AES	ug/Nm3	0.0418 @		0.0444 @
Beryllium	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 0.105	< 0.108	< 0.0996
Beryllium	Stack particulate	ICP-AES	ug/g	4.73 @		5.67 @
Cadmium	Baghouse ash	GFAAS	mg/kg	< 0.388	< 0.412	< 0.411
Cadmium	Blowdown slurry liquid	GFAAS	mg/L	0.000350 @	< 0.000310	< 0.000310
Cadmium	Blowdown slurry solids	GFAAS	mg/kg	0.181	0.163	0.148
Cadmium	Bottom ash	GFAAS	mg/kg	< 0.401	< 0.388	< 0.400
Cadmium	Coal	GFAAS	mg/kg, dry	< 0.1000	< 0.1000	< 0.1000
Cadmium	Feed slurry liquid	GFAAS	mg/L	< 0.000310	< 0.000310	0.00309
Cadmium	Feed slurry solids	GFAAS	mg/kg	0.223	0.219	0.210
Cadmium	FGD inlet gas, solid phase	GFAAS	ug/Nm3	1.02	0.188	0.218
Cadmium	FGD inlet gas, vapor phase	GFAAS	ug/Nm3	0.240 @	0.121 @	0.0712 @
Cadmium	FGD inlet particulate	GFAAS	ug/g	41.2	7.85	9.00

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Table B-1: Site 101 Data Used In Calculations

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Cadmium	Makeup water	GFAAS	mg/L			< 0.000310
Cadmium	Process water	GFAAS	mg/L	0.000570 @	0.000690 @	0.00101 @
Cadmium	Spray blend water	GFAAS	mg/L			< 0.000310
Cadmium	Stack gas, solid phase	GFAAS	ug/Nm3	0.548		0.396
Cadmium	Stack gas, vapor phase	GFAAS	ug/Nm3	< 0.0587	0.225 @	< 0.0557
Cadmium	Stack particulate	GFAAS	ug/g	62.1		50.6
Calcium	Baghouse ash	ICP-AES	mg/kg	19500	17900	18500
Calcium	Blowdown slurry liquid	ICP-AES	mg/L	831	741	831
Calcium	Blowdown slurry solids	ICP-AES	mg/kg	309000	290000	287000
Calcium	Bottom ash	ICP-AES	mg/kg	17200	13500	18200
Calcium	Coal	INAA	mg/kg, dry	2538	4311	2924
Calcium	Feed slurry liquid	ICP-AES	mg/L	4470	4480	4470
Calcium	Feed slurry solids	ICP-AES	mg/kg	482000	499000	479500
Calcium	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	387	504	377
Calcium	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	358	345	268
Calcium	FGD inlet particulate	ICP-AES	ug/g	15677	21031	15539
Calcium	Makeup water	ICP-AES	mg/L			92.8
Calcium	Process water	ICP-AES	mg/L	638	599	625
Calcium	Spray blend water	ICP-AES	mg/L			430
Calcium	Stack gas, solid phase	ICP-AES	ug/Nm3	389		429
Calcium	Stack gas, vapor phase	ICP-AES	ug/Nm3	75.0 @	43.4 @	49.6 @
Calcium	Stack particulate	ICP-AES	ug/g	44037		54898
Carbon	Coal	Ultimate	%, dry	57.2	56.4	57.1
Chloride	Baghouse ash	ISE	mg/kg	< 20.0	123	< 20.0
Chloride	Blowdown slurry liquid	IC	mg/L	2230	2210	2295
Chloride	Blowdown slurry solids	ISE	mg/kg	1280	1740	1275

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Table B-1: Site 101 Data Used In Calculations

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Chloride	Bottom ash	ISE	mg/kg	70.3 @	81.0 @	45.9 @
Chloride	Coal	ISE	mg/kg, dry	249 @	238 @	223 @
Chloride	Feed slurry liquid	IC	mg/L	379	374	369
Chloride	Feed slurry solids	IC	mg/kg	353	283	302
Chloride	FGD Inlet gas, solid phase	IC	ug/Nm3	149	129	91.1
Chloride	FGD Inlet gas, vapor phase	IC	ug/Nm3	8812	16320	9570
Chloride	Makeup water	IC	mg/L			37.2
Chloride	Process water	IC	mg/L	1350	1160	1320
Chloride	Spray blend water	IC	mg/L			854
Chloride	Stack gas, solid phase	IC	ug/Nm3	138	145	34.0
Chloride	Stack gas, vapor phase	IC	ug/Nm3	2799	3286	2651
Chromium	Baghouse ash	ICP-AES	mg/kg	26.7	22.2	24.2
Chromium	Blowdown slurry liquid	ICP-AES	mg/L	0.00684 @	< 0.00249	< 0.00249
Chromium	Blowdown slurry solids	ICP-AES	mg/kg	20.6	4.32 @	3.79 @
Chromium	Bottom ash	ICP-AES	mg/kg	27.0	29.5	27.2
Chromium	Coal	ICP-AES	mg/kg, dry	9.00	6.00	8.00
Chromium	Feed slurry liquid	ICP-AES	mg/L	0.0165	0.0232	0.0166
Chromium	Feed slurry solids	ICP-AES	mg/kg	6.86 @	6.70 @	7.57 @
Chromium	FGD Inlet gas, solid phase	ICP-AES	ug/Nm3	2.76	1.97	1.78
Chromium	FGD Inlet gas, vapor phase	ICP-AES	ug/Nm3	0.868 @	0.569 @	0.783 @
Chromium	FGD Inlet particulate	ICP-AES	ug/g	112	82.1	73.4
Chromium	Makeup water	ICP-AES	mg/L			< 0.00249
Chromium	Process water	ICP-AES	mg/L	0.00471 @	0.00578 @	0.0254
Chromium	Spray blend water	ICP-AES	mg/L			< 0.00249
Chromium	Stack gas, solid phase	ICP-AES	ug/Nm3	1.77		1.61
Chromium	Stack gas, vapor phase	ICP-AES	ug/Nm3	1.20 @	0.506 @	0.554 @

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Table B-1: Site 101 Data Used In Calculations

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Chromium	Stack particulate	ICP-AES	ug/g	200		206
Cobalt	Baghouse ash	ICP-AES	mg/kg	8.49 @	< 4.95	6.89 @
Cobalt	Blowdown slurry liquid	ICP-AES	mg/L	0.00625 @	0.00361 @	0.00747 @
Cobalt	Blowdown slurry solids	ICP-AES	mg/kg	< 4.18	< 3.95	< 3.85
Cobalt	Bottom ash	ICP-AES	mg/kg	5.99 @	5.38 @	6.36 @
Cobalt	Coal	INAA	mg/kg, dry	2.62	3.90	2.67
Cobalt	Feed slurry liquid	ICP-AES	mg/L	< 0.00340	< 0.00340	< 0.00340
Cobalt	Feed slurry solids	ICP-AES	mg/kg	< 3.58	< 4.08	< 3.97
Cobalt	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	0.353 @	0.387	0.383
Cobalt	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 0.756	< 0.733	< 0.712
Cobalt	FGD inlet particulate	ICP-AES	ug/g	14.3 @	16.1	15.8
Cobalt	Makeup water	ICP-AES	mg/L			< 0.00340
Cobalt	Process water	ICP-AES	mg/L	< 0.00340	< 0.00340	0.00502 @
Cobalt	Spray blend water	ICP-AES	mg/L			0.00471 @
Cobalt	Stack gas, solid phase	ICP-AES	ug/Nm3	0.165 @		0.135 @
Cobalt	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 0.644	< 0.664	< 0.611
Cobalt	Stack particulate	ICP-AES	ug/g	18.7 @		17.3 @
Copper	Baghouse ash	ICP-AES	mg/kg	29.0	20.3	22.0
Copper	Blowdown slurry liquid	ICP-AES	mg/L	0.0347	0.0183 @	0.0261
Copper	Blowdown slurry solids	ICP-AES	mg/kg	4.83 @	4.76 @	3.20 @
Copper	Bottom ash	ICP-AES	mg/kg	21.7	22.0	21.4
Copper	Coal	ICP-AES	mg/kg, dry	11.0	10.00	9.00
Copper	Feed slurry liquid	ICP-AES	mg/L	0.0188 @	0.0191	< 0.00381
Copper	Feed slurry solids	ICP-AES	mg/kg	4.69 @	4.02 @	4.56 @
Copper	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	8.03	2.41	2.13
Copper	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	6.41	< 0.821	1.53 @

25-Apr-94 Table B-1: Site 101 Data Used in Calculations 7

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Copper	FGD inlet particulate	ICP-AES	ug/g	325	101	87.7
Copper	Makeup water	ICP-AES	mg/L			0.0104 @
Copper	Process water	ICP-AES	mg/L	0.0138 @	0.0170 @	0.0365
Copper	Spray blend water	ICP-AES	mg/L			0.0104 @
Copper	Stack gas, solid phase	ICP-AES	ug/Nm3	1.26		0.779
Copper	Stack gas, vapor phase	ICP-AES	ug/Nm3	1.83 @	< 0.745	1.41 @
Copper	Stack particulate	ICP-AES	ug/g	143		99.6
Fixed Carbon	Coal	Proximate	%, dry	39.6	40.2	39.9
Fluoride	Baghouse ash	NaOH Fus./ISE	mg/kg	65.0	39.9 @	32.6 @
Fluoride	Blowdown slurry liquid	ISE	mg/L	19.7	16.1	17.0
Fluoride	Blowdown slurry solids	NaOH Fus./ISE	mg/kg	4590	4600	4507
Fluoride	Bottom ash	NaOH Fus./ISE	mg/kg	< 11.4	< 11.3	< 11.7
Fluoride	Coal	ISE	mg/kg, dry	153	149	62.1
Fluoride	Feed slurry liquid	ISE	mg/L	0.254	0.208	0.225
Fluoride	Feed slurry solids	NaOH Fus./ISE	mg/kg	68.7 @	67.1 @	59.7 @
Fluoride	FGD inlet gas, solid phase	ISE	ug/Nm3	199	194	169
Fluoride	FGD inlet gas, vapor phase	ISE	ug/Nm3	14834	15465	16576
Fluoride	Makeup water	ISE	mg/L			0.655
Fluoride	Process water	ISE	mg/L	13.2	12.1	12.3
Fluoride	Spray blend water	ISE	mg/L			7.71
Fluoride	Stack gas, solid phase	ISE	ug/Nm3	164	264	197
Fluoride	Stack gas, vapor phase	ISE	ug/Nm3	4537	3126	4480
HHV	Coal	Proximate	Btu/lb, dry	10212	10184	10164
Hydrogen	Coal	Ultimate	%, dry	4.30	4.25	4.20
Iron	Baghouse ash	ICP-AES	mg/kg	25300	23100	25150
Iron	Blowdown slurry liquid	ICP-AES	mg/L	1.94	0.972	0.924

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Table B-1: Site 101 Data Used In Calculations

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Iron	Blowdown slurry solids	ICP-AES	mg/kg	442 @	426 @	423 @
Iron	Bottom ash	ICP-AES	mg/kg	23100	25900	25500
Iron	Coal	INAA	mg/kg, dry	7339	10489	7614
Iron	Feed slurry liquid	ICP-AES	mg/L	< 0.00596	0.0144 @	0.00910 @
Iron	Feed slurry solids	ICP-AES	mg/kg	615 @	635 @	615 @
Iron	FGD Inlet gas, solid phase	ICP-AES	ug/Nm3	603	701	644
Iron	FGD Inlet gas, vapor phase	ICP-AES	ug/Nm3	34.7	30.8	40.2
Iron	FGD Inlet particulate	ICP-AES	ug/g	24448	29239	26548
Iron	Makeup water	ICP-AES	mg/L			0.256
Iron	Process water	ICP-AES	mg/L	0.576	0.496	1.40
Iron	Spray blend water	ICP-AES	mg/L			0.222
Iron	Stack gas, solid phase	ICP-AES	ug/Nm3	233		208
Iron	Stack gas, vapor phase	ICP-AES	ug/Nm3	9.56	7.19	7.70
Iron	Stack particulate	ICP-AES	ug/g	26422		26531
Lead	Baghouse ash	GFAAS	mg/kg	28.9	18.3	17.9
Lead	Blowdown slurry liquid	GFAAS	mg/L	< 0.00110	< 0.00220	< 0.00110
Lead	Blowdown slurry solids	GFAAS	mg/kg	0.262 @	0.268 @	0.301
Lead	Bottom ash	GFAAS	mg/kg	13.8	14.3	14.6
Lead	Coal	GFAAS	mg/kg, dry	14.0	13.0	13.0
Lead	Feed slurry liquid	GFAAS	mg/L	< 0.00110	< 0.00220	< 0.00110
Lead	Feed slurry solids	GFAAS	mg/kg	0.667	0.602	0.466
Lead	FGD Inlet gas, solid phase	GFAAS	ug/Nm3	2.88	2.50	2.34
Lead	FGD Inlet gas, vapor phase	GFAAS	ug/Nm3	< 0.178	< 0.172	< 0.167
Lead	FGD Inlet particulate	GFAAS	ug/g	117	104	96.3
Lead	Makeup water	GFAAS	mg/L			< 0.00110
Lead	Process water	GFAAS	mg/L	< 0.00110	< 0.00220	0.00138 @

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Lead	Spray blend water	GFAAS	mg/L			< 0.00110
Lead	Stack gas, solid phase	GFAAS	ug/Nm3	0.985		0.715
Lead	Stack gas, vapor phase	GFAAS	ug/Nm3	< 0.151	< 0.156	< 0.144
Lead	Stack particulate	GFAAS	ug/g	112		91.4
Manganese	Baghouse ash	ICP-AES	mg/kg	220	237	212
Manganese	Blowdown slurry liquid	ICP-AES	mg/L	0.465	0.392	0.485
Manganese	Blowdown slurry solids	ICP-AES	mg/kg	38.7	38.1	36.8
Manganese	Bottom ash	ICP-AES	mg/kg	201	186	213
Manganese	Coal	ICP-AES	mg/kg, dry	57.0	66.0	76.0
Manganese	Feed slurry liquid	ICP-AES	mg/L	0.00185 @	0.00216	0.00246
Manganese	Feed slurry solids	ICP-AES	mg/kg	53.9	56.5	52.0
Manganese	FGD Inlet gas, solid phase	ICP-AES	ug/Nm3	5.13	6.24	4.87
Manganese	FGD Inlet gas, vapor phase	ICP-AES	ug/Nm3	4.85	4.70	4.40
Manganese	FGD Inlet particulate	ICP-AES	ug/g	208	260	201
Manganese	Makeup water	ICP-AES	mg/L			0.00750
Manganese	Process water	ICP-AES	mg/L	0.553	0.510	0.543
Manganese	Spray blend water	ICP-AES	mg/L			0.339
Manganese	Stack gas, solid phase	ICP-AES	ug/Nm3	2.22		1.90
Manganese	Stack gas, vapor phase	ICP-AES	ug/Nm3	3.20	3.99	16.8
Manganese	Stack particulate	ICP-AES	ug/g	251		243
Mercury	Baghouse ash	CVAAS	mg/kg	0.0975	0.0200 @	0.0163 @
Mercury	Blowdown slurry liquid	CVAAS	mg/L	0.00787	0.00443	0.00271
Mercury	Blowdown slurry solids	CVAAS	mg/kg	1.23	1.38	1.31
Mercury	Bottom ash	CVAAS	mg/kg	< 0.0120	< 0.0120	0.0948
Mercury	Coal	DGA/CVAAS	mg/kg, dry	0.0700 @	0.0600 @	0.0600 @
Mercury	Feed slurry liquid	CVAAS	mg/L	< 0.0000480	< 0.0000480	< 0.0000480

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Mercury	Feed slurry solids	CVAAS	mg/kg	< 0.0120	< 0.0120	< 0.0120
Mercury	FGD inlet gas, solid phase	CVAAS	ug/Nm3	0.0540	0.0148	0.0129
Mercury	FGD inlet gas, vapor phase	CVAAS	ug/Nm3	3.77	7.18	7.10
Mercury	FGD inlet particulate	CVAAS	ug/g	2.19	0.617	0.533
Mercury	Makeup water	CVAAS	mg/L			< 0.0000480
Mercury	Process water	CVAAS	mg/L	0.000950	0.000990	0.00108
Mercury	Spray blend water	CVAAS	mg/L			0.000700
Mercury	Stack gas, solid phase	CVAAS	ug/Nm3	0.0726		0.223
Mercury	Stack gas, vapor phase	CVAAS	ug/Nm3	1.81	2.14	2.49
Mercury	Stack particulate	CVAAS	ug/g	8.22		28.6
Mercury, elemental	FGD inlet gas, vapor phase	CVAFS	ug/Nm3	1.32	1.28	0.590
Mercury, elemental	Stack gas, vapor phase	CVAFS	ug/Nm3	0.500	0.660	0.540
Mercury, ionic	FGD inlet gas, vapor phase	CVAFS	ug/Nm3	4.63	4.51	4.55
Mercury, ionic	Stack gas, vapor phase	CVAFS	ug/Nm3	0.880	1.34	1.58
Mercury, methyl	FGD inlet gas, vapor phase	CVAFS	ug/Nm3	< 0.00500	< 0.00500	< 0.00500
Mercury, methyl	Stack gas, vapor phase	CVAFS	ug/Nm3	< 0.00500	< 0.00500	< 0.00500
Moisture	Coal	Gravim.	wt %	13.3	13.9	13.9
Molybdenum	Baghouse ash	ICP-AES	mg/kg	< 2.52	< 2.49	< 2.49
Molybdenum	Blowdown slurry liquid	ICP-AES	mg/L	0.273	0.273	0.290
Molybdenum	Blowdown slurry solids	ICP-AES	mg/kg	< 2.10	< 1.98	< 1.94
Molybdenum	Bottom ash	ICP-AES	mg/kg	< 2.43	< 2.49	< 2.46
Molybdenum	Coal	INAA	mg/kg, dry	7.63	7.21	3.35
Molybdenum	Feed slurry liquid	ICP-AES	mg/L	0.0263	0.0203 @	< 0.00463
Molybdenum	Feed slurry solids	ICP-AES	mg/kg	< 1.79	< 2.05	< 1.99
Molybdenum	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	2.78	2.14	2.16
Molybdenum	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	1.92 @	< 0.998	< 0.969

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Table B-1: Site 101 Data Used in Calculations

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Molybdenum	FGD inlet particulate	ICP-AES	ug/g	113	89.3	88.9
Molybdenum	Makeup water	ICP-AES	mg/L			0.0132 @
Molybdenum	Process water	ICP-AES	mg/L	0.236	0.230	0.252
Molybdenum	Spray blend water	ICP-AES	mg/L			0.145
Molybdenum	Stack gas, solid phase	ICP-AES	ug/Nm3	2.40		2.52
Molybdenum	Stack gas, vapor phase	ICP-AES	ug/Nm3	1.31 @	< 0.905	< 0.832
Molybdenum	Stack particulate	ICP-AES	ug/g	272		322
Nickel	Baghouse ash	GFAAS	mg/kg	13.6	12.5	11.4
Nickel	Blowdown slurry liquid	GFAAS	mg/L	0.320	0.268	0.305
Nickel	Blowdown slurry solids	GFAAS	mg/kg	1.71	1.63	1.61
Nickel	Bottom ash	GFAAS	mg/kg	12.2	12.4	11.1
Nickel	Coal	ICP-AES	mg/kg, dry	< 1.000	< 1.000	< 1.000
Nickel	Feed slurry liquid	GFAAS	mg/L	0.00888 @	0.00696 @	0.00376 @
Nickel	Feed slurry solids	GFAAS	mg/kg	2.17	1.96	2.09
Nickel	FGD inlet gas, solid phase	GFAAS	ug/Nm3	2.61	2.13	1.67
Nickel	FGD inlet gas, vapor phase	GFAAS	ug/Nm3	< 0.405	< 0.392	0.731 @
Nickel	FGD inlet particulate	GFAAS	ug/g	106	88.7	68.8
Nickel	Makeup water	GFAAS	mg/L			< 0.00182
Nickel	Process water	GFAAS	mg/L	0.146	0.136	0.354
Nickel	Spray blend water	GFAAS	mg/L			0.115
Nickel	Stack gas, solid phase	GFAAS	ug/Nm3	2.14		3.29
Nickel	Stack gas, vapor phase	GFAAS	ug/Nm3	0.492 @	0.412 @	0.840 @
Nickel	Stack particulate	GFAAS	ug/g	242		420
Nitrogen	Coal	Ultimate	%, dry	1.25	1.27	1.25
Oxygen	Coal	Ultimate	%, dry	11.2	12.8	11.3
Phosphorus	Baghouse ash	ICP-AES	mg/kg	289 @	< 69.2	174 @

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Table B-1: Site 101 Data Used In Calculations

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Phosphorus	Blowdown slurry liquid	ICP-AES	mg/L	0.102 @	< 0.0610	< 0.0610
Phosphorus	Blowdown slurry solids	ICP-AES	mg/kg	10.9 @	10.6 @	11.9 @
Phosphorus	Bottom ash	ICP-AES	mg/kg	71.0 @	95.7 @	202 @
Phosphorus	Coal	ICP-AES	mg/kg, dry	180	260	140
Phosphorus	Feed slurry liquid	ICP-AES	mg/L	< 0.0610	< 0.0610	< 0.0610
Phosphorus	Feed slurry solids	ICP-AES	mg/kg	13.2 @	6.13 @	< 5.54
Phosphorus	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	27.1	26.0	29.8
Phosphorus	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 13.6	< 13.2	< 12.8
Phosphorus	FGD inlet particulate	ICP-AES	ug/g	1098	1084	1227
Phosphorus	Makeup water	ICP-AES	mg/L			< 0.0610
Phosphorus	Process water	ICP-AES	mg/L	0.286 @	0.200 @	0.340
Phosphorus	Spray blend water	ICP-AES	mg/L			0.124 @
Phosphorus	Stack gas, solid phase	ICP-AES	ug/Nm3	11.6		10.4
Phosphorus	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 11.6	< 11.9	< 11.0
Phosphorus	Stack particulate	ICP-AES	ug/g	1310		1329
Selenium	Baghouse ash	GFAAS	mg/kg	7.75	4.33	5.78
Selenium	Blowdown slurry liquid	GFAAS	mg/L	0.00796	0.00773	0.00735
Selenium	Blowdown slurry solids	GFAAS	mg/kg	3.31	3.67	3.87
Selenium	Bottom ash	GFAAS	mg/kg	1.59 @	2.34 @	2.50 @
Selenium	Coal	INAA	mg/kg, dry	2.54	2.96	2.49
Selenium	Feed slurry liquid	GFAAS	mg/L	0.0121	0.00857	0.0145
Selenium	Feed slurry solids	GFAAS	mg/kg	5.90	6.21	6.52
Selenium	FGD inlet gas, solid phase	GFAAS	ug/Nm3	2.40	1.40	0.419
Selenium	FGD inlet gas, vapor phase	GFAAS	ug/Nm3	1.67 @	1.35 @	2.97 @
Selenium	FGD inlet particulate	GFAAS	ug/g	97.4	58.4	17.3
Selenium	Makeup water	GFAAS	mg/L			< 0.000843

Table B-1: Site 101 Data Used In Calculations

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Selenium	Process water	GFAAS	mg/L	0.0110	0.0123	0.0160
Selenium	Spray blend water	GFAAS	mg/L			0.0148
Selenium	Stack gas, solid phase	GFAAS	ug/Nm3	1.60		0.769
Selenium	Stack gas, vapor phase	GFAAS	ug/Nm3	0.409 @	0.434 @	0.499 @
Selenium	Stack particulate	GFAAS	ug/g	181		98.4
Sodium	Baghouse ash	ICP-AES	mg/kg	9300	8140	8460
Sodium	Blowdown slurry liquid	ICP-AES	mg/L	811	819	842
Sodium	Blowdown slurry solids	ICP-AES	mg/kg	840	930	884
Sodium	Bottom ash	ICP-AES	mg/kg	7730	8490	8190
Sodium	Coal	INAA	mg/kg, dry	2694	2582	2639
Sodium	Feed slurry liquid	ICP-AES	mg/L	273	281	268
Sodium	Feed slurry solids	ICP-AES	mg/kg	203	162	335
Sodium	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	337	381	352
Sodium	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	614	582	442
Sodium	FGD inlet particulate	ICP-AES	ug/g	13674	15878	14507
Sodium	Makeup water	ICP-AES	mg/L			120
Sodium	Process water	ICP-AES	mg/L	563	532	567
Sodium	Spray blend water	ICP-AES	mg/L			398
Sodium	Stack gas, solid phase	ICP-AES	ug/Nm3	150		166
Sodium	Stack gas, vapor phase	ICP-AES	ug/Nm3	151	134	112
Sodium	Stack particulate	ICP-AES	ug/g	17009		21224
Sulfate	FGD inlet gas, solid phase	IC	ug/Nm3	549	812	635
Sulfate	FGD inlet gas, vapor phase	IC	ug/Nm3	2531224	3057397	2736295
Sulfate	Stack gas, solid phase	IC	ug/Nm3	584	805	519
Sulfate	Stack gas, vapor phase	IC	ug/Nm3	878469	819110	905639
Sulfur	Baghouse ash	ICP-AES	mg/kg	817 @	805 @	404 @

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Sulfur	Blowdown slurry liquid	ICP-AES	mg/L	1970	1910	2130
Sulfur	Blowdown slurry solids	ICP-AES	mg/kg	188000	174000	173500
Sulfur	Bottom ash	ICP-AES	mg/kg	464 @	712 @	398 @
Sulfur	Coal	Ultimate	%, dry	0.810	0.640	0.920
Sulfur	Feed slurry liquid	ICP-AES	mg/L	478	496	666
Sulfur	Feed slurry solids	ICP-AES	mg/kg	1530	1560	3175
Sulfur	Makeup water	ICP-AES	mg/L			142
Sulfur	Process water	ICP-AES	mg/L	1510	1420	1490
Sulfur	Spray blend water	ICP-AES	mg/L			964
Titanium	Baghouse ash	ICP-AES	mg/kg	4400	3960	4195
Titanium	Blowdown slurry liquid	ICP-AES	mg/L	0.00254 @	< 0.00102	< 0.00102
Titanium	Blowdown slurry solids	ICP-AES	mg/kg	26.2	26.1	26.1
Titanium	Bottom ash	ICP-AES	mg/kg	3900	4330	4120
Titanium	Coal	ICP-AES	mg/kg, dry	1400	1350	1300
Titanium	Feed slurry liquid	ICP-AES	mg/L	0.288	0.291	0.278
Titanium	Feed slurry solids	ICP-AES	mg/kg	26.8	24.4	27.2
Titanium	FGD Inlet gas, solid phase	ICP-AES	ug/Nm3	102	128	122
Titanium	FGD Inlet gas, vapor phase	ICP-AES	ug/Nm3	1.74	1.14	3.68
Titanium	FGD Inlet particulate	ICP-AES	ug/g	4116	5327	5023
Titanium	Makeup water	ICP-AES	mg/L			< 0.00102
Titanium	Process water	ICP-AES	mg/L	0.0676	0.0454	0.164
Titanium	Spray blend water	ICP-AES	mg/L			0.0154
Titanium	Stack gas, solid phase	ICP-AES	ug/Nm3	33.9		35.1
Titanium	Stack gas, vapor phase	ICP-AES	ug/Nm3	0.329 @	0.504 @	0.311 @
Titanium	Stack particulate	ICP-AES	ug/g	3835		4490
Toluene	Stack gas, VOST pair 1	GCMS	ug/Nm3		0.921 @	0.996 @

04-Apr-94 Table B-1: Site 101 Data Used In Calculations 15

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Toluene	Stack gas, VOST pair 2	GCMS	ug/Nm3	0.670 @	< 0.668	0.668 @
Toluene	Stack gas, VOST pair 3	GCMS	ug/Nm3	0.939 @	< 0.670	< 0.610
Vanadium	Baghouse ash	ICP-AES	mg/kg	80.6	63.5	68.6
Vanadium	Blowdown slurry liquid	ICP-AES	mg/L	0.139	0.137	0.139
Vanadium	Blowdown slurry solids	ICP-AES	mg/kg	3.98 @	6.47 @	5.24 @
Vanadium	Bottom ash	ICP-AES	mg/kg	62.1	64.8	67.8
Vanadium	Coal	INAA	mg/kg, dry	27.3	24.0	24.6
Vanadium	Feed slurry liquid	ICP-AES	mg/L	0.0548	0.0545	0.0529
Vanadium	Feed slurry solids	ICP-AES	mg/kg	8.97 @	9.51 @	10.5 @
Vanadium	FGD Inlet gas, solid phase	ICP-AES	ug/Nm3	2.71	3.22	3.14
Vanadium	FGD Inlet gas, vapor phase	ICP-AES	ug/Nm3	< 0.525	< 0.509	< 0.494
Vanadium	FGD Inlet particulate	ICP-AES	ug/g	110	134	130
Vanadium	Makeup water	ICP-AES	mg/L			0.00480 @
Vanadium	Process water	ICP-AES	mg/L	0.155	0.142	0.159
Vanadium	Spray blend water	ICP-AES	mg/L			0.0928
Vanadium	Stack gas, solid phase	ICP-AES	ug/Nm3	1.14		1.07
Vanadium	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 0.447	< 0.461	< 0.424
Vanadium	Stack particulate	ICP-AES	ug/g	129		137
Volatile	Coal	Proximate	%, dry	35.1	35.2	34.9

APPENDIX C:
ANALYTICAL DATA NOT USED IN CALCULATIONS

Key to Data Flags:

Flag	Description
@	Concentration is less than five times the detection limit.
<	Less than the detection limit.

04-Apr-94 Table C-1: Site 101 Data NOT Used In Calculations 1

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
1,1-Dichloroethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,1-Dichloroethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,1-Dichloroethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,1-Dichloroethene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,1-Dichloroethene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,1-Dichloroethene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,1,1-Trichlorethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,1,1-Trichlorethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,1,1-Trichlorethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,1,2-Trichloroethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,1,2-Trichloroethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,1,2-Trichloroethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,1,2,2-Tetrachloroethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,1,2,2-Tetrachloroethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,1,2,2-Tetrachloroethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,2-Dichlorobenzene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,2-Dichlorobenzene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,2-Dichlorobenzene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,2-Dichloroethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,2-Dichloroethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,2-Dichloroethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,2-Dichloropropane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,2-Dichloropropane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,2-Dichloropropane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,3-Dichlorobenzene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,3-Dichlorobenzene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668

04-Apr-94 Table C-1: Site 101 Data NOT Used In Calculations 2

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
1,3-Dichlorobenzene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,4-Dichlorobenzene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,4-Dichlorobenzene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,4-Dichlorobenzene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
2-Butanone	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 3.29	< 3.32
2-Butanone	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 3.35	< 3.34	< 3.34
2-Butanone	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 3.35	< 3.35	< 3.05
2-Hexanone	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 3.29	< 3.32
2-Hexanone	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 3.35	< 3.34	< 3.34
2-Hexanone	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 3.35	< 3.35	< 3.05
4-Methyl-2-pentanone	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 3.29	< 3.32
4-Methyl-2-pentanone	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 3.35	< 3.34	< 3.34
4-Methyl-2-pentanone	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 3.35	< 3.35	< 3.05
Acetone	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 3.29	< 3.32
Acetone	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 3.35	< 3.34	< 3.34
Acetone	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 3.35	< 3.35	< 3.05
Antimony	Baghouse ash	ICP-AES	mg/kg	< 18.6	< 18.3	< 18.4
Antimony	Blowdown slurry liquid	ICP-AES	mg/L	< 0.0241	< 0.0241	< 0.0241
Antimony	Blowdown slurry solids	ICP-AES	mg/kg	< 1.54	< 1.46	< 1.43
Antimony	Bottom ash	ICP-AES	mg/kg	< 17.9	< 18.3	< 18.1
Antimony	Coal	INAA	mg/kg, dry	0.591	0.523	0.728
Antimony	Feed slurry liquid	ICP-AES	mg/L	< 0.0241	< 0.0241	< 0.0241
Antimony	Feed slurry solids	ICP-AES	mg/kg	< 1.32	< 1.51	< 1.47
Antimony	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	< 0.329	< 0.277	< 0.269
Antimony	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 5.36	< 5.20	< 5.05
Antimony	FGD inlet particulate	ICP-AES	ug/g	< 13.3	< 11.6	< 11.1

Table C-1: Site 101 Data NOT Used in Calculations

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
1,1-Dichloroethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,1-Dichloroethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,1-Dichloroethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,1-Dichloroethene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,1-Dichloroethene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,1-Dichloroethene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,1,1-Trichlorethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,1,1-Trichlorethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,1,1-Trichlorethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,1,2-Trichloroethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,1,2-Trichloroethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,1,2-Trichloroethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,1,2,2-Tetrachloroethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,1,2,2-Tetrachloroethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,1,2,2-Tetrachloroethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,2-Dichlorobenzene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,2-Dichlorobenzene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,2-Dichlorobenzene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,2-Dichloroethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,2-Dichloroethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,2-Dichloroethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,2-Dichloropropane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,2-Dichloropropane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,2-Dichloropropane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,3-Dichlorobenzene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,3-Dichlorobenzene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
1,3-Dichlorobenzene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
1,4-Dichlorobenzene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
1,4-Dichlorobenzene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
1,4-Dichlorobenzene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
2-Butanone	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 3.29	< 3.32
2-Butanone	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 3.35	< 3.34	< 3.34
2-Butanone	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 3.35	< 3.35	< 3.05
2-Hexanone	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 3.29	< 3.32
2-Hexanone	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 3.35	< 3.34	< 3.34
2-Hexanone	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 3.35	< 3.35	< 3.05
4-Methyl-2-pentanone	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 3.29	< 3.32
4-Methyl-2-pentanone	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 3.35	< 3.34	< 3.34
4-Methyl-2-pentanone	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 3.35	< 3.35	< 3.05
Acetone	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 3.29	< 3.32
Acetone	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 3.35	< 3.34	< 3.34
Acetone	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 3.35	< 3.35	< 3.05
Antimony	Baghouse ash	ICP-AES	mg/kg	< 18.6	< 18.3	< 18.4
Antimony	Blowdown slurry liquid	ICP-AES	mg/L	< 0.0241	< 0.0241	< 0.0241
Antimony	Blowdown slurry solids	ICP-AES	mg/kg	< 1.54	< 1.46	< 1.43
Antimony	Bottom ash	ICP-AES	mg/kg	< 17.9	< 18.3	< 18.1
Antimony	Coal	INAA	mg/kg, dry	0.591	0.523	0.728
Antimony	Feed slurry liquid	ICP-AES	mg/L	< 0.0241	< 0.0241	< 0.0241
Antimony	Feed slurry solids	ICP-AES	mg/kg	< 1.32	< 1.51	< 1.47
Antimony	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	< 0.329	< 0.277	< 0.269
Antimony	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 5.36	< 5.20	< 5.05
Antimony	FGD inlet particulate	ICP-AES	ug/g	< 13.3	< 11.6	< 11.1

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Antimony	Makeup water	ICP-AES	mg/L			< 0.0241
Antimony	Process water	ICP-AES	mg/L	< 0.0241	< 0.0241	< 0.0241
Antimony	Spray blend water	ICP-AES	mg/L			< 0.0241
Antimony	Stack gas, solid phase	ICP-AES	ug/Nm3	< 0.313		< 0.308
Antimony	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 4.56	< 4.71	6.42 @
Antimony	Stack particulate	ICP-AES	ug/g	< 35.4		< 39.4
Arsenic	Coal	GFAAS	mg/kg, dry	2.00 @	2.00 @	3.00 @
Arsenic	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 5.01	< 4.85	< 4.71
Arsenic	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 4.26	< 4.40	< 4.05
Boron	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	3204	3255	3371
Boron	Stack gas, vapor phase	ICP-AES	ug/Nm3	966	729	1018
Bromodichloromethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Bromodichloromethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Bromodichloromethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Bromoform	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Bromoform	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Bromoform	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Bromomethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Bromomethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Bromomethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Cadmium	Baghouse ash	ICP-AES	mg/kg	< 2.76	< 2.72	< 2.73
Cadmium	Blowdown slurry liquid	ICP-AES	mg/L	0.00328 @	0.00311 @	0.00258 @
Cadmium	Blowdown slurry solids	ICP-AES	mg/kg	< 2.30	< 2.17	< 2.12
Cadmium	Bottom ash	ICP-AES	mg/kg	< 2.66	< 2.73	< 2.69
Cadmium	Coal	INAA	mg/kg, dry	< 2.73	< 2.73	< 2.56
Cadmium	Feed slurry liquid	ICP-AES	mg/L	< 0.00172	< 0.00172	0.00300 @

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Table C-1: Site 101 Data NOT Used in Calculations

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Cadmium	Feed slurry solids	ICP-AES	mg/kg	< 1.97	< 2.24	< 2.18
Cadmium	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	0.816	0.130 @	0.184 @
Cadmium	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 0.383	< 0.371	< 0.360
Cadmium	FGD inlet particulate	ICP-AES	ug/g	33.1	5.42 @	7.57 @
Cadmium	Makeup water	ICP-AES	mg/L			< 0.00172
Cadmium	Process water	ICP-AES	mg/L	< 0.00172	0.00234 @	0.00314 @
Cadmium	Spray blend water	ICP-AES	mg/L			0.00255 @
Cadmium	Stack gas, solid phase	ICP-AES	ug/Nm3	0.590		0.241
Cadmium	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 0.326	< 0.336	< 0.309
Cadmium	Stack particulate	ICP-AES	ug/g	66.8		30.8
Carbon disulfide	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Carbon disulfide	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Carbon disulfide	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Carbon tetrachloride	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Carbon tetrachloride	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Carbon tetrachloride	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Chloride	Feed slurry solids	ISE	mg/kg	585	525	1125
Chlorine	Coal	INAA	mg/kg, dry	< 82.0	177	218
Chlorobenzene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Chlorobenzene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Chlorobenzene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Chloroethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Chloroethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Chloroethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Chloroform	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Chloroform	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668

Table C-1: Site 101 Data NOT Used In Calculations

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Chloroform	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Chloromethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Chloromethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	0.668 @
Chloromethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	1.01 @	< 0.670	< 0.610
Chromium	Coal	INAA	mg/kg, dry	8.27	11.3	7.72
cis-1,3-Dichloropropene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
cis-1,3-Dichloropropene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
cis-1,3-Dichloropropene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Copper	Coal	INAA	mg/kg, dry	< 32.8	< 32.8	< 30.7
Dibromochloromethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Dibromochloromethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Dibromochloromethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Ethyl benzene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Ethyl benzene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Ethyl benzene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Fluoride	Baghouse ash	Leach/ISE	mg/kg	27.7	16.6	16.1
Fluoride	Blowdown slurry solids	Leach/ISE	mg/kg	174	176	171
Fluoride	Bottom ash	Leach/ISE	mg/kg	0.897 @	0.786 @	0.730 @
Fluoride	Feed slurry solids	Leach/ISE	mg/kg	3.39	2.81 @	2.24 @
Lead	Baghouse ash	ICP-AES	mg/kg	62.2 @	< 23.4	25.7 @
Lead	Blowdown slurry liquid	ICP-AES	mg/L	< 0.0270	< 0.0270	< 0.0270
Lead	Blowdown slurry solids	ICP-AES	mg/kg	< 1.98	< 1.87	< 1.83
Lead	Bottom ash	ICP-AES	mg/kg	58.0 @	35.6 @	37.1 @
Lead	Feed slurry liquid	ICP-AES	mg/L	< 0.0270	< 0.0270	< 0.0270
Lead	Feed slurry solids	ICP-AES	mg/kg	< 1.69	< 1.93	< 1.88
Lead	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	5.15	4.61	4.61

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Table C-1: Site 101 Data NOT Used In Calculations

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Lead	FGD Inlet gas, vapor phase	ICP-AES	ug/Nm3	< 6.01	< 5.82	< 5.65
Lead	FGD Inlet particulate	ICP-AES	ug/g	209	192	190
Lead	Makeup water	ICP-AES	mg/L			< 0.0270
Lead	Process water	ICP-AES	mg/L	< 0.0270	< 0.0270	< 0.0270
Lead	Spray blend water	ICP-AES	mg/L			< 0.0270
Lead	Stack gas, solid phase	ICP-AES	ug/Nm3	2.95		3.13
Lead	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 5.11	< 5.28	< 4.85
Lead	Stack particulate	ICP-AES	ug/g	334		400
Magnesium	Baghouse ash	ICP-AES	mg/kg	4200	2680	3465
Magnesium	Blowdown slurry liquid	ICP-AES	mg/L	674	697	715
Magnesium	Blowdown slurry solids	ICP-AES	mg/kg	465	607	544
Magnesium	Bottom ash	ICP-AES	mg/kg	3470	2120	3910
Magnesium	Coal	INAA	mg/kg, dry	1222	1183	1135
Magnesium	Feed slurry liquid	ICP-AES	mg/L	< 0.0228	< 0.0228	0.281
Magnesium	Feed slurry solids	ICP-AES	mg/kg	2510	2530	2570
Magnesium	FGD Inlet gas, solid phase	ICP-AES	ug/Nm3	70.9	130	81.2
Magnesium	FGD Inlet gas, vapor phase	ICP-AES	ug/Nm3	27.6	26.7	21.1 @
Magnesium	FGD Inlet particulate	ICP-AES	ug/g	2873	5422	3349
Magnesium	Makeup water	ICP-AES	mg/L			31.1
Magnesium	Process water	ICP-AES	mg/L	403	379	408
Magnesium	Spray blend water	ICP-AES	mg/L			265
Magnesium	Stack gas, solid phase	ICP-AES	ug/Nm3	61.7		61.5
Magnesium	Stack gas, vapor phase	ICP-AES	ug/Nm3	10.9 @	< 4.46	6.01 @
Magnesium	Stack particulate	ICP-AES	ug/g	6991		7857
Manganese	Coal	INAA	mg/kg, dry	56.8	62.7	77.0
Mercury	Coal	INAA	mg/kg, dry	< 0.327	< 0.307	< 0.322

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Table C-1: Site 101 Data NOT Used in Calculations

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Methylene chloride	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Methylene chloride	Stack gas, VOST pair 2	GCMS	ug/Nm3	0.670 @	< 0.668	< 0.668
Methylene chloride	Stack gas, VOST pair 3	GCMS	ug/Nm3	4.76	< 0.670	< 0.610
m,p-Xylene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
m,p-Xylene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
m,p-Xylene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Nickel	Baghouse ash	ICP-AES	mg/kg	< 10.5	< 10.3	< 10.4
Nickel	Blowdown slurry liquid	ICP-AES	mg/L	0.262	0.260	0.266
Nickel	Blowdown slurry solids	ICP-AES	mg/kg	< 8.72	< 8.26	< 8.05
Nickel	Bottom ash	ICP-AES	mg/kg	< 10.1	10.5 @	< 10.3
Nickel	Coal	INAA	mg/kg, dry	11.1	< 11.0	< 7.67
Nickel	Feed slurry liquid	ICP-AES	mg/L	0.0134 @	0.0184 @	0.0145 @
Nickel	Feed slurry solids	ICP-AES	mg/kg	< 7.47	< 8.52	< 8.29
Nickel	FGD Inlet gas, solid phase	ICP-AES	ug/Nm3	2.11	1.84	1.32
Nickel	FGD Inlet gas, vapor phase	ICP-AES	ug/Nm3	< 2.19	< 2.13	< 2.06
Nickel	FGD Inlet particulate	ICP-AES	ug/g	85.6	76.7	54.2
Nickel	Makeup water	ICP-AES	mg/L			< 0.00986
Nickel	Process water	ICP-AES	mg/L	0.146	0.153	0.380
Nickel	Spray blend water	ICP-AES	mg/L			0.127
Nickel	Stack gas, solid phase	ICP-AES	ug/Nm3	1.81		2.67
Nickel	Stack gas, vapor phase	ICP-AES	ug/Nm3	2.10 @	2.58 @	< 1.77
Nickel	Stack particulate	ICP-AES	ug/g	206		341
o-Xylene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
o-Xylene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
o-Xylene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Potassium	Baghouse ash	ICP-AES	mg/kg	6910	5380	6725

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Potassium	Blowdown slurry liquid	ICP-AES	mg/L	76.3	77.8	79.8
Potassium	Blowdown slurry solids	ICP-AES	mg/kg	< 277	< 262	< 256
Potassium	Bottom ash	ICP-AES	mg/kg	6230	5590	6595
Potassium	Coal	INAA	mg/kg, dry	1409	4610	7188
Potassium	Feed slurry liquid	ICP-AES	mg/L	44.2	45.6	44.7
Potassium	Feed slurry solids	ICP-AES	mg/kg	< 237	< 270	< 263
Potassium	FGD inlet gas, solid phase	ICP-AES	ug/Nm3	140	174	159
Potassium	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 82.3	< 79.8	< 77.5
Potassium	FGD inlet particulate	ICP-AES	ug/g	5656	7250	6537
Potassium	Makeup water	ICP-AES	mg/L			6.27
Potassium	Process water	ICP-AES	mg/L	48.3	45.5	48.9
Potassium	Spray blend water	ICP-AES	mg/L			32.6
Potassium	Stack gas, solid phase	ICP-AES	ug/Nm3	56.1		53.5
Potassium	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 70.1	< 72.3	< 66.5
Potassium	Stack particulate	ICP-AES	ug/g	6349		6837
Selenium	Coal	GFAAS	mg/kg, dry	1.000 @	2.00 @	2.00 @
Selenium	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 9.28	< 8.99	< 8.73
Selenium	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 7.90	< 8.15	< 7.50
Silicon	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	2714	2695	2303
Silicon	Stack gas, vapor phase	ICP-AES	ug/Nm3	386	211	367
Silver	Coal	INAA	mg/kg, dry	< 3.28	< 3.28	< 3.07
Silver	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 1.09	< 1.06	< 1.03
Silver	Stack gas, vapor phase	ICP-AES	ug/Nm3	< 0.932	< 0.961	< 0.885
Strontium	Coal	INAA	mg/kg, dry	209	105	296
Strontium	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	5.85	5.50	4.19
Strontium	Stack gas, vapor phase	ICP-AES	ug/Nm3	0.979	0.397	0.703

04-Apr-94 Table C-1: Site 101 Data NOT Used In Calculations 11

Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Styrene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Styrene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Styrene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Sulfate	Blowdown slurry liquid	IC	mg/L	1810	1640	1770
Sulfate	Feed slurry liquid	IC	mg/L	675	661	672
Sulfate	Makeup water	IC	mg/L			393
Sulfate	Process water	IC	mg/L	1740	1580	1690
Sulfate	Spray blend water	IC	mg/L			1270
Sulfur	Baghouse ash	tot S	%	0.0400	< 0.00500	< 0.00500
Sulfur	Blowdown slurry solids	tot S	%	7.32	10.4	18.6
Sulfur	Bottom ash	tot S	%	< 0.00500	< 0.00500	< 0.00500
Sulfur	Feed slurry solids	tot S	%	< 0.00500	< 0.00500	< 0.00500
Tetrachloroethene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Tetrachloroethene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Tetrachloroethene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Thallium	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	< 3.83	< 3.71	< 3.60
Thallium	Stack gas, vapor phase	ICP-AES	ug/Nm3	5.66 @	6.25 @	< 3.09
Titanium	Coal	INAA	mg/kg, dry	958	1192	1309
trans-1,2-Dichloroethene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
trans-1,2-Dichloroethene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
trans-1,2-Dichloroethene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
trans-1,3-Dichloropropene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
trans-1,3-Dichloropropene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
trans-1,3-Dichloropropene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Trichlorethene	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Trichlorethene	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668

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Table C-1: Site 101 Data NOT Used in Calculations

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Substance	Stream	Method	UOM	Run 1	Run 2	Run 3
Trichlorethene	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Trichlorofluoromethane	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Trichlorofluoromethane	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Trichlorofluoromethane	Stack gas, VOST pair 3	GCMS	ug/Nm3	1.54 @	< 0.670	< 0.610
Vinyl acetate	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 3.29	< 3.32
Vinyl acetate	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 3.35	< 3.34	< 3.34
Vinyl acetate	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 3.35	< 3.35	< 3.05
Vinyl chloride	Stack gas, VOST pair 1	GCMS	ug/Nm3		< 0.658	< 0.664
Vinyl chloride	Stack gas, VOST pair 2	GCMS	ug/Nm3	< 0.670	< 0.668	< 0.668
Vinyl chloride	Stack gas, VOST pair 3	GCMS	ug/Nm3	< 0.671	< 0.670	< 0.610
Zinc	Coal	INAA	mg/kg, dry	17.1	24.8	20.3
Zinc	FGD inlet gas, vapor phase	ICP-AES	ug/Nm3	14.8	20.7	8.52
Zinc	Stack gas, vapor phase	ICP-AES	ug/Nm3	2.37	2.36	2.03

APPENDIX D: UNCERTAINTY FORMULAS

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 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:

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

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

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

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

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

$$\theta_i = \frac{\partial r}{\partial pi} \quad \text{(eq. 4)}$$

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

$$\theta_i = \frac{r(P_i + \Delta P_i) - r(P_i)}{\Delta P_i} \quad \text{(eq. 5)}$$

Equation 5 was applied to the calculations in this report. The perturbation selected for each parameter was the larger of the normalized standard deviation, $S_{\overline{pi}}$, or the bias, β_{pi}.

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

$$S_{\overline{pi}} = \frac{S_{pi}}{\sqrt{N}} \quad \text{(eq. 6)}$$

The degrees of freedom for each parameter is found from

$$v_i = N_i - 1 \quad \text{(eq. 7)}$$

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

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

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

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

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

Assignment of the flow rate bias values is based on engineering judgment. No bias is assigned to the analytical results (above the detection 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.

The calculations assume that the population distribution of each measurement is normal and that the samples collected reflect the true 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 term to reflect the fact that the sampled system may not have been 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 are 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.

APPENDIX E: QA/QC RESULTS

Table E-1
Field Duplicate Results

Sample Type	Client ID	Units	Matrix	Analyte	Dup Flag	Dup Res	Dup Com	Dup DL	Res Flag	Result	Comm.	Detection Lim	RPD
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Aluminum		726	B	56		824	B	56.6	12.64516
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Arsenic		0.566		0.221		0.566		0.257	0
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Barium		7.01	B	0.442		7.55	B	0.439	7.417582
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Beryllium		0.0229	BJ	0.45		0.167	BJ	0.446	151.7640
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Cadmium		0.222		0.025		0.197		0.0292	11.93317
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Cadmium		0.641	BJ	2.19		0.697	BJ	2.17	8.370702
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Calcium		463000	B	182		496000	B	180	6.882168
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Chloride		296		40		307		39.8	3.649424
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Chloride		1140		99.8		1110		99.8	2.666666
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Chromium		6.72	B	2.08		6.41	B	2.07	22.33972
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Cobalt		1.62	BJ	3.98		1.6	BJ	3.95	1.242236
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Copper		3.92	B	1.89		5.2	B	1.87	28.07017
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Fluoride		61.2	B	19		58.2	B	18.7	5.025126
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Fluoride		1.81	B	0.463		2.66	B	0.466	38.03131
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Iron		606	B	237		624	B	236	2.926829
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Lead		0.504	B	0.0473		0.426	B	0.0552	16.30901
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Magnesium		2480	B	20.8		2660	B	20.7	7.003891
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Manganese		49.9	B	0.0901		54.1	B	0.0894	8.076923
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Molybdenum		0.641	BJ	2		2.01	B	1.98	103.2817
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Nickel		2.07	B	0.0892		2.1	B	0.0807	1.438848
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Phosphorus		1.47	J	5.56		3.12	BJ	5.62	71.69542
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Selenium		7.01	B	0.0836		6.03	B	0.0874	15.03067
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Sodium		318	B	19.8		352	B	19.6	10.14925
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Sulfur		3100	B	234		3250	B	233	4.724409
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Titanium		26.7	B	1.4		27.6	B	1.39	3.314917
Feed slurry solids	FC101R-AS03GRXX	mg/kg	S	Vanadium		9.91	B	3.28		11	B	3.26	10.42583
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Barium		0.307		0.00053		0.311	B	0.00053	1.294498
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Beryllium		0.00018	J	0.000554		0.00076		0.000554	133.3333
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Cadmium		0.00292		0.00031		0.00325		0.00031	10.69892
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Cadmium		0.00351		0.00172		0.00249	B	0.00172	34
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Calcium		4470		0.148		4470	B	0.148	0
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Chloride		364		1		374		1	2.710027
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Chromium		0.0164		0.00249		0.0168		0.00249	2.409638
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Cobalt		0.00024	J	0.0034		0.00025	J	0.0034	4.081632
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Copper		0.00222	J	0.00381		0.00521	B	0.00381	80.46452
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Fluoride		0.221	B	0.0235		0.229	B	0.0235	3.555555
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Iron		0.0058	J	0.00596		0.0126	B	0.00596	76.92307
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Magnesium		0.562		0.0228	ND			0.0228	
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Manganese		0.00245		0.000395		0.00246		0.000395	0.407331
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Molybdenum		0.00476		0.00463		0.00379	BJ	0.00463	22.48243
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Nickel		0.0209		0.00986		0.00805	J	0.00986	88.77374
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Nickel		0.00382		0.00182		0.0037		0.00182	3.191489
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Potassium		44.3		0.37		45		0.37	1.567749
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Selenium		0.0143	B	0.000843		0.0146	B	0.000843	2.076124
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Sodium		268		0.0307		268	B	0.0307	0
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Sulfate		671		3		673		3	0.297619
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Sulfur		660		0.0252		672	B	0.0252	1.801801
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Titanium		0.28		0.00102		0.275		0.00102	1.801801
Feed slurry liquid	FC101R-AW03GRXX	mg/L	W	Vanadium		0.0522		0.00236		0.0535		0.00236	2.459701
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Aluminum		106000		67.7		101000		69.7	4.830917
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Barium		1370		0.535		1360		0.551	0.727272
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Beryllium		3.32		0.544		3.51		0.56	5.563689
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Cadmium		0.037	J	0.392		0.0965	J	0.408	89.13857
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Cadmium		0.73	J	2.65	ND			2.73	
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Calcium		18300	B	220		18100	B	226	1.098901
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Chloride		42.2		20		49.5		20	15.92148
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Chromium		27	B	2.52		27.4	B	2.6	1.470588
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Cobalt		9.13		4.82		3.68	J	4.97	87.33280
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Copper		20.8		2.28		22		2.35	5.607476
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Fluoride		9.16	BJ	11.7		12.7	B	11.9	32.49427
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Fluoride		0.717	B	0.47		0.743	B	0.468	3.561643

Table E-1 (Continued)

Sample Type	Client ID	Units	Matrix	Analyte	Dup Flag	Dup Res	Dup Com	Dup DL	Res Flag	Result	Comm.	Detection Lim	RPD
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Iron		25600	B	287		25500	B	296	0
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Lead		33.1		22.8		41.1		23.5	21.86334
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Lead		14.8		1.02		14.3		1.06	3.436426
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Magnesium		4010	B	25.2		3810	B	26	5.115089
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Manganese		213		0.109		213		0.112	0
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Mercury		0.0875		0.012		0.102		0.012	15.30343
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Nickel		6.56	BJ	10.1		10.7	B	10.4	47.97219
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Nickel		11.6	B	1.07		10.6	B	1.13	9.009009
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Phosphorus		208		67.4		195		69.4	6.451612
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Potassium		6850	B	320		6540	B	329	1.667930
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Sodium		7990	B	23.9		8390	B	24.6	4.884004
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Sulfur		415		284		380		292	8.805031
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Titanium		4060	B	1.7		4180	B	1.75	2.912621
Bottom ash	FC101R-BA03GRXX	mg/kg	S	Vanadium		66.5		3.97		69.1		4.09	3.834608
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Aluminum		2.41		0.0284		2.36		0.0284	2.096436
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Barium		0.239		0.00053		0.228	B	0.00053	4.710920
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Beryllium		0.00154		0.000554		0.00166		0.000554	7.5
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Cadmium		0.00027	J	0.00031		0.00005	J	0.00031	137.5
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Cadmium		0.0037		0.00172		0.00146	BJ	0.00172	86.82170
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Calcium		849		0.148		813	B	0.148	4.332129
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Chloride		2250		4		2340		4	3.921568
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Chromium		0.00339		0.00249		0.00075	J	0.00249	127.5362
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Cobalt		0.00723		0.0034		0.00771		0.0034	6.425702
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Copper		0.0262		0.00381		0.026	B	0.00381	0.766283
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Fluoride		17.1	B	0.47		16.8	B	0.47	1.769911
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Iron		0.935		0.00596		0.913	B	0.00596	2.380952
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Magnesium		723		0.0228		707		0.0228	2.237762
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Manganese		0.492		0.000395		0.478		0.000395	2.886597
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Mercury		0.00271		0.000048		0.0027		0.000048	0.369685
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Molybdenum		0.296		0.00463		0.284	B	0.00463	4.137931
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Nickel		0.271		0.00986		0.26		0.00986	4.143126
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Nickel		0.284		0.0182		0.328		0.0182	13.77049
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Potassium		81.3		0.37		78.3		0.37	3.759398
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Selenium		0.0076	B	0.000843		0.0071	B	0.000843	6.802721
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Sodium		860		0.0397		824	B	0.0397	4.275534
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Sulfate		1780		12		1760		12	1.129943
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Sulfur		2150		0.0262		2110	B	0.0262	1.877934
Blowdown slurry liquid	FC101R-BL03GRXX	mg/L	W	Vanadium		0.14		0.00236		0.137		0.00236	2.166064
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Aluminum		638	B	55.1		658	B	53.1	3.086419
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Arsenic		1.45		0.121		1.48		0.128	2.047781
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Barium		19.1	B	0.435		19.2	B	0.42	0.522193
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Beryllium		0.12	BJ	0.443		0.181	BJ	0.427	40.53156
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Cadmium		0.147		0.0275		0.149		0.029	1.351351
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Cadmium		0.0526	BJ	2.16		0.029	BJ	2.08	57.84313
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Calcium		281000	B	179		293000	B	172	4.181184
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Chloride		1500		20		1050		20	35.29411
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Chromium		6.04	BJ	52600		3.79	B	1.98	45.77822
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Copper		3.6	B	1.86		2.6	B	1.79	37.5
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Fluoride		171	B	9.32		170	B	9.34	0.586510
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Fluoride		4610	B	79.1		4690	B	113	1.720430
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Fluoride		4630	B	79.1		4770	B	113	2.978723
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Fluoride		4140	B	190		4200	B	190	1.438848
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Iron		415	B	234		430	B	225	3.550295
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Lead		0.316	B	0.0519		0.286	B	0.0548	9.966777
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Magnesium		565	B	20.5		623	B	19.8	7.720588
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Manganese		36.2	B	0.0867		37.3	B	0.0855	2.993197
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Mercury		1.31		0.012		1.3		0.012	0.766283
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Nickel		1.63	B	0.076		1.69	B	0.0801	9.937888
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Phosphorus		7.27		6.48		16.5	B	5.28	77.66091
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Potassium		130	J	260	ND			251	
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Selenium		3.62	B	0.0458		3.92	B	0.0464	2.563979

Table E-1 (Continued)

Sample Type	Client ID	Units	Matrix	Analyte	Dup Flag	Dup Res	Dup Com	Dup DL	Res Flag	Result	Comm.	Detection Lim	RPD
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Sodium		896	B	19.5		872	B	18.8	2.714932
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Sulfur		171000	B	231		176000	B	222	2.881844
Blowdown slurry solids	FC101R-BS03GRXX	% Sulfur	S	Sulfur		17.2		0.005		19.9		0.005	14.55525
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Titanium		25.3	B	1.36		26.9	B	1.33	6.130268
Blowdown slurry solids	FC101R-BS03GRXX	mg/kg	S	Vanadium		5.23	B	3.23		5.25	B	3.12	0.381679
Coal	*FC101R-CO03GRXX*	*mg/kg*	S	Chloride		241		102		259		102	7.2
Coal	FC101R-CO03GRXX	mg/kg	S	Fluoride		227	B	4.63		223	B	4.63	1.777777
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Aluminum		91800		69.7		99700		69.5	8.250652
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Barium		1830		0.551		1710		0.549	6.779661
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Beryllium		3.57		0.56		3.56		0.558	0.280504
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Calcium		17800	B	226		19200	B	226	7.567567
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Chloride		0	J	20		0	J	20	0
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Chromium		23.7	B	2.6		24.6	B	2.59	3.726708
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Cobalt		6.31		4.97		7.47		4.95	16.83599
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	*Copper*		22.8		2.35		21.2		2.34	7.272727
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Fluoride		16.2	B	0.466		15.9	B	0.47	1.869158
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Fluoride		34.5	B	11.1		30.7	B	11.2	11.65644
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Iron		25700	B	206		24600	B	205	4.373757
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Lead		29.6		23.5		21.8	J	23.4	30.35019
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Lead		17.8		1.07		18		1.07	1.117318
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Magnesium		3280	B	26		3650	B	25.9	10.67821
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Manganese		215		0.112		209		0.112	2.830188
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Mercury		0.015		0.012		0.0175		0.012	15.38461
Baghouse ash (Fly ash)	*FC101R-FA03GCXX*	*mg/kg*	S	*Nickel*		3.29	BJ	10.4	ND		B	10.3	
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Nickel		11.2	B	1.14		11.5	B	1.14	2.643171
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Phosphorus		162		69.4		185		69.1	13.25648
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Potassium		6510	B	329		6940	B	328	6.394052
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Sodium		8390	B	24.6		8530	B	24.5	1.654846
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Sulfur		570		292		237	J	291	82.52788
Baghouse ash (Fly ash)	FC101R-FA03GCXX	% Sulfur	S	Sulfur		0.00216	J	0.005		0.00158	J	0.005	30.56300
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Titanium		4240	B	1.75		4150	B	1.74	2.145411
Baghouse ash (Fly ash)	FC101R-FA03GCXX	mg/kg	S	Vanadium		69.5		4.09		67.7		4.08	2.623906
FGD inlet anions impingers	FC101R-HG03ANCI	ug/sampleW		Chloride, IC BIF		14200		0.252		14900		0.252	4.810996
FGD inlet anions impingers	FC101R-HG03ANCI	ug/sampleW		Fluoride		25200	B	475		25200	B	475	0
FGD inlet anions impingers	FC101R-HG03ANCI	ug/sampleW		Sulfate		4230000		12		4090000		12	3.365384
FGD inlet anions particulate fraction	FC101R-HG03ANWR,HG03ANRL	ug/sampleW		Chloride		140		6.04		137		6.04	2.166064
FGD inlet anions particulate fraction	FC101R-HG03ANWR,HG03ANRL	ug/sampleW		Fluoride		258	B	5.92		256	B	5.92	0.778210
FGD inlet anions particulate fraction	FC101R-HG03ANWR,HG03ANRL	ug/sampleW		Sulfate		966		15.1		966		15.1	0
Process Water	FC101R-RW03GRXX	mg/L	W	Aluminum		4.02		0.0264		3.8		0.0264	5.626598
Process Water	FC101R-RW03GRXX	mg/L	W	Barium		0.688		0.00053		0.659	B	0.00053	4.305864
Process Water	FC101R-RW03GRXX	mg/L	W	Beryllium		0.00103		0.000554		0.00306		0.000554	99.75669
Process Water	FC101R-RW03GRXX	mg/L	W	Cadmium		0.00108		0.00031		0.00093		0.00031	14.92537
Process Water	FC101R-RW03GRXX	mg/L	W	Cadmium		*0.0032*		*0.00172*		*0.00307*	*B*	*0.00172*	4.146730
Process Water	FC101R-RW03GRXX	mg/L	W	Calcium		641		0.148		609	B	0.148	5.12
Process Water	FC101R-RW03GRXX	mg/L	W	Chloride		1300		4		1340		4	3.030303
Process Water	FC101R-RW03GRXX	mg/L	W	Chromium		0.0245		0.00249		0.0262		0.00249	6.706114
Process Water	FC101R-RW03GRXX	mg/L	W	Cobalt		0.00339	J	0.0034		0.00664		0.0034	64.80558
Process Water	FC101R-RW03GRXX	mg/L	W	Copper		0.0355		0.00381		0.0375	B	0.00381	5.479452
Process Water	FC101R-RW03GRXX	mg/L	W	Fluoride		12.3	B	0.47		12.3	B	0.47	0
Process Water	FC101R-RW03GRXX	mg/L	W	Iron		1.44		0.00596		1.36	B	0.00596	5.714285
Process Water	FC101R-RW03GRXX	mg/L	W	Lead		0.00029	J	0.0011		0.00247		0.0011	157.9710
Process Water	FC101R-RW03GRXX	mg/L	W	Magnesium		416		0.0228		396		0.0228	4.901960
Process Water	FC101R-RW03GRXX	mg/L	W	Manganese		0.555		0.000395		0.53		0.000395	4.608294
Process Water	FC101R-RW03GRXX	mg/L	W	Mercury		0.00109		0.000046		0.00106		0.000046	2.790697
Process Water	FC101R-RW03GRXX	mg/L	W	Molybdenum		0.257		0.00463		0.246	B	0.00463	4.373757
Process Water	FC101R-RW03GRXX	mg/L	W	Nickel		0.382		0.00986		0.377		0.00986	1.317523
Process Water	FC101R-RW03GRXX	mg/L	W	Nickel		0.35		0.0162		0.358		0.0162	2.259887
Process Water	FC101R-RW03GRXX	mg/L	W	Phosphorus		0.284		0.061		0.396		0.061	32.94117
Process Water	FC101R-RW03GRXX	mg/L	W	Potassium		50.1		0.37		47.6		0.37	5.117707
Process Water	FC101R-RW03GRXX	mg/L	W	Selenium		0.0161	B	0.000843		0.0159	B	0.000843	1.25
Process Water	FC101R-RW03GRXX	mg/L	W	Sodium		583		*0.0397*		*550*	*B*	*0.0397*	*5.825242*

Table E-1 (Continued)

Sample Type	Client ID	Units	Matrix	Analyte	Dup Flag	Dup Res	Dup Com	Dup DL	Res Flag	Result	Comm.	Detection Lim	RPD
Process Water	FC101R-RW03GRXX	mg/L	W	Sulfate		1680		12		1700		12	1.183431
Process Water	FC101R-RW03GRXX	mg/L	W	Sulfur		1540		0.0252		1440	B	0.0252	6.711409
Process Water	FC101R-RW03GRXX	mg/L	W	Titanium		0.168		0.00102		0.159		0.00102	5.504587
Process Water	FC101R-RW03GRXX	mg/L	W	Vanadium		0.162		0.00236		0.156		0.00236	3.773584
Stack gas anions impingers	FC101R-SG03ANCI	ug/sample	W	Chloride, IC BIF		6110		0.252		6540		0.252	6.785407
Stack gas anions impingers	FC101R-SG03ANCI	ug/sample	W	Fluoride		9780	B	359		9910	B	359	1.320467
Stack gas anions impingers	FC101R-SG03ANCI	ug/sample	W	Sulfate		2010000		12		1970000		12	2.010050
Stack gas anions particulate fraction	FC101R-SG03ANWR,SG03ANFL	ug/sample	W	Chloride		74.9		3.8		74.7		3.8	0.267379
Stack gas anions particulate fraction	FC101R-SG03ANWR,SG03ANFL	ug/sample	W	Fluoride		428	B	8.93		439	B	8.93	2.537485
Stack gas anions particulate fraction	FC101R-SG03ANWR,SG03ANFL	ug/sample	W	Sulfate		1140		11.4		1140		11.4	0

Table E-2
Matrix Spike Results

Sample type	Client ID	Units	Matrix	Analyte	Res. Flag	Result	Comm.	Det. Lim	Spk Rcvry	Spk Dup R'y	L Spec	U Spec	RPD Spec	Spk Dup RPD	Method Code
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Aluminum		4580		57.7	98	98	75	125	20	0	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Antimony		43.9		1.52	77	72 Q	75	125	20	6.7	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Antimony		41.7		1.52	75	73 Q	75	125	20	2.7	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Arsenic		2.91		0.244	75	65 Q	75	125	20	14	Arsenic by SW7060
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Barium		81.5		0.456	98	98	75	125	20	0	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Beryllium		70.8		0.464	90	91	75	125	20	1.1	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Cadmium		3.04		0.278	108	108	75	125	20	0	Cadmium by SW7131
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Cadmium		70.6		2.28	89	88	75	125	20	1.1	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Calcium		504000		187	144 Q	292 Q	75	125	20	68 Q	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Chloride		816		39.8	89	89	80	120	20	0	Chloride, by IC EPA300
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Chloride		5510		99.9	100	100	80	120	20	0	Chloride, potentiometric
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Chromium		79.6		2.15	93	92	75	125	20	1.1	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Cobalt		68.1		4.11	84	83	75	125	20	1.2	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Copper		75.8		1.94	91	93	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Fluoride		4.8		0.463	22 Q	16 Q	80	120	20	32 Q	Fluoride by EPA 340.2
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Fluoride		11.5		0.47	88	101	80	120	20	14	Fluoride by EPA 340.2
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Fluoride		5.07		0.926	21 Q	14 Q	80	120	20	40 Q	Fluoride by EPA 340.2
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Fluoride		613 B		19.3	83	83	80	120	20	0	Fluoride by EPA 340.2
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Iron		4070		245	87	88	75	125	20	1.1	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Lead		44		1.94	74 Q	72 Q	75	125	20	2.7	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Lead		44.8		1.94	75	73 Q	75	125	20	2.7	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Lead		2.54		0.0523	59 Q	63 Q	75	125	20	6.6	Lead by SW7421
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Lead		2.82		0.0523	68 Q	72 Q	75	125	20	5.7	Lead by SW7421
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Magnesium		6300		21.5	96	98	75	125	20	2.1	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Manganese		128		0.0929	88	90	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Mercury		0.532		0.012	111	112	75	125	20	0.90	Mercury, cold vapor SW7471
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Molybdenum		71.5		2.08	92	94	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Nickel		72.5		8.58	99	108	75	125	20	8.8	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Nickel		4.73		0.153	85	87	75	125	20	2.3	Nickel by GF, EPA 249.2
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Phosphorus		673		5.74	85	86	75	125	20	1.2	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Potassium		3840		272	98	89	75	125	20	7.8	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Selenium		8.31		0.185	64 Q	56 Q	75	125	20	13	Selenium by SW7740
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Selenium		8.31		0.185	64 Q	77	75	125	20	18	Selenium by SW7740
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Sodium		4140		20.4	101	103	75	125	20	2.0	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Sulfur		1530		242	-41 Q	-57 Q	75	125	20	33 Q	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Titanium		98.3		1.45	94	95	75	125	20	1.1	ICP analysis by SW6010
Lime feed slurry solids	FC101R-AS02GRXX	mg/kg	S	Vanadium		80.9		3.39	91	89	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Aluminum		9.47		0.0284	95	99	75	125	20	4.1	ICP analysis by SW5010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Aluminum		9.4		0.0284	94	98	75	125	20	2.1	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Antimony		0.783		0.0241	91	89	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Antimony		0.807		0.0741	95	94	75	125	20	1.1	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Arsenic		0.0449		0.00197	101	101	75	125	20	0	Arsenic by SW7050
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Barium		1.48		0.00053	90	92	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Barium		1.49		0.00053	91	96	75	125	20	5.4	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Beryllium		0.885		0.000554	88	90	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Beryllium		0.89		0.000554	89	93	75	125	20	4.4	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Cadmium		0.878		0.00172	88	90	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Cadmium		0.879		0.00172	88	89	75	125	20	1.1	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Calcium		4480		0.148	0 Q	0	75	125	20	0	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Calcium		4480		0.148	0 Q	0 Q	75	125	20	0	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Chloride		572		1	99	100	80	120	20	1.0	Chloride, by IC EPA300
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Chromium		0.9		0.00249	88	89	75	125	20	1.1	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Chromium		0.903		0.00249	88	91	75	125	20	3.4	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Cobalt		0.836		0.0034	83	87	75	125	20	4.7	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Cobalt		0.834		0.0034	83	85	75	125	20	2.4	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Copper		0.94		0.00381	92	94	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Copper		0.944		0.00381	92	96	75	125	20	4.3	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Fluoride		0.68 B		0.0235	94	93	80	120	20	1.1	Fluoride by EPA 340.2
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Iron		8.72		0.00596	87	90	75	125	20	3.4	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Iron		8.87		0.00596	87	88	75	125	20	1.1	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Lead		0.734		0.027	82	87	75	125	20	5.9	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Lead		0.746		0.027	83	88	75	125	20	5.8	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Lead		0.0421		0.0022	84	86	75	125	20	2.1	Lead by SW7421
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Magnesium		9.14		0.0228	92	94	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Magnesium		9.17		0.0228	92	96	75	125	20	4.3	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Manganese		0.881		0.000395	86	88	75	125	20	2.3	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Manganese		0.887		0.000395	87	90	75	125	20	3.4	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Mercury		0.00142		0.000048	74 Q	74 Q	75	125	20	0	Mercury, cold vapor SW7470
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Mercury		0.00143		0.000048	74 Q	78	75	125	20	2.7	Mercury, cold vapor SW7470
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Molybdenum		0.888		0.00463	87	88	75	125	20	1.2	ICP analysis by SW6010

Table E-2 (Continued)

Sample type	Client ID	Units	Matrix	Analyte	Res. Flag	Result	Comm.	Det. Lim	Spk Rcvry	Spk Dup R'y	L Spec	U Spec	RPD Spec	Spk Dup RPD	Method Code
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Molybdenum		0.882		0.00463	88	89	75	125	20	3.4	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Nickel		0.861		0.00988	84	87	75	125	20	3.5	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Nickel		0.855		0.00988	84	85	75	125	20	1.2	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Nickel		0.0531		0.00167	92	92	75	125	20	0	Nickel by GF, EPA 249.2
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Phosphorus		9.38		0.081	98	97	75	125	20	1.0	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Phosphorus		9.38		0.081	98	97	75	125	20	1.0	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Potassium		63.3		0.37	89	94	75	125	20	5.5	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Potassium		62.8		0.37	88	88	75	125	20	0	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Selenium		0.0449		0.00169	73 Q	72 Q	75	125	20	1.4	Selenium by SW7740
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Selenium		0.0458		0.00169	74 Q	74 Q	75	125	20	0	Selenium by SW7740
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Sodium		285		0.0397	46 Q	72	75	125	20	44 Q	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Sodium		284		0.0397	28 Q	0 Q	75	125	20	200 Q	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Sulfate		1590		3	93	97	80	120	20	4.2	Sulfate, EPA 300.0
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Sulfur		497		0.0252	130 Q	350 Q	75	125	20	92 Q	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Sulfur		502		0.0252	680 Q	1080	75	125	20	46 Q	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Titanium		1.2		0.00102	90	94	75	125	20	4.4	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Titanium		1.18		0.00102	90	92	75	125	20	2.2	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Vanadium		0.928		0.00238	87	89	75	125	20	2.3	ICP analysis by SW6010
Lime feed slurry liquid	FC101R-AW02GRXX	mg/L	W	Vanadium		0.931		0.00238	88	91	75	125	20	3.4	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Aluminum		117000		66.8	105	91	75	125	20	14	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Aluminum		118000		66.8	107	94	75	125	20	13	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Antimony		735		17.6	85	88	75	125	20	3.5	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Antimony		735		17.6	85	89	75	125	20	4.8	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Arsenic		993		14.4	109	108	75	125	20	2.8	Arsenic by SW7060
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Barium		2910		0.528	98	93	75	125	20	5.2	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Barium		2900		0.528	97	95	75	125	20	2.1	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Beryllium		772		0.537	84	85	75	125	20	1.2	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Beryllium		774		0.537	85	85	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Cadmium		1040		77.2	114	102	75	125	20	11	Cadmium by SW7131
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Cadmium		757		2.62	83	83	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Cadmium		746		2.62	82	83	75	125	20	1.2	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Calcium		55300		217	92	89	75	125	20	3.3	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Calcium		54400		217	90	89	75	125	20	1.1	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Chloride		1010		20	93	94	80	120	20	1.1	Chloride, potentiometric
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Chromium		840		2.49	89	89	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Chromium		839		2.49	89	90	75	125	20	1.1	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Cobalt		773		4.76	84	84	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Cobalt		766		4.76	83	85	75	125	20	2.4	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Copper		832		2.25	89	89	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Copper		879		2.25	88	89	75	125	20	1.1	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Fluoride		9.4		0.467	87	88	80	120	20	1.1	Fluoride by EPA 340.2
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Fluoride		262		11.4	66 Q	60 Q	80	120	20	9.5	Fluoride by EPA 340.2
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Iron		63900		284	83	83	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Iron		64200		284	84	83	75	125	20	1.2	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Lead		788		22.5	82	86	75	125	20	4.8	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Lead		810		22.5	85	82	75	125	20	3.6	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Lead		838		20.1	90	89	75	125	20	1.1	Lead by SW7421
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Magnesium		40600		24.9	84	84	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Magnesium		40900		24.9	85	84	75	125	20	1.2	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Manganese		1010		0.108	90	90	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Manganese		1000		0.108	90	90	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Mercury		0.51		0.012	107	107	75	125	20	0	Mercury, cold vapor SW7471
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Molybdenum		765		2.39	85	87	75	125	20	2.3	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Molybdenum		779		2.39	87	87	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Nickel		788		9.94	85	86	75	125	20	1.2	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Nickel		774		9.94	84	86	75	125	20	2.4	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Nickel		785		21.4	88	83	75	125	20	3.8	Nickel by GF, EPA 249.2
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Phosphorus		9260		68.5	99	98	75	125	20	1.0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Potassium		44300		315	85	84	75	125	20	1.2	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Potassium		44500		315	85	84	75	125	20	1.2	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Selenium		868		12.9	95	93	75	125	20	2.1	Selenium by SW7740
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Sodium		49200		23.6	89	89	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Sodium		49200		23.6	89	89	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Sulfur		592		280	-13 Q	-28 Q	75	125	20	73 Q	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Sulfur		228 J		280	-53 Q	-73 Q	75	125	20	79 Q	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Titanium		4980		1.88	71 Q	77	75	125	20	8.1	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Titanium		4980		1.88	71 Q	77	75	125	20	8.1	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Vanadium		863		3.92	88	88	75	125	20	0	ICP analysis by SW6010
Bottom ash	FC101R-BA02GRXX	mg/kg	S	Vanadium		860		3.92	87	88	75	125	20	1.1	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Aluminum		12		0.0284	94	97	75	125	20	3.1	ICP analysis by SW6010

Table E-2 (Continued)

Sample type	Client ID	Units	Matrix	Analyte	Res. Flag	Result	Comm.	Det. Lim	Spk Rcvry	Spk Dup R'y	L Spec	U Spec	RPD Spec	Spk Dup RPD	Method Code
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Aluminum		11.8		0.0284	93	94	75	125	20	1.1	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Antimony		0.66		0.0241	81	95	75	125	20	16	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Antimony		0.781		0.0241	94	86	75	125	20	8.9	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Arsenic		0.027		0.00197	45 Q	47 Q	75	125	20	4.4	Arsenic by SW7060
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Arsenic		0.039		0.00197	69 Q	66	75	125	20	4.4	Arsenic by SW7060
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Barium		1.1		0.00053	89	87	75	125	20	2.3	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Barium		1.11		0.00053	89	90	75	125	20	1.1	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Beryllium		0.906		0.000554	93	96	75	125	20	3.2	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Beryllium		0.928		0.000554	93	94	75	125	20	1.1	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Cadmium		0.0416		0.0031	104	103	75	125	20	0.97	Cadmium by SW7131
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Cadmium		0.0431		0.0031	108	103	75	125	20	4.7	Cadmium by SW7131
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Cadmium		0.847		0.00172	84	85	75	125	20	1.2	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Cadmium		0.854		0.00172	85	86	75	125	20	1.2	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Calcium		728		0.148	-128 Q	-130 Q	75	125	20	1.6	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Calcium		734		0.148	-73 Q	25 Q	75	125	20	408 Q	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Chloride		4440		10	111	100	80	120	20	10	Chloride, by IC EPA300
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Chromium		0.856		0.00249	86	88	75	125	20	2.3	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Chromium		0.848		0.00249	85	86	75	125	20	1.2	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Cobalt		0.815		0.0034	81	82	75	125	20	1.2	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Cobalt		0.815		0.0034	81	83	75	125	20	2.4	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Copper		0.932		0.00381	91	94	75	125	20	3.2	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Copper		0.924		0.00381	91	92	75	125	20	1.1	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Fluoride		25.8	B	0.47	97	104	80	120	20	7.0	Fluoride by EPA 340.2
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Iron		9.39		0.00596	84	96	75	125	20	13	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Iron		9.46		0.00596	85	99	75	125	20	15	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Lead		0.734		0.027	79	85	75	125	20	7.3	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Lead		0.734		0.027	79	86	75	125	20	8.5	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Lead		0.0374		0.0022	82	84	75	125	20	2.4	Lead by SW7421
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Magnesium		689		0.0228	-83 Q	72 Q	75	125	20	344 Q	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Magnesium		684		0.0228	-132 Q	-134 Q	75	125	20	1.5	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Manganese		1.22		0.000395	83	86	75	125	20	3.6	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Manganese		1.21		0.000395	82	84	75	125	20	2.4	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Mercury		0.00506		0.000048	32 Q	34 Q	75	125	20	6.1	Mercury, cold vapor SW7470
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Mercury		0.005		0.000048	28 Q	32 Q	75	125	20	13	Mercury, cold vapor SW7470
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Molybdenum		1.1		0.00463	83	84	75	125	20	1.2	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Molybdenum		1.1		0.00463	83	86	75	125	20	3.6	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Nickel		1.07		0.00986	81	85	75	125	20	4.8	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Nickel		1.1		0.00986	84	84	75	125	20	0	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Nickel		0.319		0.0182	101	96	75	125	20	5.1	Nickel by GF, EPA 249.2
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Phosphorus		9.9		0.061	98	98	75	125	20	0	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Phosphorus		9.61		0.061	98	97	75	125	20	1.0	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Potassium		93.7		0.37	80	81	75	125	20	1.2	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Potassium		94.7		0.37	85	94	75	125	20	10	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Selenium		0.00691		0.000843	-1.8 Q	0.74 Q	75	125	20	544 Q	Selenium by SW7740
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Selenium		0.00745		0.000843	-0.56	-0.080	75	125	20	150 Q	Selenium by SW7740
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Sodium		808		0.0397	-108 Q	36 Q	75	125	20	408 Q	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Sodium		808		0.0397	-128 Q	-152 Q	75	125	20	17	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Sulfate		12300		30	108	92	80	120	20	14	Sulfate, EPA 300.0
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Sulfur		1860		0.0252	-4300	-3400	75	125	20	23 Q	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Sulfur		1890		0.0252	-2100	700 Q	75	125	20	400 Q	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Titanium		0.887		0.00102	90	90	75	125	20	0	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Titanium		0.894		0.00102	90	93	75	125	20	3.3	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Vanadium		0.992		0.00238	86	86	75	125	20	0	ICP analysis by SW6010
Blowdown slurry liquid	FC101R-BL02GRXX	mg/L	W	Vanadium		0.995		0.00238	86	88	75	125	20	2.3	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Aluminum		4400		54.3	101	99	75	125	20	2.0	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Antimony		41.3		1.43	80	83	75	125	20	3.7	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Antimony		43.1		1.43	82	76	75	125	20	7.6	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Arsenic		5		0.138	102	89	75	125	20	14	Arsenic by SW7060
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Barium		92.2		0.429	98	95	75	125	20	3.1	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Beryllium		69.8		0.436	94	92	75	125	20	2.2	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Cadmium		2.79		0.273	102	96	75	125	20	6.1	Cadmium by SW7131
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Cadmium		68.3		2.13	90	88	75	125	20	2.2	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Calcium		315000		178	678 Q	498 Q	75	125	20	31 Q	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Chloride		2550		20	82	80	80	120	20	2.5	Chloride, potentiometric
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Chromium		74.3		2.02	94	94	75	125	20	0	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Cobalt		63.7		3.67	84	88	75	125	20	4.6	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Copper		74.3		1.83	94	92	75	125	20	2.2	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Fluoride		200		2.32	103	108	80	120	20	4.7	Fluoride by EPA 340.2
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Fluoride		5830	B	192	114	72 Q	80	120	20	45 Q	Fluoride by EPA 340.2
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Fluoride		5140	B	112	-23 Q	-29 Q	80	120	20	23 Q	Fluoride by EPA 340.2

Table E-2 (Continued)

Sample type	Client ID	Units	Matrix	Analyte	Res. Flag	Result	Comm.	Det. Lim	Spk Rcvry	Spk Dup R'y	L Spec	U Spec	RPD Spec	Spk Dup RPD	Method Code
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Iron		3850		230	93	91	75	125	20	2.2	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Lead		47.7		1.83	80	81	75	125	20	1.2	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Lead		41.5		1.83	72 Q	71 Q	75	125	20	1.4	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Lead		2.12		0.0518	57 Q	53 Q	75	125	20	7.3	Lead by SW7421
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Lead		2.08		0.0518	56 Q	54 Q	75	125	20	3.8	Lead by SW7421
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Magnesium		4200		20.2	97	94	75	125	20	3.1	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Manganese		105		0.0874	91	89	75	125	20	2.2	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Mercury		1.97		0.012	120	120	75	125	20	0	Mercury, cold vapor SW7471
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Molybdenum		68.5		1.94	92	91	75	125	20	1.1	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Nickel		69		8.07	98	91	75	125	20	7.4	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Nickel		4.95		0.151	103	87	75	125	20	17	Nickel by GF, EPA 249.2
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Phosphorus		636		5.4	84	83	75	125	20	1.2	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Potassium		3330		256	88	95	75	125	20	7.6	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Selenium		3.58		0.0911	-2.7 Q	21 Q	75	125	20	259 Q	Selenium by SW7740
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Selenium		3.9		0.0911	7.0 Q	2.6 Q	75	125	20	92 Q	Selenium by SW7740
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Sodium		4690		19.2	102	99	75	125	20	3.0	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Sulfur		186000		227	16000	6680 Q	75	125	20	59 Q	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Titanium		98.3		1.36	88	94	75	125	20	4.2	ICP analysis by SW6010
Blowdown slurry solids	FC101R-BS02GRXX	mg/kg	S	Vanadium		74.8		3.19	92	92	75	125	20	0	ICP analysis by SW6010
Coal	FC101R-CO02GRXX	mg/kg	S	Chloride		6030		103	97	98	80	120	20	1.0	Chloride by SM 4500 Cl B
Coal	FC101R-CO02GRXX	mg/kg	S	Fluoride		903	B	22.9	98	94	80	120	20	4.2	Fluoride by EPA 340.2
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Aluminum		113000		68.9	79	181 Q	75	125	20	78 Q	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Aluminum		115000		68.9	83	184 Q	75	125	20	78 Q	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Antimony		740		17.8	87	92	75	125	20	5.8	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Antimony		784		17.8	92	94	75	125	20	2.2	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Arsenic		1000		14.5	108	105	75	125	20	2.8	Arsenic by SW7060
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Barium		3480		0.528	123	32 Q	75	125	20	117 Q	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Barium		3440		0.528	119	29 Q	75	125	20	122 Q	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Beryllium		770		0.537	84	88	75	125	20	4.6	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Beryllium		775		0.537	85	89	75	125	20	4.8	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Cadmium		934		77.8	102	98	75	125	20	4.0	Cadmium by SW7131
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Cadmium		755		2.62	83	90	75	125	20	8.1	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Cadmium		760		2.62	84	91	75	125	20	6.0	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Calcium		55700		217	83	105	75	125	20	23 Q	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Calcium		56300		217	84	105	75	125	20	22 Q	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Chloride		963		20	84	85	80	120	20	1.2	Chloride, potentiometric
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Chromium		836		2.49	89	94	75	125	20	5.5	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Chromium		833		2.49	89	94	75	125	20	5.5	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Cobalt		776		4.76	85	89	75	125	20	4.6	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Cobalt		771		4.76	84	89	75	125	20	5.8	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Copper		831		2.25	89	92	75	125	20	3.3	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Copper		824		2.25	88	92	75	125	20	4.4	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Fluoride		19.9		0.937	28 Q	32 Q	80	120	20	13	Fluoride by EPA 340.2
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Fluoride		237		9.08	64 Q	76 Q	80	120	20	158 Q	Fluoride by EPA 340.2
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Fluoride		18.6		0.468	25 Q	34 Q	80	120	20	30 Q	Fluoride by EPA 340.2
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Fluoride		28.1		0.47	120	120	80	120	20	0	Fluoride by EPA 340.2
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Iron		65400		284	93	98	75	125	20	5.2	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Iron		65800		284	94	99	75	125	20	5.2	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Lead		803		22.5	87	93	75	125	20	6.7	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Lead		799		22.5	87	93	75	125	20	6.7	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Lead		882		20.2	92	89	75	125	20	3.3	Lead by SW7421
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Magnesium		40500		24.9	83	94	75	125	20	12	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Magnesium		40900		24.9	84	94	75	125	20	11	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Manganese		1020		0.108	86	80	75	125	20	4.6	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Manganese		1020		0.108	88	80	75	125	20	4.6	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Mercury		0.525		0.012	101	100	75	125	20	1.00	Mercury, cold vapor SW7471
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Molybdenum		779		2.39	88	80	75	125	20	4.6	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Molybdenum		769		2.39	85	80	75	125	20	5.7	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Nickel		783		9.95	85	90	75	125	20	5.7	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Nickel		784		9.95	85	91	75	125	20	8.8	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Nickel		793		21.5	85	84	75	125	20	1.2	Nickel by GF, EPA 249.2
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Phosphorus		9290		66.5	101	103	75	125	20	2.0	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Potassium		44800		316	88	94	75	125	20	8.9	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Potassium		44900		316	87	94	75	125	20	7.7	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Selenium		912		13	99	100	75	125	20	1.0	Selenium by SW7740
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Sodium		49900		23.8	92	98	75	125	20	6.3	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Sodium		49400		23.8	90	97	75	125	20	7.5	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Sulfur		638		280	-18 Q	-30 Q	75	125	20	50 Q	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Sulfur		455		280	-38 Q	-35 Q	75	125	20	8.2	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Titanium		5090		1.68	124	127 Q	75	125	20	2.4	ICP analysis by SW6010

Table E-2 (Continued)

Sample type	Client ID	Units	Matrix	Analyte	Res. Flag	Result	Comm.	Det. Lim	Spk Rcvry	Spk Dup R'y	L Spec	U Spec	RPD Spec	Spk Dup RPD	Method Code
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Titanium		5060		1.68	121	124	75	125	20	2.4	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Vanadium		867		3.92	88	92	75	125	20	4.4	ICP analysis by SW6010
Baghouse ash (Fly ash)	FC101R-FA02GCXX	mg/kg	S	Vanadium		859		3.92	87	92	75	125	20	5.6	ICP analysis by SW6010
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Aluminum		944		7.33	90	91	75	125	20	1.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Antimony		90.9		1.93	99	108	75	125	20	6.8	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Barium		99.8		0.0579	93	94	75	125	20	1.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Beryllium		89.3		0.0589	89	90	75	125	20	1.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Cadmium		81.6 B		0.787	81	84	75	125	20	3.6	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Calcium		1000 B		23.8	98	98	75	125	20	2.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Chromium		94.2 B		0.273	93	95	75	125	20	2.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Cobalt		87.3 B		0.572	87	88	75	125	20	1.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Copper		91.5 B		0.247	91	92	75	125	20	1.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Iron		940 B		31.1	92	93	75	125	20	1.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Lead		97.1		2.47	88	89	75	125	20	1.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Magnesium		888 B		2.73	88	89	75	125	20	1.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Manganese		89.8		0.0118	89	91	75	125	20	2.2	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Molybdenum		97.5		0.282	90	91	75	125	20	1.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Nickel		88.9 B		1.09	88	90	75	125	20	2.2	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Potassium		1800 B		34.8	89	90	75	125	20	1.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Sodium		893 B		2.59	94	96	75	125	20	2.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Sulfur		57.4 B		30.7	-1.6 Q	-4.2 Q	75	125	20	90 Q	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Titanium		92.5 B		0.184	92	92	75	125	20	0	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 07 SPIKE	ug	T	Vanadium		91.9 B		0.43	92	93	75	125	20	1.1	BIF ICP for Metals Trains
FGD inlet anions impinger	FC101R-HG02ANCI	ug/sample	W	Chloride, IC BIF		59000		1.26	102	100	80	120	10	2.0	Chloride (BIF), IC
FGD inlet anions impinger	FC101R-HG02ANCI	ug/sample	W	Fluoride		30900 B		429	101	108	80	120	20	4.8	Fluoride by EPA 340 2
FGD inlet anions impinger	FC101R-HG02ANCI	ug/sample	W	Sulfate		8290000		12	110	99	80	120	20	10	Sulfate, EPA 300 0
FGD inlet anions particulate	FC101R-HG02ANWR,HG02ANFL	mg/L	W	Chloride		1290		0.574	97	106	80	120	20	6.9	Chloride, by IC EPA300
FGD inlet anions particulate	FC101R-HG02ANWR,HG02ANFL	ug/sample	W	Fluoride		408 B		6.74	95	98	80	120	20	3.1	Fluoride by EPA 340 2
FGD inlet anions particulate	FC101R-HG02ANWR,HG02ANFL	ug/sample	W	Sulfate		6150		17.2	87	99	80	120	20	9.8	Sulfate, EPA 300 0
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Aluminum		20400		8.06	214 Q	239 Q	85	115	20	11	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Aluminum		20500		8.06	221 Q	236 Q	85	115	20	6.6	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Antimony		81.6		2.12	103	113	85	115	20	9.3	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Antimony		84.1		2.12	106	94	85	115	20	12	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Arsenic		4.49		0.237	120 Q	139 Q	85	115	20	15	BIF As for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Arsenic		16.3		1.18	111	123 Q	85	115	20	10	BIF As for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Barium		715		0.0837	94	96	85	115	20	2.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Barium		721		0.0537	100	102	85	115	20	2.0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Beryllium		87.3		0.0648	95	97	85	115	20	2.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Beryllium		88.8		0.0648	97	95	85	115	20	2.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Cadmium		3.03		0.169	86	91	85	115	20	5.6	BIF Cd for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Cadmium		81.9		0.316	89	91	85	115	20	2.2	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Cadmium		83.3		0.316	91	90	85	115	20	1.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Calcium		4660		26.2	176 Q	134 Q	85	115	20	6.2	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Calcium		4690		26.2	130 Q	130 Q	85	115	20	0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Chromium		105		0.3	100	102	85	115	20	2.0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Chromium		108		0.3	102	100	85	115	20	2.0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Cobalt		87.2		0.574	93	96	85	115	20	3.2	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Cobalt		88.6		0.574	95	94	85	115	20	1.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Copper		105		0.272	97	100	85	115	20	3.0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Copper		107		0.272	99	97	85	115	20	2.0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Iron		5750		34.2	98	99	85	115	20	3.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Iron		5790		34.2	101	101	85	115	20	0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Lead		123		2.72	100	97	85	115	20	3.0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Lead		118		2.72	94	97	85	115	20	3.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Lead		23.7		0.32	80 Q	83	85	115	20	3.7	BIF Pb for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Lead		24		0.32	83 Q	77 Q	85	115	20	7.5	BIF Pb for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Magnesium		1830		3	102	102	85	115	20	0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Magnesium		1810		3	100	104	85	115	20	3.9	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Manganese		132		0.043	98	97	85	115	20	1.0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Manganese		131		0.013	98	89	85	115	20	3.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	S	Mercury		0.554		0.0048	113	114	85	115	20	0.88	Mercury, cold vapor SW7471
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Molybdenum		103		0.288	98	100	85	115	20	4.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Molybdenum		105		0.288	99	98	85	115	20	1.0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Nickel		96.2		1.2	94	94	85	115	20	0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Nickel		98.2		1.2	94	98	85	115	20	4.2	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Nickel		22.1		0.468	92	91	85	115	20	1.1	BIF Ni for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Potassium		2990		38.1	98	96	85	115	20	2.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Potassium		2980		38.1	98	98	85	115	20	0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Selenium		17		0.787	91	90	85	115	20	1.1	BIF Se for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Sodium		3530		2.85	97	100	85	115	20	3.0	BIF ICP for Metals Trains

Table E-2 (Continued)

Sample type	Client ID	Units	Matrix	Analyte	Res Flag	Result	Comm.	Det. Lim	Spk Rcvry	Spk Dup R'y	L Spec	U Spec	RPD Spec	Spk Dup RPD	Method Code
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Sodium		3570		2.85	101	101	85	115	20	0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Sulfur		1350		33.8	91	94	85	115	20	3.2	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Sulfur		1370		33.8	93	88	85	115	20	5.5	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Titanium		968		0.202	87	90	85	115	20	3.4	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Titanium		975		0.202	95	98	85	115	20	3.1	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Vanadium		114		0.473	101	100	85	115	20	1.00	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG02MMNP,AP,FL	ug	T	Vanadium		112		0.473	98	101	85	115	20	3.0	BIF ICP for Metals Trains
FGD inlet metals particulate	FC101R-HG03MMNP,AP,FL	ug	T	Phosphorus		1160		7.29	94	95	85	115	20	1.1	BIF ICP for Metals Trains
Process water	FC101R-RW02GRXX	mg/L	W	Aluminum		10.8		0.0284	95	96	75	125	20	1.0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Aluminum		11		0.0284	98	99	75	125	20	1.0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Antimony		0.865		0.0241	87	88	75	125	20	1.2	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Antimony		0.835		0.0241	84	79	75	125	20	6.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Arsenic		0.0601		0.00197	62 Q	60 Q	75	125	20	3.3	Arsenic by SW7060
Process water	FC101R-RW02GRXX	mg/L	W	Arsenic		0.0536		0.00197	69 Q	63 Q	75	125	20	9.1	Arsenic by SW7060
Process water	FC101R-RW02GRXX	mg/L	W	Barium		1.18		0.00053	92	94	75	125	20	2.2	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Barium		1.15		0.00053	89	90	75	125	20	1.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Beryllium		0.938		0.000554	94	94	75	125	20	0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Beryllium		0.965		0.000554	96	98	75	125	20	2.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Cadmium		0.0432		0.0031	106	100	75	125	20	5.8	Cadmium by SW7131
Process water	FC101R-RW02GRXX	mg/L	W	Cadmium		0.872		0.00172	87	88	75	125	20	1.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Cadmium		0.857		0.00172	85	85	75	125	20	0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Calcium		598		0.148	-31 Q	98	75	125	20	385 Q	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Calcium		609		0.148	98	303 Q	75	125	20	102 Q	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Chloride		2050		4	111	116	80	120	20	4.4	Chloride, by IC EPA300
Process water	FC101R-RW02GRXX	mg/L	W	Chromium		0.867		0.00249	88	85	75	125	20	0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Chromium		0.883		0.00249	88	89	75	125	20	1.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Cobalt		0.839		0.0034	84	84	75	125	20	0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Cobalt		0.83		0.0034	83	82	75	125	20	1.2	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Copper		0.932		0.00381	92	91	75	125	20	1.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Copper		0.955		0.00381	94	95	75	125	20	1.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Fluoride		22.3	B	0.47	101	98	80	120	20	3.0	Fluoride by EPA 340.2
Process water	FC101R-RW02GRXX	mg/L	W	Iron		9.33		0.00598	88	89	75	125	20	1.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Iron		9.13		0.00598	88	86	75	125	20	0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Lead		0.772		0.027	82	79	75	125	20	3.7	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Lead		0.841		0.027	89	88	75	125	20	1.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Lead		0.0415		0.0072	90	91	75	125	20	1.1	Lead by SW7421
Process water	FC101R-RW02GRXX	mg/L	W	Magnesium		389		0.0228	92	224 Q	75	125	20	84 Q	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Magnesium		380		0.0228	10 Q	90	75	125	20	150 Q	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Manganese		1.35		0.000395	84	84	75	125	20	0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Manganese		1.38		0.000395	87	90	75	125	20	3.4	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Mercury		0.00161		0.000048	31 Q	32 Q	75	125	20	3.2	Mercury, cold vapor SW7470
Process water	FC101R-RW02GRXX	mg/L	W	Mercury		0.00162		0.000048	32 Q	32 Q	75	125	20	0	Mercury, cold vapor SW7470
Process water	FC101R-RW02GRXX	mg/L	W	Molybdenum		1.09		0.00463	86	88	75	125	20	2.3	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Molybdenum		1.06		0.00463	83	84	75	125	20	1.2	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Nickel		0.98		0.00986	83	86	75	125	20	3.6	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Nickel		0.983		0.00986	83	83	75	125	20	0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Nickel		0.192		0.00728	113	105	75	125	20	7.3	Nickel by GF, EPA 249.2
Process water	FC101R-RW02GRXX	mg/L	W	Phosphorus		10.3		0.081	101	94	75	125	20	7.2	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Phosphorus		10.4		0.081	101	99	75	125	20	2.0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Potassium		83.3		0.37	89	93	75	125	20	4.4	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Potassium		84.4		0.37	95	103	75	125	20	8.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Selenium		0.0176		0.000843	11 Q	5.8 Q	75	125	20	65 Q	Selenium by SW7740
Process water	FC101R-RW02GRXX	mg/L	W	Selenium		0.0187		0.000843	13 Q	14 Q	75	125	20	7.4	Selenium by SW7740
Process water	FC101R-RW02GRXX	mg/L	W	Sodium		532		0.0397	-7.0 Q	105	75	125	20	229 Q	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Sodium		543		0.0397	105	291 Q	75	125	20	94 Q	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Sulfate		5680		12	102	93	80	120	20	9.2	Sulfate, EPA 300.0
Process water	FC101R-RW02GRXX	mg/L	W	Sulfur		1410		0.0252	-1100	900 Q	75	125	20	2000 Q	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Sulfur		1440		0.0252	1400 Q	5300 Q	75	125	20	116 Q	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Titanium		0.973		0.00102	93	94	75	125	20	1.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Titanium		0.95		0.00102	91	90	75	125	20	1.1	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Vanadium		1.01		0.00238	87	87	75	125	20	0	ICP analysis by SW6010
Process water	FC101R-RW02GRXX	mg/L	W	Vanadium		1.03		0.00238	89	91	75	125	20	2.2	ICP analysis by SW6010
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Aluminum		5590		8.08	103	105	85	115	20	1.8	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Aluminum		5550		8.08	99	103	85	115	20	4.0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Antimony		81.2		2.12	98	94	85	115	20	2.1	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Antimony		81.7		2.12	98	94	85	115	20	2.1	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Arsenic		4.78		0.237	90	93	85	115	20	3.3	BIF As for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Barium		228		0.0837	108	108	85	115	20	1.9	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Barium		224		0.0837	102	105	85	115	20	2.9	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Beryllium		69.9		0.0846	99	99	85	115	20	0	BIF ICP for Metals Trains

Table E-2 (Continued)

Sample type	Client ID	Units	Matrix	Analyte	Res. Flag	Result	Comm.	Det. Lim	Spk Rcvry	Spk Dup R'y	L Spec	U Spec	RPD Spec	Spk Dup RPD	Method Code
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Beryllium		92.7		0.0848	102	101	85	115	20	0.98	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Cadmium		8.73		0.423	80 Q	82 Q	85	115	20	2.5	BIF Cd for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Cadmium		8.68		0.423	79 Q	78 Q	85	115	20	1.3	BIF Cd for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Cadmium		87.7		0.316	97	97	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Cadmium		89.8		0.316	95	94	85	115	20	1.1	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Calcium		3410		28.2	110	110	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Calcium		3370		28.2	107	108	85	115	20	0.93	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Chromium		108		0.3	107	107	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Chromium		105		0.3	103	104	85	115	20	0.97	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Cobalt		92.3		0.574	100	100	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Cobalt		89.1		0.574	97	98	85	115	20	1.0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Copper		99.8		0.272	101	102	85	115	20	0.98	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Copper		103		0.272	104	105	85	115	20	0.96	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Iron		2410		34.2	106	106	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Iron		2370		34.2	102	104	85	115	20	1.9	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Lead		107		2.72	98	98	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Lead		110		2.72	101	100	85	115	20	1.00	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Lead		9.88		0.18	88	103	85	115	20	16	BIF Pb for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Lead		9.68		0.18	82 Q	85	85	115	20	3.6	BIF Pb for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Magnesium		1300		3	101	100	85	115	20	1.00	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Magnesium		1270		3	98	98	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Manganese		107		0.013	103	103	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Manganese		105		0.013	100	100	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	S	Mercury		0.825		0.0048	94	94	85	115	20	0	Mercury, cold vapor SW7471
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Molybdenum		109		0.288	104	103	85	115	20	0.97	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Molybdenum		106		0.288	100	100	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Nickel		101		1.2	98	98	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Nickel		102		1.2	100	102	85	115	20	2.0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Nickel		19.9		0.468	84 Q	85	85	115	20	1.2	BIF Ni for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Potassium		2180		38.1	101	101	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Potassium		2180		38.1	101	101	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Selenium		17.6		0.282	97	99	85	115	20	2.0	BIF Se for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Sodium		1890		2.85	108	108	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Sodium		1860		2.85	103	104	85	115	20	0.97	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Sulfur		1700		33.8	98	95	85	115	20	3.1	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Sulfur		1700		33.8	98	93	85	115	20	5.2	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Titanium		304		0.202	104	104	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Titanium		299		0.202	99	102	85	115	20	3.0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Vanadium		103		0.473	105	105	85	115	20	0	BIF ICP for Metals Trains
Stack metals particulate fra	FC101R-SG01MMNP,AP,FL	ug	T	Vanadium		99.7		0.473	102	102	85	115	20	0	BIF ICP for Metals Trains
Stack anions impinger	FC101R-SG02ANCI	ug/sample	W	Chloride, IC BIF		20100		0.63	114	111	80	120	10	2.7	Chloride (BIF), IC
Stack anions impinger	FC101R-SG02ANCI	ug/sample	W	Fluoride		12400	B	272	100	103	80	120	20	3.0	Fluoride by EPA 340.2
Stack anions impinger	FC101R-SG02ANCI	ug/sample	W	Sulfate		4050000		12	100	101	80	120	20	1.00	Sulfate, EPA 300.0
Stack anions particulate fra	FC101R-SG02ANWR,SG02ANFL	mg/L	W	Chloride		1150		0.416	102	111	80	120	20	8.4	Chloride, by IC EPA300
Stack anions particulate fra	FC101R-SG02ANWR,SG02ANFL	ug/sample	W	Fluoride		780	B	9.78	108	99	80	120	20	6.8	Fluoride by EPA 340.2
Stack anions particulate fra	FC101R-SG02ANWR,SG02ANFL	ug/sample	W	Sulfate		5440		17.5	90	101	80	120	20	12	Sulfate, EPA 300.0
Stack metals KMnO4 impin	FC101R-SG03MMMI	mg/L	W	Mercury		0.00869		0.000048	87	86	75	125	20	1.2	Mercury, cold vapor SW7470
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Aluminum		8.97		0.0284	99	97	75	125	20	2.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Aluminum		9.92		0.0284	99	98	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Antimony		1.03		0.0241	99	91	75	125	20	8.4	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Antimony		0.976		0.0241	94	96	75	125	20	2.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Arsenic		0.0495		0.000657	99	100	75	125	20	1.0	Arsenic by SW7060
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Arsenic		0.942		0.0225	96	94	75	125	20	2.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Arsenic		0.98		0.0225	100	96	75	125	20	4.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Barium		0.998		0.00053	99	96	75	125	20	3.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Barium		0.987		0.00053	98	97	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Beryllium		1.02		0.000554	102	101	75	125	20	0.98	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Beryllium		1.02		0.000554	102	99	75	125	20	3.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Boron		6.94		0.015	128 Q	128 Q	75	125	20	0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Boron		6.95		0.015	128 Q	119	75	125	20	7.3	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Cadmium		0.0452		0.0031	112	106	75	125	20	5.5	Cadmium by SW7131
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Cadmium		0.981		0.00172	96	95	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Cadmium		0.969		0.00172	97	94	75	125	20	3.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Calcium		10.7		0.148	104	103	75	125	20	0.97	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Calcium		10.8		0.148	105	102	75	125	20	2.9	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Chromium		0.991		0.00249	99	98	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Chromium		1		0.00249	100	97	75	125	20	3.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Cobalt		0.958		0.0034	96	95	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Cobalt		0.987		0.0034	97	94	75	125	20	3.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Copper		1.01		0.00381	100	97	75	125	20	3.0	ICP analysis by SW6010

Table E-2 (Continued)

Sample type	Client ID	Units	Matrix	Analyte	Res. Flag	Result	Comm.	Det. Lim	Spk Rcvry	Spk Dup R'y	L Spec	U Spec	RPD Spec	Spk Dup RPD	Method Code
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Copper		0.996		0.00381	99	98	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Iron		9.83		0.00598	98	97	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Iron		9.91		0.00598	99	98	75	125	20	3.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Lead		0.965		0.027	98	95	75	125	20	3.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Lead		0.958		0.027	98	98	75	125	20	2.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Lead		0.0519		0.0008	105	108	75	125	20	0.95	Lead by SW7421
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Magnesium		9.93		0.0228	99	97	75	125	20	2.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Magnesium		9.92		0.0228	99	98	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Manganese		1.08		0.000395	98	98	75	125	20	2.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Manganese		1.07		0.000395	98	97	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Mercury		0.0272		0.00024	83	85	75	125	20	2.4	Mercury,HNO3/H2O2 Impinge
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Molybdenum		0.982		0.00463	98	95	75	125	20	3.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Molybdenum		0.968		0.00463	97	95	75	125	20	2.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Nickel		0.984		0.00986	98	98	75	125	20	0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Nickel		1		0.00986	99	97	75	125	20	2.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Nickel		0.0632		0.00182	97	98	75	125	20	1.0	Nickel by GF, EPA 249.2
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Phosphorus		10.3		0.061	103	103	75	125	20	0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Potassium		19.2		0.37	97	98	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Potassium		19.3		0.37	97	94	75	125	20	3.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Selenium		0.958		0.0417	95	98	75	125	20	3.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Selenium		0.968		0.0417	96	95	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Selenium		0.0239	X	0.000643	44 Q	51 Q	75	125	20	15	Selenium by SW7740
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Silicon		7.03		0.0273	100	89	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Silicon		7.04		0.0273	100	97	75	125	20	3.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Silver		0.991		0.00492	99	98	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Silver		0.995		0.00492	100	97	75	125	20	3.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Sodium		10.8		0.0397	100	97	75	125	20	3.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Sodium		10.8		0.0397	100	98	75	125	20	2.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Strontium		0.887		0.000168	88	96	75	125	20	2.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Strontium		0.879		0.000168	88	97	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Thallium		0.917		0.0172	90	91	75	125	20	1.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Thallium		0.956		0.0172	94	84	75	125	20	0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Titanium		0.99		0.00102	99	98	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Titanium		0.998		0.00102	100	97	75	125	20	3.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Vanadium		0.976		0.00236	98	97	75	125	20	1.0	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Vanadium		0.983		0.00236	98	96	75	125	20	2.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Zinc		0.879		0.00153	97	94	75	125	20	3.1	ICP analysis by SW6010
Stack metals nitric impinger	FC101R-SG03MMNI	mg/L	W	Zinc		0.978		0.00153	87	85	75	125	20	2.1	ICP analysis by SW6010
Stack metals particulate fra	FC101R-SG03MMNP AP FL	ug	F	Phosphorus		1040		7.29	98	99	85	115	20	2.1	BIF ICP for Metals Trains

Table E-3
Laboratory Control Sample Results

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LCS Group	Matrix	Analyte	Count	Min Rec	Max Rec	Avg Rec	< Low Lim	> Up Lim	Dup RPD	> Dup RPD	Meth	Low Lim	Up Lim	RPD Lim
Anion Impingers	S	Chloride	2	105	107	106	0	0	2	0	IC	80	120	20
Anion Impingers	W	Chloride, IC BIF	2	94	95	95	0	0	1	0	IC	80	120	20
Anion Impingers	W	Sulfate	2	98	99	99	0	0	1	0	IC	80	120	20
Anion Impingers	W	Fluoride	2	98	102	100	0	0	4	0	SIE	80	120	20
Anion Solids	W	Chloride	2	100	101	101	0	0	0	0	IC	80	120	20
Anion Solids	W	Sulfate	2	99	99	99	0	0	0	0	IC	80	120	20
Anion Solids	W	Fluoride	2	98	99	99	0	0	1	0	SIE	80	120	20
Ashes	S	Arsenic	2	104	107	106	0	0	3	0	GFAA	75	125	20
Ashes	S	Cadmium	2	104	109	107	0	0	5	0	GFAA	75	125	20
Ashes	W	Lead	2	89	92	91	0	0	3	0	GFAA	75	125	20
Ashes	W	Nickel	2	86	88	87	0	0	3	0	GFAA	75	125	20
Ashes	S	Selenium	2	96	97	97	0	0	1	0	GFAA	75	125	20
Ashes	W	Aluminum	2	84	85	85	0	0	1	0	ICAP	75	125	20
Ashes	W	Antimony	2	80	83	81	0	0	4	0	ICAP	75	125	20
Ashes	W	Barium	2	87	88	88	0	0	0	0	ICAP	75	125	20
Ashes	W	Beryllium	2	83	83	83	0	0	0	0	ICAP	75	125	20
Ashes	W	Cadmium	2	82	82	82	0	0	0	0	ICAP	75	125	20
Ashes	W	Calcium	2	89	90	90	0	0	0	0	ICAP	75	125	20
Ashes	W	Chromium	2	88	89	89	0	0	1	0	ICAP	75	125	20
Ashes	W	Cobalt	2	83	84	84	0	0	0	0	ICAP	75	125	20
Ashes	W	Copper	2	86	86	86	0	0	1	0	ICAP	75	125	20
Ashes	W	Iron	2	87	87	87	0	0	0	0	ICAP	75	125	20
Ashes	W	Lead	2	82	84	83	0	0	2	0	ICAP	75	125	20
Ashes	W	Magnesium	2	84	84	84	0	0	1	0	ICAP	75	125	20
Ashes	W	Manganese	2	85	85	85	0	0	0	0	ICAP	75	125	20
Ashes	W	Molybdenum	2	83	84	83	0	0	1	0	ICAP	75	125	20
Ashes	W	Nickel	2	83	85	84	0	0	2	0	ICAP	75	125	20
Ashes	W	Phosphorus	2	98	98	98	0	0	0	0	ICAP	75	125	20
Ashes	W	Phosphorus	2	0	0	0	2	0	0	0	ICAP	75	125	20
Ashes	W	Potassium	2	83	84	84	0	0	0	0	ICAP	75	125	20
Ashes	W	Sodium	2	87	88	88	0	0	1	0	ICAP	75	125	20
Ashes	W	Sulfur	2	3	5	4	2	0	75	0	ICAP	75	125	20
Ashes	W	Titanium	2	85	85	85	0	0	0	0	ICAP	75	125	20
Ashes	W	Vanadium	2	85	85	85	0	0	0	0	ICAP	75	125	20
Ashes	S	Chloride	2	100	101	101	0	0	0	0	SIE	80	120	20
Ashes	S	Fluoride	2	91	94	92	0	0	3	0	SIE	80	120	20
Ashes	S	Fluoride	2	81	84	82	0	0	4	0	SIE	80	120	20
Ashes	S	Sulfur	2	95	96	95	0	0	1	0	tot S	75	125	20
Ashes	S	Arsenic	2	106	107	107	0	0	1	0	GFAA	75	125	20

Table E-3 (Continued)

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LCS Group	Matrix	Analyte	Count	Min Rec	Max Rec	Avg Rec	< Low Lim	> Up Lim	Dup RPD	> Dup RPD	Meth	Low Lim	Up Lim	RPD Lim
Ashes	S	Cadmium	2	79	101	90	0	0	25	0	GFAA	75	125	20
Ashes	S	Lead	2	68	68	67	2	0	3	0	GFAA	75	125	20
Ashes	S	Nickel	2	90	94	92	0	0	5	0	GFAA	75	125	20
Ashes	S	Selenium	2	122	128	124	0	1	3	0	GFAA	75	125	20
Ashes	S	Aluminum	2	53	57	55	2	0	7	0	ICAP	75	125	20
Ashes	S	Barium	2	58	65	61	2	0	11	0	ICAP	75	125	20
Ashes	S	Beryllium	2	84	88	86	0	0	4	0	ICAP	75	125	20
Ashes	S	Calcium	2	50	56	53	2	0	12	0	ICAP	75	125	20
Ashes	S	Chromium	2	84	88	86	0	0	4	0	ICAP	75	125	20
Ashes	S	Cobalt	2	79	80	79	0	0	2	0	ICAP	75	125	20
Ashes	S	Copper	2	73	76	74	1	0	4	0	ICAP	75	125	20
Ashes	S	Iron	2	79	81	80	0	0	3	0	ICAP	75	125	20
Ashes	S	Magnesium	2	34	44	39	2	0	26	0	ICAP	75	125	20
Ashes	S	Manganese	2	66	74	70	2	0	11	0	ICAP	75	125	20
Ashes	S	Nickel	2	72	78	75	1	0	9	0	ICAP	75	125	20
Ashes	S	Potassium	2	73	74	74	2	0	2	0	ICAP	75	125	20
Ashes	S	Sodium	2	81	84	83	0	0	4	0	ICAP	75	125	20
Ashes	S	Sulfur	2	85	102	94	0	0	18	0	ICAP	75	125	20
Ashes	S	Titanium	2	89	93	91	0	0	4	0	ICAP	75	125	20
Ashes	S	Vanadium	2	88	89	87	0	0	3	0	ICAP	75	125	20
Ashes	S	Mercury	2	106	108	107	0	0	2	0	CVAA	75	125	20
Coal	S	Chloride	2	94	98	96	0	0	4	0	IC	80	120	20
Coal	S	Fluoride	2	77	78	78	0	0	2	0	SIE	80	120	20
Gas Nitric Acid Impi	W	Mercury	2	112	113	112	0	0	1	0	CVAA	75	125	20
Gas Nitric Acid Impi	W	Arsenic	2	101	101	101	0	0	0	0	GFAA	75	125	20
Gas Nitric Acid Impi	W	Cadmium	2	103	110	106	0	0	6	0	GFAA	75	125	20
Gas Nitric Acid Impi	W	Lead	2	104	106	105	0	0	2	0	GFAA	75	125	20
Gas Nitric Acid Impi	W	Nickel	2	104	109	107	0	0	5	0	GFAA	75	125	20
Gas Nitric Acid Impi	W	Selenium	2	99	100	100	0	0	1	0	GFAA	75	125	20
Gas Nitric Acid Impi	W	Selenium	2	99	102	100	0	0	3	0	GFAA	75	125	20
Gas Nitric Acid Impi	W	Aluminum	2	99	100	99	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Antimony	2	96	100	98	0	0	4	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Arsenic	2	96	96	96	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Barium	2	98	100	99	0	0	2	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Beryllium	2	100	102	101	0	0	2	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Boron	2	104	105	105	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Cadmium	2	96	97	97	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Calcium	2	104	105	105	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Chromium	2	99	100	99	0	0	1	0	ICAP	75	125	20

Table E-3 (Continued)

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LCS Group	Matrix	Analyte	Count	Min Rec	Max Rec	Avg Rec	< Low Lim	> Up Lim	Dup RPD	> Dup RPD	Meth	Low Lim	Up Lim	RPD Lim
Gas Nitric Acid Impi	W	Cobalt	2	95	98	96	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Copper	2	98	100	99	0	0	2	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Iron	2	98	99	98	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Lead	2	93	97	95	0	0	4	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Magnesium	2	99	100	99	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Manganese	2	97	98	98	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Molybdenum	2	97	99	98	0	0	2	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Nickel	2	96	100	98	0	0	4	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Phosphorus	2	106	106	106	0	0	0	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Potassium	2	94	95	94	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Selenium	2	100	100	100	0	0	0	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Silicon	2	99	99	99	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Silver	2	100	100	100	0	0	0	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Sodium	2	99	100	100	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Strontium	2	97	99	98	0	0	2	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Thallium	2	92	97	94	0	0	5	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Titanium	2	99	100	100	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Vanadium	2	97	98	98	0	0	1	0	ICAP	75	125	20
Gas Nitric Acid Impi	W	Zinc	2	97	98	97	0	0	1	0	ICAP	75	125	20
Gas Permanganate Imp	W	Mercury	2	104	108	106	0	0	4	0	CVAA	75	125	20
Gas Solids	W	Mercury	2	110	110	110	0	0	0	0	CVAA	75	125	20
Gas Solids	W	Arsenic	2	97	104	101	0	0	7	0	GFAA	75	125	20
Gas Solids	W	Cadmium	2	104	106	105	0	0	2	0	GFAA	75	125	20
Gas Solids	W	Cadmium	2	102	105	104	0	0	3	0	GFAA	75	125	20
Gas Solids	W	Lead	2	103	103	103	0	0	0	0	GFAA	75	125	20
Gas Solids	T	Nickel	2	98	109	104	0	0	10	0	GFAA	75	125	20
Gas Solids	W	Selenium	2	93	94	93	0	0	1	0	GFAA	75	125	20
Gas Solids	W	Chloride	2	100	101	101	0	0	0	0	IC	80	120	20
Gas Solids	W	Sulfate	2	99	99	99	0	0	0	0	IC	80	120	20
Gas Solids	W	Aluminum	2	93	93	93	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Antimony	2	92	93	93	0	0	1	0	ICAP	75	125	20
Gas Solids	W	Barium	2	95	95	95	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Beryllium	2	91	91	91	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Cadmium	2	85	88	85	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Calcium	2	98	98	98	0	0	1	0	ICAP	75	125	20
Gas Solids	W	Chromium	2	96	98	96	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Cobalt	2	90	90	90	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Copper	2	94	94	94	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Iron	2	95	96	95	0	0	0	0	ICAP	75	125	20

Table E-3 (Continued)

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LCS Group	Matrix	Analyte	Count	Min Rec	Max Rec	Avg Rec	< Low Lim	> Up Lim	Dup RPD	> Dup RPD	Meth	Low Lim	Up Lim	RPD Lim
Gas Solids	W	Lead	2	91	94	92	0	0	4	0	ICAP	75	125	20
Gas Solids	W	Magnesium	2	92	92	92	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Manganese	2	92	92	92	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Molybdenum	2	92	93	92	0	0	2	0	ICAP	75	125	20
Gas Solids	W	Nickel	2	92	93	92	0	0	1	0	ICAP	75	125	20
Gas Solids	W	Phosphorus	2	101	102	102	0	0	1	0	ICAP	75	125	20
Gas Solids	W	Potassium	2	94	94	94	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Sodium	2	105	114	110	0	0	8	0	ICAP	75	125	20
Gas Solids	W	Sulfur	2	3	5	4	2	0	87	0	ICAP	75	125	20
Gas Solids	W	Titanium	2	93	93	93	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Vanadium	2	93	93	93	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Fluoride	2	98	99	99	0	0	1	0	SIE	80	120	20
Gas Solids	S	Arsenic	2	116	117	116	0	0	1	0	GFAA	75	125	20
Gas Solids	W	Cadmium	2	102	112	107	0	0	9	0	GFAA	75	125	20
Gas Solids	W	Cadmium	2	90	92	91	0	0	2	0	GFAA	75	125	20
Gas Solids	W	Lead	2	82	85	83	0	0	3	0	GFAA	75	125	20
Gas Solids	S	Nickel	2	109	110	110	0	0	1	0	GFAA	75	125	20
Gas Solids	S	Selenium	2	121	131	126	0	1	8	0	GFAA	75	125	20
Gas Solids	W	Aluminum	2	73	86	79	1	0	17	0	ICAP	75	125	20
Gas Solids	W	Barium	2	75	79	77	0	0	5	0	ICAP	75	125	20
Gas Solids	W	Beryllium	2	93	93	93	0	0	1	0	ICAP	75	125	20
Gas Solids	W	Calcium	2	75	90	82	1	0	18	0	ICAP	75	125	20
Gas Solids	W	Chromium	2	93	93	93	0	0	0	0	ICAP	75	125	20
Gas Solids	W	Cobalt	2	89	93	91	0	0	4	0	ICAP	75	125	20
Gas Solids	W	Copper	2	85	86	86	0	0	2	0	ICAP	75	125	20
Gas Solids	W	Iron	2	90	93	91	0	0	4	0	ICAP	75	125	20
Gas Solids	W	Magnesium	2	64	79	71	1	0	21	0	ICAP	75	125	20
Gas Solids	W	Manganese	2	79	88	84	0	0	10	0	ICAP	75	125	20
Gas Solids	W	Nickel	2	91	98	94	0	0	8	0	ICAP	75	125	20
Gas Solids	W	Potassium	2	88	91	90	0	0	4	0	ICAP	75	125	20
Gas Solids	W	Sodium	2	163	212	188	0	2	26	0	ICAP	75	125	20
Gas Solids	W	Sulfur	2	101	121	111	0	0	18	0	ICAP	75	125	20
Gas Solids	W	Titanium	2	95	97	96	0	0	2	0	ICAP	75	125	20
Gas Solids	W	Vanadium	2	93	94	94	0	0	1	0	ICAP	75	125	20
Gas Solids	S	Mercury	2	109	111	110	0	0	2	0	CVAA	75	125	20
Gas Solids	T	Arsenic	2	98	97	97	0	0	1	0	GFAA	75	125	20
Gas Solids	T	Arsenic	2	105	105	105	0	0	0	0	GFAA	75	125	20
Gas Solids	S	Cadmium	2	103	104	104	0	0	1	0	GFAA	75	125	20
Gas Solids	T	Lead	2	98	99	97	0	0	3	0	GFAA	75	125	20

Table E-3 (Continued)

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LCS Group	Matrix	Analyte	Count	Min Rec	Max Rec	Avg Rec	< Low Lim	> Up Lim	Dup RPD	> Dup RPD	Meth	Low Lim	Up Lim	RPD Lim
Gas Solids	T	Nickel	2	98	99	98	0	0	0	0	GFAA	75	125	20
Gas Solids	T	Selenium	2	97	99	98	0	0	2	0	GFAA	75	125	20
Gas Solids	T	Arsenic	2	96	97	97	0	0	1	0	ICAP	75	125	20
Gas Solids	T	Arsenic	2	105	105	105	0	0	0	0	ICAP	75	125	20
Gas Solids	T	Phosphorus	2	101	101	101	0	0	0	0	ICAP	75	125	20
Solids	W	Arsenic	2	98	99	99	0	0	0	0	GFAA	75	125	20
Solids	S	Cadmium	2	99	104	101	0	0	5	0	GFAA	75	125	20
Solids	W	Lead	2	99	100	100	0	0	1	0	GFAA	75	125	20
Solids	W	Nickel	2	96	100	98	0	0	4	0	GFAA	75	125	20
Solids	W	Selenium	2	93	97	95	0	0	4	0	GFAA	75	125	20
Solids	S	Chloride	2	105	107	106	0	0	2	0	IC	80	120	20
Solids	W	Aluminum	2	88	90	89	0	0	1	0	ICAP	75	125	20
Solids	W	Antimony	2	83	89	86	0	0	7	0	ICAP	75	125	20
Solids	W	Barium	2	84	86	85	0	0	2	0	ICAP	75	125	20
Solids	W	Beryllium	2	84	86	85	0	0	2	0	ICAP	75	125	20
Solids	W	Cadmium	2	80	82	81	0	0	2	0	ICAP	75	125	20
Solids	W	Calcium	2	94	95	94	0	0	2	0	ICAP	75	125	20
Solids	W	Chromium	2	86	88	87	0	0	2	0	ICAP	75	125	20
Solids	W	Cobalt	2	82	83	83	0	0	2	0	ICAP	75	125	20
Solids	W	Copper	2	85	86	85	0	0	1	0	ICAP	75	125	20
Solids	W	Iron	2	84	85	85	0	0	2	0	ICAP	75	125	20
Solids	W	Lead	2	86	89	87	0	0	4	0	ICAP	75	125	20
Solids	W	Magnesium	2	89	90	89	0	0	2	0	ICAP	75	125	20
Solids	W	Manganese	2	83	85	84	0	0	2	0	ICAP	75	125	20
Solids	W	Molybdenum	2	87	88	88	0	0	1	0	ICAP	75	125	20
Solids	W	Nickel	2	83	84	83	0	0	1	0	ICAP	75	125	20
Solids	W	Phosphorus	2	98	99	98	0	0	0	0	ICAP	75	125	20
Solids	W	Potassium	2	83	85	84	0	0	2	0	ICAP	75	125	20
Solids	W	Sodium	2	89	91	90	0	0	2	0	ICAP	75	125	20
Solids	W	Sulfur	2	2	2	2	2	0	29	0	ICAP	75	125	20
Solids	W	Titanium	2	88	90	89	0	0	2	0	ICAP	75	125	20
Solids	W	Vanadium	2	85	86	85	0	0	2	0	ICAP	75	125	20
Solids	S	Chloride	2	100	101	101	0	0	0	0	SIE	80	120	20
Solids	S	Chloride	2	101	101	101	0	0	0	0	SIE	80	120	20
Solids	S	Fluoride	2	91	84	92	0	0	3	0	SIE	80	120	20
Solids	S	Fluoride	2	95	103	99	0	0	9	0	SIE	80	120	20
Solids	S	Fluoride	2	88	90	89	0	0	2	0	SIE	80	120	20
Solids	S	Sulfur	2	95	96	95	0	0	1	0	tot S	75	125	20
Solids	S	Mercury	2	106	108	107	0	0	2	0	CVAA	75	125	20

Table E-3 (Continued)

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LCS Group	Matrix	Analyte	Count	Min Rec	Max Rec	Avg Rec	< Low Lim	> Up Lim	Dup RPD	> Dup RPD	Meth	Low Lim	Up Lim	RPD Lim
Solids	S	Arsenic	2	114	123	118	0	0	7	0	GFAA	75	125	20
Solids	S	Cadmium	2	95	101	98	0	0	6	0	GFAA	75	125	20
Solids	S	Lead	2	88	91	90	0	0	2	0	GFAA	75	125	20
Solids	S	Nickel	2	93	95	94	0	0	2	0	GFAA	75	125	20
Solids	S	Selenium	2	98	99	99	0	0	1	0	GFAA	75	125	20
Solids	S	Aluminum	2	95	95	95	0	0	0	0	ICAP	75	125	20
Solids	S	Antimony	2	100	107	104	0	0	6	0	ICAP	75	125	20
Solids	S	Barium	2	82	82	82	0	0	0	0	ICAP	75	125	20
Solids	S	Beryllium	2	85	85	85	0	0	1	0	ICAP	75	125	20
Solids	S	Cadmium	2	85	85	85	0	0	1	0	ICAP	75	125	20
Solids	S	Calcium	2	98	97	98	0	0	1	0	ICAP	75	125	20
Solids	S	Chromium	2	79	79	79	0	0	0	0	ICAP	75	125	20
Solids	S	Cobalt	2	82	83	82	0	0	0	0	ICAP	75	125	20
Solids	S	Copper	2	81	81	81	0	0	0	0	ICAP	75	125	20
Solids	S	Iron	2	84	90	87	0	0	7	0	ICAP	75	125	20
Solids	S	Lead	2	79	80	79	0	0	1	0	ICAP	75	125	20
Solids	S	Magnesium	2	80	80	80	0	0	0	0	ICAP	75	125	20
Solids	S	Manganese	2	82	84	83	0	0	2	0	ICAP	75	125	20
Solids	S	Molybdenum	2	90	91	91	0	0	1	0	ICAP	75	125	20
Solids	S	Nickel	2	83	85	84	0	0	2	0	ICAP	75	125	20
Solids	S	Potassium	2	86	86	86	0	0	1	0	ICAP	75	125	20
Solids	S	Sodium	2	88	94	91	0	0	7	0	ICAP	75	125	20
Solids	S	Sulfur	2	0	0	0	2	0	0	0	ICAP	75	125	20
Solids	S	Titanium	2	0	0	0	2	0	0	0	ICAP	75	125	20
Solids	S	Vanadium	2	83	84	84	0	0	2	0	ICAP	75	125	20
Waters	W	Mercury	2	104	108	105	0	0	2	0	CVAA	75	125	20
Waters	W	Arsenic	2	98	100	99	0	0	2	0	GFAA	75	125	20
Waters	W	Arsenic	2	101	103	102	0	0	2	0	GFAA	75	125	20
Waters	W	Cadmium	2	100	101	101	0	0	1	0	GFAA	75	125	20
Waters	W	Lead	2	98	100	99	0	0	2	0	GFAA	75	125	20
Waters	W	Lead	2	94	96	95	0	0	1	0	GFAA	75	125	20
Waters	W	Lead	2	91	92	91	0	0	1	0	GFAA	75	125	20
Waters	W	Nickel	2	91	97	94	0	0	6	0	GFAA	75	125	20
Waters	W	Selenium	2	103	104	104	0	0	1	0	GFAA	75	125	20
Waters	W	Chloride	2	99	102	101	0	0	3	0	IC	80	120	20
Waters	W	Chloride, IC BIF	2	94	95	95	0	0	1	0	IC	80	120	20
Waters	W	Sulfate	2	96	96	96	0	0	0	0	IC	80	120	20
Waters	W	Aluminum	2	100	101	101	0	0	1	0	ICAP	75	125	20
Waters	W	Antimony	2	97	99	98	0	0	3	0	ICAP	75	125	20

Table E-3 (Continued)

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LCS Group	Matrix	Analyte	Count	Min Rec	Max Rec	Avg Rec	< Low Lim	> Up Lim	Dup RPD	> Dup RPD	Meth	Low Lim	Up Lim	RPD Lim
Waters	W	Barium	2	99	100	100	0	0	1	0	ICAP	75	125	20
Waters	W	Beryllium	2	102	104	103	0	0	2	0	ICAP	75	125	20
Waters	W	Cadmium	2	96	97	96	0	0	1	0	ICAP	75	125	20
Waters	W	Calcium	2	107	108	108	0	0	1	0	ICAP	75	125	20
Waters	W	Chromium	2	100	102	101	0	0	2	0	ICAP	75	125	20
Waters	W	Cobalt	2	97	98	97	0	0	1	0	ICAP	75	125	20
Waters	W	Copper	2	102	102	102	0	0	0	0	ICAP	75	125	20
Waters	W	Iron	2	99	100	100	0	0	1	0	ICAP	75	125	20
Waters	W	Lead	2	96	97	96	0	0	1	0	ICAP	75	125	20
Waters	W	Magnesium	2	100	101	101	0	0	1	0	ICAP	75	125	20
Waters	W	Manganese	2	98	99	99	0	0	1	0	ICAP	75	125	20
Waters	W	Molybdenum	2	97	98	98	0	0	1	0	ICAP	75	125	20
Waters	W	Nickel	2	99	100	100	0	0	1	0	ICAP	75	125	20
Waters	W	Phosphorus	2	103	104	104	0	0	1	0	ICAP	75	125	20
Waters	W	Potassium	2	94	96	95	0	0	2	0	ICAP	75	125	20
Waters	W	Sodium	2	102	103	103	0	0	1	0	ICAP	75	125	20
Waters	W	Sulfur	2	100	100	100	0	0	0	0	ICAP	75	125	20
Waters	W	Titanium	2	99	100	100	0	0	1	0	ICAP	75	125	20
Waters	W	Vanadium	2	98	99	98	0	0	1	0	ICAP	75	125	20
Waters	W	Fluoride	2	98	102	100	0	0	4	0	SIE	80	120	20

Table E-4
Coal Standard Reference Material Results

Analyte	Reference Value	Measured Value	Recovery (%)	Project Objectives (%)
SARM-20 (by ICP-AES), $\mu g/g$[a]				
Arsenic	4.7	4.0	85	75-125
Beryllium	2.5	2.0	80	75-125
Cadmium	Not Spiked	ND(0.1)	--	75-125
Chromium	67[b]	71	106	75-125
Copper	18	14	78	75-125
Lead	26	29	112	75-125
Manganese	80	86	108	75-125
Mercury	0.25	0.27	108	75-125
Nickel	25	19	76	75-125
Phosphorus	611[b]	710	116	75-125
Selenium	0.8	ND(1)	--	75-125
Titanium	3,780[b]	3,700	98	75-125
NBS-1632b[b]				
Ash, %	6.79	6.82[c]	100	--
Volatiles, %	35.4	34.8[c]	98%	--
Carbon, %	78.11	78.39[c]	100	--
Hydrogen, %	5.07	4.91[c]	97	--
Nitrogen, %	1.56	1.60[c]	103	--
Sulfur, %	1.89	1.93[c]	102	--
SARM-20 (INAA), $\mu g/g$[d]				
Arsenic	4.7	6.3	134	75-125
Barium	372	467	126	75-125
Beryllium	2.5	Not Reported	--	75-125
Cadmium	Not Spiked	ND(2.5)	--	75-125
Chromium	67[b]	76	113	75-125
Copper	18	ND(25)	--	75-125
Lead	26	Not Reported	--	75-125
Manganese	80	85	106	75-125
Mercury	0.25	ND(0.253)	--	75-125
Nickel	25	43.6	170	75-125
Phosphorus	611[b]	Not Reported	--	75-125
Selenium	0.8	2.7	340	75-125
Titanium	3,780[b]	3,659	97	75-125

[a]Analyzed by Commercial Testing and Engineering Company.
[b]Uncertified/approximate value.
[c]Based on dry weight values.
[d]Analyzed by North Carolina State University.

Table E-5
Filter Blank Results

Sample type	Client ID	Units	Matrix	Analyte	Result Flag	Result	Comment	Detection Limit	Method Code
Blank quartz filter	FC101R-FILTER 01	ug/sample	W	Chloride		0	J	4	Chloride, by IC EPA300
Blank quartz filter	FC101R-FILTER 01	ug/sample	W	Fluoride		3.7	BJ	4.7	Fluoride by EPA 340.2
Blank quartz filter	FC101R-FILTER 01	ug/sample	W	Sulfate		0	J	12	Sulfate, EPA 300.0
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Aluminum		46.6		7.33	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Antimony	ND			1.93	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Arsenic	ND			0.237	BIF As for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Barium		5.32		0.0579	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Beryllium	ND			0.0589	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Cadmium	ND			0.0423	BIF Cd for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Cadmium	ND		B	0.287	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Calcium		61.2	B	23.6	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Chromium		1.13	B	0.273	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Cobalt		0.445	BJ	0.522	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Copper		0.49	B	0.247	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Iron		6.13	BJ	31.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Lead		9.61		2.47	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Lead		0.118	B	0.08	BIF Pb for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Magnesium		6.24	B	2.73	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Manganese		0.283		0.0118	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	S	Mercury		0.024	B	0.0048	Mercury, cold vapor SW7471
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Molybdenum		6.9		0.262	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Nickel		0.796	BJ	1.09	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Nickel		0.275		0.117	BIF Ni for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Phosphorus		11.3	B	7.29	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Potassium		41.6	B	34.8	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Selenium		0.16	B	0.0706	BIF Se for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Sodium		81.6	B	2.69	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Sulfur		67.4	B	30.7	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Titanium		1.31	B	0.164	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 02 BLANK	ug	T	Vanadium		0.323	BJ	0.43	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Aluminum		42.6		7.33	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Antimony	ND			1.93	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Arsenic	ND			0.237	BIF As for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Barium		4.85		0.0579	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Beryllium	ND			0.0589	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Cadmium		0.004	J	0.0423	BIF Cd for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Cadmium	ND		B	0.287	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Calcium		35.1	B	23.8	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Chromium		1.32	B	0.273	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Cobalt		0.031	BJ	0.522	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Copper		0.681	B	0.247	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Iron		7.52	BJ	31.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Lead		7.19		2.47	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Lead		0.11	B	0.08	BIF Pb for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Magnesium		7.43	B	2.73	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Manganese		0.255		0.0118	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	S	Mercury		0.025	B	0.0048	Mercury, cold vapor SW7471
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Molybdenum		6.57		0.282	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Nickel		1.04	BJ	1.09	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Nickel	ND			0.117	BIF Ni for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Phosphorus		9.69	B	7.29	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Potassium		55	B	34.6	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Selenium		0.112	B	0.0706	BIF Se for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Sodium		39.2	B	2.59	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Sulfur		41.7	B	30.7	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Titanium		0.883	B	0.184	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 03 BLANK	ug	T	Vanadium		0.283	BJ	0.43	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Aluminum		45.9		7.33	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Antimony	ND			1.93	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Arsenic	ND			0.237	BIF As for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Barium		6.33		0.0579	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Beryllium	ND			0.0589	BIF ICP for Metals Trains

Table E-5 (Continued)

Sample type	Client ID	Units	Matrix	Analyte	Result Flag	Result	Comment	Detection Limit	Method Code
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Cadmium		0.014	J	0.0423	BIF Cd for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Cadmium	ND		B	0.287	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Calcium		35.4	B	23.8	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Chromium		1.03	B	0.273	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Cobalt		0.113	BJ	0.522	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Copper		0.62	B	0.247	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Iron		8.16	BJ	31.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Lead		8.12		2.47	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Lead		0.172	B	0.08	BIF Pb for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Magnesium		6.3	B	2.73	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Manganese		0.265		0.0118	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	S	Mercury		0.028	B	0.0048	Mercury, cold vapor SW7471
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Molybdenum		7.47		0.262	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Nickel		1.2	B	1.09	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Nickel		0.307		0.117	BIF Ni for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Phosphorus		6.49	BJ	7.29	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Potassium		29.6	BJ	34.6	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Selenium		0.198	B	0.0706	BIF Se for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Sodium		41.8	B	2.69	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Sulfur		36.5	B	30.7	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Titanium		1.04	B	0.164	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 04 BLANK	ug	T	Vanadium		0.348	BJ	0.43	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Aluminum		46.7		7.33	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Antimony	ND			1.93	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Arsenic	ND			0.237	BIF As for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Barium		6.31		0.0579	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Beryllium	ND			0.0589	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Cadmium	ND			0.0423	BIF Cd for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Cadmium		0.088	BJ	0.287	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Calcium		35.1	B	23.8	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Chromium		0.824	B	0.273	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Cobalt		0.609	B	0.522	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Copper		0.471	B	0.247	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Iron		24.1	BJ	31.1	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Lead		9.19		2.47	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Lead		0.136	B	0.08	BIF Pb for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Magnesium		5.19	B	2.73	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Manganese		0.372		0.0118	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	S	Mercury		0.014	B	0.0048	Mercury, cold vapor SW7471
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Molybdenum		7.69		0.262	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Nickel		0.616	BJ	1.09	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Nickel		0.142		0.117	BIF Ni for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Phosphorus		11.3	B	7.29	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Potassium		21.2	BJ	34.6	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Selenium		0.238	B	0.0706	BIF Se for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Sodium		64.9	B	2.59	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Sulfur		73	B	30.7	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Titanium		0.969	B	0.164	BIF ICP for Metals Trains
Blank quartz filter	FC101R-FILTER 05 BLANK	ug	T	Vanadium		0.249	BJ	0.43	BIF ICP for Metals Trains

Table E-6
Field Blank Results

Sample Type	Client ID	Units	Matrix	Analyte	Res. Flag	Result	Comm.	Detection Limit	Method Code
Stack anions impinger, field blank	FC101R-SG04ANCI	ug/sample	W	Chloride, IC BIF		4.48		0.0126	Chloride (BIF), IC
Stack anions impinger, field blank	FC101R-SG04ANCI	ug/sample	W	Fluoride		22.2	B	11.7	Fluoride by EPA 340.2
Stack anions impinger, field blank	FC101R-SG04ANCI	ug/sample	W	Sulfate		1050		0.06	Sulfate, EPA 300.0
Stack anions particulate, field blank	FC101R-SG04ANWR,SG04ANFL	ug/sample	W	Chloride		178		3.48	Chloride, by IC EPA300
Stack anions particulate, field blank	FC101R-SG04ANWR,SG04ANFL	ug/sample	W	Fluoride		12.8	B	4.09	Fluoride by EPA 340.2
Stack anions particulate, field blank	FC101R-SG04ANWR,SG04ANFL	ug/sample	W	Sulfate		380		10.4	Sulfate, EPA 300.0
Stack MM KMnO4 Imp., field blank	FC101R-SG04MMMI	mg/L	W	Mercury		0.00008	B	0.000048	Mercury, cold vapor SW7470
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Aluminum	ND			0.0264	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Antimony	ND		B	0.0241	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Arsenic	ND			0.000657	Arsenic by SW7060
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Arsenic	ND			0.0225	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Barium	ND			0.00053	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Beryllium	ND			0.000554	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Boron		0.127	B	0.015	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Cadmium		0.00024	BJ	0.00031	Cadmium by SW7131
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Cadmium		0.00027	J	0.00172	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Calcium		0.0895	BJ	0.148	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Chromium		0.00284	B	0.00249	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Cobalt	ND			0.0034	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Copper		0.00339	BJ	0.00381	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Iron		0.0144	B	0.00596	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Lead	ND			0.027	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Lead	ND			0.0008	Lead by SW7421
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Magnesium		0.0112	J	0.0228	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Manganese		0.0777		0.000395	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Mercury		0.0003	B	0.00024	Mercury,HNO3/H2O2 Impinger
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Molybdenum	ND			0.00463	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Nickel	ND		B	0.00988	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Nickel		0.00069	J	0.00182	Nickel by GF, EPA 249.2
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Phosphorus		0.0721		0.061	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Potassium	ND			0.37	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Selenium		0.017	BJ	0.0417	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Selenium		0.00048	SBJ	0.000843	Selenium by SW7740
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Selenium		0.00086	RB	0.000843	Selenium by SW7740
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Silicon		0.54	B	0.0273	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Silver	ND		B	0.00492	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Sodium		0.189	B	0.0397	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Strontium		0.00094	B	0.000166	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Thallium	ND		B	0.0172	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Titanium		0.00086	J	0.00102	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Vanadium	ND			0.00236	ICP analysis by SW6010
Stack MM Nitric Imp., field blank	FC101R-SG04MMNI	mg/L	W	Zinc		0.00577	B	0.00153	ICP analysis by SW6010
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Aluminum		146		7.33	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Antimony	ND			1.93	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Arsenic		0.414		0.237	BIF As for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Barium		4.98		0.0579	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Beryllium	ND			0.0589	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Cadmium		0.476		0.0846	BIF Cd for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Cadmium		0.317	B	0.287	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Calcium		130	B	23.6	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Chromium		3.65	B	0.273	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Cobalt		0.138	BJ	0.522	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Copper		1.39	B	0.247	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Iron		53.2	B	31.1	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Lead		15.6		2.47	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Lead		0.43	B	0.08	BIF Pb for Metals Trains

Table E-6 (Continued)

Sample Type	Client ID	Units	Matrix	Analyte	Res. Flag	Result	Comm.	Detection Limit	Method Code
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Magnesium		79.7	B	2.73	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Manganese		3.47		0.0118	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	S	Mercury		0.019	B	0.0048	Mercury, cold vapor SW7471
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Molybdenum		13.7		0.262	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Nickel		4.26	B	1.09	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Nickel		3.84		0.117	BIF Ni for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Phosphorus		6.49	BJ	7.29	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Potassium		62.1	B	34.6	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Selenium		0.212	B	0.0706	BIF Se for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Sodium		257	B	2.59	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Sulfur		93.9	B	30.7	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Titanium		4.52	B	0.184	BIF ICP for Metals Trains
Stack MM particulate, field blank	FC101R-SG04MMNP,AP,FL	ug	T	Vanadium		0.508	B	0.43	BIF ICP for Metals Trains

Table E-7
Method Blank Contaminants

Work Order	Sample	Analyte	Sample Conc.	Blank Conc.	Blank ID	Date Analyzed
9401574	FC101R-SG04MMNP,AP,FL	Lead	0.430 ug	0.0520 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 02 BLANK	Lead	0.118 ug	0.0520 ug	BLK94546	2/15/94
9401574	GC101R-FILTER 03 BLANK	Lead	0.110 ug	0.0520 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 04 BLANK	Lead	0.172 ug	0.0520 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 05 BLANK	Lead	0.136 ug	0.0520 ug	BLK94546	2/15/94
9401574	FC101R-SG04MMNP,AP,FL	Selenium	0.212 ug	0.0480 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 02 BLANK	Selenium	0.180 ug	0.0480 J ug	BLK94546	2/15/94
9401574	GC101R-FILTER 03 BLANK	Selenium	0.112 ug	0.0480 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 04 BLANK	Selenium	0.198 ug	0.0480 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 05 BLANK	Selenium	0.238 ug	0.0480 J ug	BLK94546	2/15/94
9401574	FC101R-SG04MMNP,AP,FL	Phosphorus	6.49 ug	1.61 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 02 BLANK	Phosphorus	11.3 ug	1.61 J ug	BLK94546	2/15/94
9401574	GC101R-FILTER 03 BLANK	Phosphorus	9.89 ug	1.61 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 04 BLANK	Phosphorus	5.49 ug	1.61 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 05 BLANK	Phosphorus	11.3 ug	1.61 J ug	BLK94546	2/15/94
9401574	FC101R-SG04MMNP,AP,FL	Cadmium	0.317 ug	0.0550 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 05 BLANK	Cadmium	0.0860 J ug	0.0550 J ug	BLK94546	2/15/94
9401574	FC101R-SG04MMNP,AP,FL	Chromium	3.85 ug	0.630 ug	BLK94546	2/15/94
9401574	FC101R-FILTER O2 BLANK	Chromium	1.13 ug	0.630 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 03 BLANK	Chromium	1.32 ug	0.630 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 04 BLANK	Chromium	1.03 ug	0.630 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 05 BLANK	Chromium	0.824 ug	0.630 ug	BLK94546	2/15/94
9401574	FC101R-SG01MMNP,AP,FL	Cobalt	1.02 ug	0.331 ug	BLK94546	2/15/94
9401574	FC101R-SG03MMNP,AP,FL	Cobalt	0.847 ug	0.331 ug	BLK94546	2/15/94
9401574	FC101R-SG04MMNP,AP,FL	Cobalt	0.138 J ug	0.331 ug	BLK94546	2/15/94
9401574	FC101R-HG01MMNP,AP,FL	Cobalt	2.07 ug	0.331 ug	BLK94546	2/15/94
9401574	FC101R-HG02MMNP,AP,FL	Cobalt	2.69 ug	0.331 ug	BLK94546	2/15/94
9401574	FC101R-HG03MMNP,AP,FL	Cobalt	2.75 ug	0.331 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 02 BLANK	Cobalt	0.445 J ug	0.331 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 03 BLANK	Cobalt	0.0310 J ug	0.331 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 04 BLANK	Cobalt	0.113 J ug	0.331 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 05 BLANK	Cobalt	0.609 ug	0.331 ug	BLK94546	2/15/94
9401574	FC101R-SG04MMNP,AP,Fl	Copper	1.39 ug	0.471 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 02 BLANK	Copper	0.490 ug	0.471 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 03 BLANK	Copper	0.681 ug	0.471 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 04 BLANK	Copper	0.620 ug	0.471 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 05 BLANK	Copper	0.471 ug	0.471 ug	BLK94546	2/15/94
9401574	FC101R-SG01MMNP,AP,FL	Nickel	11.2 ug	1.20 ug	BLK94546	2/15/94
9401574	FC101R-SG04MMNP,AP,FL	Nickel	4.26 ug	1.20 ug	BLK94546	2/15/94
9401574	FC101R-HG03MMNP,AP,FL	Nickel	9.46 ug	1.20 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 02 BLANK	Nickel	0.796 J ug	1.20 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 03 BLANK	Nickel	1.04 J ug	1.20 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 04 BLANK	Nickel	1.20 ug	1.20 ug	BLK94546	2/15/94
9401574	FC101R-FILTER 05 BLANK	Nickel	0.616 J ug	1.20 ug	BLK94546	2/15/94
9401574	FC101R-SG04MMNP,AP,FL	Vanadium	0.508 ug	0.0550 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 02 BLANK	Vanadium	0.323 J ug	0.0550 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 03 BLANK	Vanadium	0.283 J ug	0.0550 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 04 BLANK	Vanadium	0.345 J ug	0.0550 J ug	BLK94546	2/15/94
9401574	FC101R-FILTER 05 BLANK	Vanadium	0.249 J ug	0.0550 J ug	BLK94546	2/15/94
9401292	FC101R-SG03MMNI	Antimony	0.0357 mg/l	0.0150 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG01MMNI	Antimony	0.0103 J mg/l	0.0150 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG02MMNI	Antimony	0.00224 J mg/l	0.0150 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG01MMNI	Chromium	0.00635 mg/l	0.00110 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG02MMNI	Chromium	0.00259 mg/l	0.00110 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG03MMNI	Chromium	0.00308 mg/l	0.00110 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG01MMNI	Chromium	0.00390 mg/l	0.00110 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG02MMNI	Chromium	0.00264 mg/l	0.00110 J mg/l	BLK94247	1/27/94

Table E-7 (Continued)

Work Order	Sample	Analyte	Sample Conc.	Blank Conc.	Blank ID	Date Analyzed
9401292	FC101R-HG03MMNI	Chromium	0.00374 mg/l	0.00110 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG04MMNI	Chromium	0.00284 mg/l	0.00110 J mg/l	]	1/27/94
9401292	FC101R-SG02MMNI	Copper	0.00319 J mg/l	0.00079 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG03MMNI	Copper	0.00783 mg/l	0.00079 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG02MMNI	Copper	0.00335 J mg/l	0.00079 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG03MMNI	Copper	0.00733 mg/l	0.00079 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG04MMNI	Copper	0.00339 J mg/l	0.00079 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG01MMNI	Nickel	0.0111 mg/l	0.00595 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG02MMNI	Nickel	0.0132 mg/l	0.00595 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG03MMNI	Nickel	0.00936 J mg/l	0.00595 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG01MMNI	Nickel	0.00766 J mg/l	0.00595 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG02MMNI	Nickel	0.00893 J mg/l	0.00595 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG03MMNI	Nickel	0.00872 J mg/l	0.00595 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG01MMNI	Selenium	0.0354 J mg/l	0.0179 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG02MMNI	Selenium	0.0213 J mg/l	0.0179 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG03MMNI	Selenium	0.0126 J mg/l	0.0179 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG01MMNI	Selenium	0.00581 J mg/l	0.0179 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG02MMNI	Selenium	0.0291 J mg/l	0.0179 J mg/l	BLK94247	1/27/94
9401292	FC101R-HG03MMNI	Selenium	0.0354 J mg/l	0.0179 J mg/l	BLK94247	1/27/94
9401292	FC101R-SG04MMNI	Selenium	0.0170 J mg/l	0.0179 J mg/l	BLK94247	1/27/94
9401293	FC101R-SG01MMNI	Cadmium	0.000140 J mg/l	0.0000700 J mg/l	BLK94248	1/24/94
9401293	FC101R-SG03MMNI	Cadmium	0.000290 J mg/l	0.0000700 J mg/l	BLK94248	1/24/94
9401293	FC101R-HG02MMNI	Cadmium	0.000560 mg/l	0.0000700 J mg/l	BLK94248	1/24/94
9401293	FC101R-HG03MMNI	Cadmium	0.0003400 mg/l	0.0000700 J mg/l	BLK94248	1/24/94
9401293	FC101R-SG04MMNI	Cadmium	0.000240 J mg/l	0.0000700 J mg/l	BLK94248	1/24/94
9401293	FC101R-SG01MMNI	Selenium	0.00297 S mg/l	0.000320 J mg/l	BLK94248	2/9/94
9401293	FC101R-SG02MMNI	Selenium	0.00248 S mg/l	0.000320 J mg/l	BLK94248	2/9/94
9401293	FC101R-SG04MMNI	Selenium	0.000480 SJ mg/l	0.000320 J mg/l	BLK94248	2/9/94
9401291	FC101R-SG01MMMI	Mercury	0.00008 mg/l	0.0000600 mg/l	BLK94565	2/10/94
9401294	FC101R-SG04MMNI	Mercury	0.000300 mg/l	0.0000600 mg/l	BLK94566	2/10/94
9402029	FC101R-BA01GRXX	Fluoride	7.71J mg/l	9.30 J mg/kg	BLK94547	2/11/94
9402029	FC101R-BA02GRXX	Fluoride	5.86 J mg/kg	9.30 J mg/kg	BLK94547	2/11/94
9402029	FC101R-BA03GRXX	Fluoride	12.7 mg/kg	9.30 J mg/kg	BLK94547	2/11/94
9402029	FC101R-FA01GCXX	Fluoride	65.0 mg/kg	9.30 J mg/kg	BLK94547	2/11/94
9402029	FC101R-FA02GCXX	Fluoride	39.9 mg/kg	9.30 J mg/kg	BLK94547	2/11/94
9402029	FC101R-FA03GCXX	Fluoride	30.7 mg/kg	9.30 J mg/kg	BLK94547	2/11/94
9402029	FC101R-BA03GRXX	Fluoride	9.15 J mg/kg	9.30 J mg/kg	BLK94547	2/11/94
9402029	FC101R-FA03GCXX	Fluoride	34.5 mg/kg	9.30 J mg/kg	BLK94547	2/11/94
9402029	FC101R-ASO1GRXX	Fluoride	68.7 mg/kg	14.8 J mg/kg	BLK94735	2/23/94
9402029	FC101R-AS02GRXX	Fluoride	67.1 mg/kg	14.8 J mg/kg	BLK94735	2/23/94
9402029	FC101R-AS03GRXX	Fluoride	58.2 mg/kg	14.8 J mg/kg	BLK94735	2/23/94
9402029	FC101R-AS03GRXX	Fluoride	61.2 mg/kg	14.8 J mg/kg	BLK94735	2/23/94
9401508	FC101R-BA01GRXX	Fluoride	0.897 mg/kg	0.289 J mg/kg	BLK94488	2/2/94
9401508	FC101R-BA02GRXX	Fluoride	0.786 mg/kg	0.289 J mg/kg	BLK94488	2/2/94
9401508	FC101R-BA03GRXX	Fluoride	0.743 mg/kg	0.289 J mg/kg	BLK94488	2/2/94
9401508	FC101R-AS02GRXX	Fluoride	2.63 mg/kg	0.289 J mg/kg	BLK94488	2/2/94
9401508	FC101R-AS03GRXX	Fluoride	2.66 mg/kg	0.289 J mg/kg	BLK94488	2/2/94
9401508	FC101R-BA03GRXX	Fluoride	0.717 mg/kg	0.289 J mg/kg	BLK94488	2/2/94
9401508	FC101R-AS03GRXX	Fluoride	1.81 mg/kg	0.289 J mg/kg	BLK94488	2/2/94
9401510	FC101R-BS01GRXX	Phosphorus	10.9 mg/kg	13.7 mg/kg	BLK94651	2/18/94
9401510	FC101R-BS02GRXX	Phosphorus	10.6 mg/kg	13.7 mg/kg	BLK94651	2/18/94
9401510	FC101R-BS03GRXX	Phosphorus	16.5 mg/kg	13.7 mg/kg	BLK94651	2/18/94
9401510	FC101R-AS01GRXX	Phosphorus	13.2 mg/kg	13.7 mg/kg	BLK94651	2/18/94
9401510	FC101R-AS02GRXX	Phosphorus	6.13 mg/kg	13.7 mg/kg	BLK94651	2/18/94
9401510	FC101R-AS03GRXX	Phosphorus	3.12 J mg/kg	13.7 mg/kg	BLK94651	2/18/94
9401510	FC101R-BS03GRXX	Phosphorus	7.27 mg/kg	13.7 mg/kg	BLK94651	2/18/94

Table E-7 (Continued)

Work Order	Sample	Analyte	Sample Conc.	Blank Conc.	Blank ID	Date Analyzed
9401510	FC101R-AS03GRXX	Phosphorus	1.47 J mg/kg	13.7 mg/kg	BLK94651	2/18/94
9401510	FC101R-AW01GRXX	Cadmium	0.000940 J mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-AW03GRXX	Cadmium	0.00249 mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-BL01GRXX	Cadmium	0.00328 mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-BL02GRXX	Cadmium	0.00311 mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-BL03GRXX	Cadmium	0.00146 J mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-RW01GRXX	Cadmium	0.000840 J mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-RW02GRXX	Cadmium	0.00234 mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-RW03GRXX	Cadmium	0.00307 mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-4MEW3	Cadmium	0.00255 mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-4MAKEUP3	Cadmium	0.000290 J mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-AW03GRXX	Cadmium	0.00351 mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-BL03GRXX	Cadmium	0.00370 mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-RW03GRXX	Cadmium	0.00320 mg/l	0.00142 mg/l	BLK94639	2/21/94
9401510	FC101R-AW01GRXX	Copper	0.0188 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-AW02GRXX	Copper	0.0191 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-AW03GRXX	Copper	0.00521 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-BL01GRXX	Copper	0.0347 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-BL02GRXX	Copper	0.0183 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-BL03GRXX	Copper	0.0260 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-RW01GRXX	Copper	0.0138 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-RW02GRXX	Copper	0.0170 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-RW03GRXX	Copper	0.0375 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-4MEW3	Copper	0.0104 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-4MAKEUP3	Copper	0.0104 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-AW03GRXX	Copper	0.00222 J mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-BL03GRXX	Copper	0.0262 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-RW03GRXX	Copper	0.0355 mg/l	0.00417 mg/l	BLK94693	2/21/94
9401510	FC101R-AW03GRXX	Molybdenum	0.00379 J mg/l	0.00193 J mg/l	BLK94639	2/21/94
9401510	FC101R-4MAKEUP3	Molybdenum	0.0132 mg/l	0.00193 J mg/l	BLK94639	2/21/94
9401510	FC101R-AW03GRXX	Molybdenum	0.00475 mg/l	0.00193 J mg/l	BLK94639	2/21/94
9401510	FC101R-BS01GRXX	Beryllium	0.0560 J mg/kg	0.0180 J mg/kg	BLK94651	2/21/94
9401510	FC101R-BS02GRXX	Beryllium	0.0379 J mg/kg	0.0180 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS01GRXX	Beryllium	0.0890 J mg/kg	0.0180 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS02GRXX	Beryllium	0.102 J mg/kg	0.0180 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Beryllium	0167 J mg/kg	0.0180 J mg/kg	BLK94651	2/21/94
9401510	FC101R-BS03GRXX	Beryllium	0.120 J mg/kg	0.0180 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Beryllium	0.0229 J mg/kg	0.0180 J mg/kg	BLK94651	2/21/94
9401510	FC101R-BS01GRXX	Cadmium	1.14 J mg/kg	0.120 J mg/kg	BLK94651	2/21/94
9401510	FC101R-BS03GRXX	Cadmium	0.0290 J mg/kg	0.120 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS02GRXX	Cadmium	0.406 J mg/kg	0.120 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Cadmium	0.697 J mg/kg	0.120 J mg/kg	BLK94651	2/21/94
9401510	FC101R-BS03GRXX	Cadmium	0.0526 J mg/kg	0.120 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Cadmium	0.641 J mg/kg	0.120 J mg/kg	BLK94651	2/21/94
9401510	FC101R-BS02GRXX	Chromium	4.32 mg/kg	0.508 mg/kg	BLK94651	2/21/94
9401510	FC101R-BS03GRXX	Chromium	3.79 mg/kg	0.508 mg/kg	BLK94651	2/21/94
9401510	FC101R-BS01GRXX	Cobalt	2.42 J mg/kg	0.359 J mg/kg	BLK94651	2/21/94
9401510	FC101R-BS02GRXX	Cobalt	1.27 J mg/kg	0.359 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS01GRXX	Cobalt	1.75 J mg/kg	0.359 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS02GRXX	Cobalt	2.37 J mg/kg	0.359 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Cobalt	1.60 J mg/kg	0.359 J mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Cobalt	1.62 J mg/kg	0.359 J mg/kg	BLK94651	2/21/94
9401510	FC101R-BS01GRXX	Copper	4.83 mg/kg	1.55 mg/kg	BLK94651	2/21/94
9401510	FC101R-BS02GRXX	Copper	4.76 mg/kg	1.55 mg/kg	BLK94651	2/21/94
9401510	FC101R-BS03GRXX	Copper	2.60 mg/kg	1.55 mg/kg	BLK94651	2/21/94
9401510	FC101R-AS01GRXX	Copper	4.69 mg/kg	1.55 mg/kg	BLK94651	2/21/94
9401510	FC101R-AS02GRXX	Copper	4.02 mg/kg	1.55 mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Copper	5.20 mg/kg	1.55 mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Copper	3.02 mg/kg	1.55 mg/kg	BLK94651	2/21/94

Table E-7 (Continued)

Work Order	Sample	Analyte	Sample Conc.	Blank Conc.	Blank ID	Date Analyzed
9401510	FC101R-BS03GRXX	Copper	3.80 mg/kg	1.55 mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Copper	3.92 mg/kg	1.55 mg/kg	BLK94651	2/21/94
9401510	FC101R-BS02GRXX	Molybdenum	0.356 J mg/kg	0.495 mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Molybdenum	2.01 mg/kg	0.495 mg/kg	BLK94651	2/21/94
9401510	FC101R-AS03GRXX	Molybdenum	0.641 J mg/kg	0.495 mg/kg	BLK94651	2/21/94
9403022	FC101R-BA01GRXX	Chromium	27.0 mg/kg	4.97 mg/kg	BLK94769	3/2/94
9403022	FC1014-BA02GRXX	Chromium	29.5 mg/kg	4.97 mg/kg	BLK94769	3/2/94
9403022	FC101R-BA03GRXX	Chromium	27.4 mg/kg	4.97 mg/kg	BLK94769	3/2/94
9403022	FC101R-BA03GRXX Dup	Chromium	27.0 mg/kg	4.97 mg/kg	BLK94769	3/2/94
9403022	FC101R-FA01GCXX	Chromium	26.7 mg/kg	4.97 mg/kg	BLK94769	3/2/94
9403022	FC101R-FA02GCXX	Chromium	22.2 mg/kg	4.97 mg/kg	BLK94769	3/2/94
9403022	FC101R-FA03GCXX	Chromium	24.6 mg/kg	4.97 mg/kg	BLK94769	3/2/94
9403022	FC101R-FA03GCXX Dup	Chromium	23.7 mg/kg	4.97 mg/kg	BLK94769	3/2/94
9403022	FC101R-BA01GRXX	Nickel	6.35 J mg/kg	1.93 J mg/kg	BLK94769	3/2/94
9403022	FC1014-BA02GRXX	Nickel	10.5 mg/kg	1.93 J mg/kg	BLK94769	3/2/94
9403022	FC101R-BA03GRXX	Nickel	10.7 mg/kg	1.93 J mg/kg	BLK94769	3/2/94
9403022	FC101R-BA03GRXX Dup	Nickel	6.56 J mg/kg	1.93 J mg/kg	BLK94769	3/2/94
9403022	FC101R-FA01GCXX	Nickel	8.49 B mg/kg	1.93 J mg/kg	BLK94769	3/2/94
9403022	FC101R-FA02GCXX	Nickel	8.06 B mg/kg	1.93 J mg/kg	BLK94769	3/2/94
9403022	FC101R-FA03GCXX Dup	Nickel	3.29 B mg/kg	1.93 J mg/kg	BLK94769	3/2/94
9401509	FC101R-BS01GRXX	Lead	0.262 mg/kg	0.108 mg/kg	BLK94589	2/20/94
9401509	FC101R-BS02GRXX	Lead	0.268 mg/kg	0.108 mg/kg	BLK94589	2/20/94
9401509	FC101R-BS03GRXX	Lead	0.286 mg/kg	0.108 mg/kg	BLK94589	2/20/94
9401509	FC101R-BS03GRXX Dup	Lead	0.316 mg/kg	0.108 mg/kg	BLK94589	2/20/94
9401509	FC101R-AS01GRXX	Lead	0.667 mg/kg	0.108 mg/kg	BLK94589	2/20/94
9401509	FC101R-AS02GRXX	Lead	0.602 mg/kg	0.108 mg/kg	BLK94589	2/20/94
9401509	FC101R-AS03GRXX	Lead	0.428 mg/kg	0.108 mg/kg	BLK94589	2/20/94
9401509	FC101R-AS03GRXX Dup	Lead	0.504 mg/kg	0.108 mg/kg	BLK94589	2/20/94
9401509	FC101R-AW02GRXX	Selenium	0.00857 mg/l	0.00111 mg/l	BLK94597	2/20/94
9401509	FC101R-BL01GRXX	Selenium	0.00796 mg/l	0.00111 mg/l	BLK94597	2/20/94
9401509	FC101R-BL02GRXX	Selenium	0.00773 mg/l	0.00111 mg/l	BLK94597	2/20/94
9401509	FC101R-BL03GRXX	Selenium	0.00710 mg/l	0.00111 mg/l	BLK94597	2/20/94
9401509	FC101R-BL03GRXX Dup	Selenium	0.00760 mg/l	0.00111 mg/l	BLK94597	2/20/94
9401509	FC101R-4MAKEUP3	Selenium	0.000110 J mg/l	0.00111 mg/l	BLK94597	2/20/94

* Sample result is less than ten times the method blank result.

APPENDIX F: PROCESS STREAM FLOW RATES AND FLUE GAS SAMPLING DATA

Table F-1
Process Stream Flow Rates

Stream	Mean Flow Rate	Std. Dev.	Source
Coal (lb/hr, wet)	766,000	6,400	Measured[a]
Coal (lb/hr, dry)	661,000	7,600	Calculated[b]
Bottom Ash (lb/hr, dry)	38,500	3,000	Calculated[c]
Baghouse Ash (lb/hr, dry)	127,000	6,600	Calculated[c]
Stack Gas (Nm^3/hr)	2,580,000	24,000	Measured[d]
FGD Inlet Gas (Nm^3/hr)	2,580,000	24,000	Calculated[e]
Feed Slurry Liquid (lb/hr)	50,300	7,200	Calculated[f]
Feed Slurry Solids (lb/hr)	11,500	1,700	Calculated[f]
Blowdown Slurry Liquid (lb/hr)	119,000	16,000	Calculated[f]
Blowdown Slurry Solids (lb/hr)	19,800	3,800	Calculated[f]
Process Water (lb/hr)	59,700	12,000	Measured[g]
Makeup Water (lb/hr)	33,400	2,600	Measured[g]
Spray Blend Water (lb/hr)	93,100	10,000	Calculated[h]

[a]Available from plant meters.

[b]Calculated from the wet coal flow rate and the moisture content of the coal.

[c]Calculated from an ash balance around the boiler, using the ratio of baghouse ash/bottom ash obtained from disposal truck records.

[d]Measured during multi-metals sampling at the stack.

[e]Total FGD inlet flow rate was assumed equal to the stack gas flow rate.

[f]Calculated from material balances around the FGD system on sulfur and calcium.

[g]Available from plant totalizers, which are logged every 24 hours.

[h]Assumed to be the sum of process water and makeup water flow rates.

Table F-2
FCEM Site 101R - FGD Scrubber Inlet Metals Sampling Data Summary

AM Velocity Data			
Run No.	1	2	3
Date	01/11/94	01/12/94	01/13/94
Time Start	1200	0920	835
Time Finish	2025	1740	1650
Operator	LAR/CG	LAR/CG	LAR/CG
Initial Leak Rate	0.009	0.015	0.018
Final Leak Rate	0.008	0.004	0.011
Duct Length (ft)	17	17	17
Stack Width (ft)	15	15	15
Pitot Tube Correction Factor (Cp)	0.84	0.84	0.84
Dry Gas Meter Calibration (Yd)	0.997	0.997	0.997
Nozzle Diameter (inches)	0.280	0.280	0.309
Barometric Pressure ("Hg)	25.05	25.03	25.07
Static Pressure ("H_2O)	5.3	5	4.9
Meter Volume (acf)	261.21	307.20	318.80
Average square root of delta p	0.435	0.528	0.458
Average delta H (" H2O)	0.83	1.25	1.33
Average Stack Temperature (F)	219	219	234
Average DGM Temp (°F)	59.0	54.9	58.2
Test Duration (minutes)	480.0	480.0	480.0
Condensed Water (g)	432.7	537.1	549.7
Filter Weight Gain (g)	0.1103	0.1332	0.1272
PNR Weight Gain (g)	0.0345	0.0337	0.0472
Impinger Residue (g)	N/D	N/D	N/D
% CO_2	13.5	13.2	13.4
% O_2	5.3	5.6	5.4
% N_2	81.2	81.2	81.2
Meter Volume (dscf)	222.36	263.71	272.42
Flue Gas Moisture (%)	8.4	8.8	8.7
Gas Molecular Weight (Wet) (g/g-mole)	29.33	29.25	29.29
Absolute Stack Pressure (" Hg)	25.44	25.40	25.43
Absolute Stack Temperature (R)	679	679	694
Average Gas Velocity (f/sec)	29.80	36.25	31.76
Avg Flow Rate (acfm)	455,920	554,581	485,911
Avg Flow Rate (dscfm)	275,973	333,829	286,607
Isokinetic Sampling Rate (%)	100.12	98.16	96.98

N/D = Not determined.

Table F-3
FCEM Site 101R - FGD Scrubber Inlet Metals Sampling Data Summary

PM Velocity Data			
Run No.	1	2	3
Date	01/11/94	01/12/94	01/13/94
Time Start	1200	0920	835
Time Finish	2025	1740	1650
Operator	LAR/CG	LAR/CG	LAR/CG
Initial Leak Rate	0.009	0.015	0.018
Final Leak Rate	0.008	0.004	0.011
Duct Length (ft)	17	17	17
Stack Width (ft)	15	15	15
Pitot Tube Correction Factor (Cp)	0.84	0.84	0.84
Dry Gas Meter Calibration (Yd)	0.997	0.997	0.997
Nozzle Diameter (inches)	0.280	0.280	0.309
Barometric Pressure (" Hg)	25.05	25.03	25.07
Static Pressure (" H_2O)	5.3	5	4.9
Meter Volume (acf)	261.21	307.20	318.80
Average Square Root of Δ p	0.416	0.515	0.425
Average Δ H (" H2O)	0.83	1.25	1.33
Average Stack Temperature (°F)	219	219	234
Average DGM Temp (°F)	59.0	54.9	58.2
Test Duration (minutes)	480.0	480.0	480.0
Condensed Water (g)	432.7	537.1	549.7
Filter Weight Gain (g)	0.1103	0.1332	0.1272
PNR Weight Gain (g)	0.0345	0.0337	0.0472
Impinger Residue (g)	N/D	N/D	N/D
% CO_2	13.5	13.2	13.4
% O_2	5.3	5.6	5.4
% N_2	81.2	81.2	81.2
Meter Volume (dscf)	222.36	263.71	272.42
Flue Gas Moisture (%)	8.4	8.8	8.7
Gas Molecular Weight (Wet) (g/g-mole)	29.33	29.25	29.29
Absolute Stack Pressure (" Hg)	25.44	25.40	25.43
Absolute Stack Temperature (R)	679	679	694
Average Gas Velocity (ft/sec)	28.50	35.35	29.47
Avg Flow Rate (acfm)	436,007	540,926	450,900
Avg Flow Rate (dscfm)	263,919	325,610	265,956
Isokinetic Sampling Rate (%)	104.69	100.64	104.51

N/D = Not determined.

Table F-4
FCEM Site 101R - FGD Scrubber Inlet Anions Sampling Data Summary

AM Velocity Data			
Run No.	1	2	3
Date	01/11/94	01/12/94	01/13/94
Time Start	1339	0930	0900
Time Finish	1818	1255	1205
Operator	LAR/CG	LAR/CG	LAR/CG
Initial Leak Rate	0.018	0.003	0.011
Final Leak Rate	0.015	0.002	0.016
Duct Dimensions (ft)	17	17	17
Stack Diameter (ft)	15	15	15
Pitot Tube Correction Factor (Cp)	0.84	0.84	0.84
Dry Gas Meter Calibration (Yd)	1.016	1.016	1.016
Nozzle Diameter (inches)	0.279	0.246	0.280
Barometric Pressure ("Hg)	25.05	25.03	25.07
Static Pressure ("H2O)	5.3	5.0	4.9
Meter Volume (acf)	63.40	59.60	64.84
Average square root of delta p	0.435	0.528	0.458
Average delta H (" H2O)	0.83	0.74	0.90
Average Stack Temperature (°F)	219	219	234
Average DGM Temp (°F)	52.5	44.0	47.2
Test Duration (minutes)	120.0	120.0	120.0
Condensed Water (g)	105.9	106.3	115.0
Filter Weight Gain (g)	0.0335	0.0148	0.0219
PNR Weight Gain (g)	N/A	N/A	N/A
Impinger Residue (g)	N/D	N/D	N/D
% CO_2	13.5	13.2	13.4
% O_2	5.3	5.6	5.4
% N_2	81.2	81.2	81.2
Meter Volume (dscf)	55.70	53.18	57.62
Flue Gas Moisture (%)	8.2	8.6	8.6
Gas Molecular Weight (Wet) (g/g-mole)	29.35	29.27	29.30
Absolute Stack Pressure (" Hg)	25.44	25.40	25.43
Absolute Stack Temperature (R)	679	679	694
Average Gas Velocity (f/sec)	29.79	36.24	31.74
Avg Flow Rate (acfm)	455,750	554,406	485,682
Avg Flow Rate (dscfm)	276,403	334,271	286,909
Isokinetic Sampling Rate (%)	100.88	102.45	99.82

N/A = Not analyzed.

N/D = Not determined.

Table F-5
FCEM Site 101R - FGD Scrubber Inlet Anions Sampling Data Summary

PM Velocity Data			
Run No.	1	2	3
Date	01/11/94	01/12/94	01/13/94
Time Start	1339	0930	0900
Time Finish	1818	1255	1205
Operator	LAR/CG	LAR/CG	LAR/CG
Initial Leak Rate	0.018	0.003	0.011
Final Leak Rate	0.015	0.002	0.016
Duct Dimensions (ft)	17	17	17
Stack Diameter (ft)	15	15	15
Pitot Tube Correction Factor (Cp)	0.84	0.84	0.84
Dry Gas Meter Calibration (Yd)	1.016	1.016	1.016
Nozzle Diameter (inches)	0.279	0.246	0.280
Barometric Pressure (" Hg)	25.05	25.03	25.07
Static Pressure (" H_2O)	5.3	5.0	4.9
Meter Volume (acf)	63.40	59.60	64.84
Average Square Root of Δ p	0.416	0.515	0.425
Average Δ H (" H_2O)	0.83	0.74	0.90
Average Stack Temperature (°F)	219	219	234
Average DGM Temp (°F)	52.5	44.0	47.2
Test Duration (minutes)	120.0	120.0	120.0
Condensed Water (g)	105.9	106.3	115.0
Filter Weight Gain (g)	0.0335	0.0148	0.0219
PNR Weight Gain (g)	N/A	N/A	N/A
Impinger Residue (g)	N/D	N/D	N/D
% CO_2	13.5	13.2	13.4
% O_2	5.3	5.6	5.4
% N_2	81.2	81.2	81.2
Meter Volume (dscf)	55.70	53.18	57.62
Flue Gas Moisture (%)	8.2	8.6	8.6
Gas Molecular Weight (Wet) (g/g-mole)	29.35	29.27	29.30
Absolute Stack Pressure (" Hg)	25.44	25.40	25.43
Absolute Stack Temperature (R)	679	679	694
Average Gas Velocity (f/sec)	28.49	35.34	29.46
Avg Flow Rate (acfm)	435,844	540,756	450,688
Avg Flow Rate (dscfm)	264,330	326,041	266,237
Isokinetic Sampling Rate (%)	105.48	105.04	107.57

N/A = Not analyzed.

N/D = Not determined.

Table F-6
FCEM Site 101R - Stack Metals Sampling Data Summary

Metals Sampling Data Summary			
Run No.	1	2	3
Date	01/11/94	1/12/94	01/13/94
Time Start	1200	920	835
Time Finish	2028	1745	1657
Operator	DJV	DJV	DJV
Initial Leak Rate	0.012	0.006	0.006
Final Leak Rate	0.006	0.004	0.004
Duct Dimensions (ft)			
Stack Diameter (ft)	28.0	28.0	28.0
Pitot Tube Correction Factor (Cp)	0.84	0.84	0.84
Dry Gas Meter Calibration (Yd)	0.998	0.998	0.998
Nozzle Diameter (inches)	0.1850	0.1850	0.1850
Barometric Pressure ("Hg)	24.75	24.73	24.77
Static Pressure ("H2O)	-0.45	-0.48	-0.52
Meter Volume (acf)	298.10	296.29	299.96
Average square root of delta p	1.031	1.030	1.034
Average delta H (" H_2O)	1.07	1.07	1.08
Average Stack Temperature (°F)	142	135	143
Average DGM Temp (°F)	97.3	91.4	92.9
Test Duration (minutes)	480.0	480.0	480.0
Condensed Water (g)	643.7	654.6	639.3
Filter Weight Gain (g)	0.0297	0.0198	0.0313
PNR Weight Gain (g)	0.0248	0.0154	0.0177
Impinger Residue (g)	N/D	N/D	N/D
% CO_2	13.3	12.9	11.8
% O_2	5.8	7.2	5.3
% N_2	80.9	79.9	82.9
Meter Volume (dscf)	233.913	234.769	237.422
Flue Gas Moisture (%)	11.5	11.6	11.3
Gas Molecular Weight (Wet) (g/g-mole)	28.94	28.92	28.74
Absolute Stack Pressure (" Hg)	24.72	24.69	24.73
Absolute Stack Temperature (R)	602	595	603
Average Gas Velocity (f/sec)	67.91	67.53	68.39
Avg Flow Rate (acfm)	2,509,012	2,495,079	2,526,548
Avg Flow Rate (dscfm)	1,609,088	1,613,179	1,622,631
Isokinetic Sampling Rate (%)	99.92	100.03	100.57

N/D = Not determined.

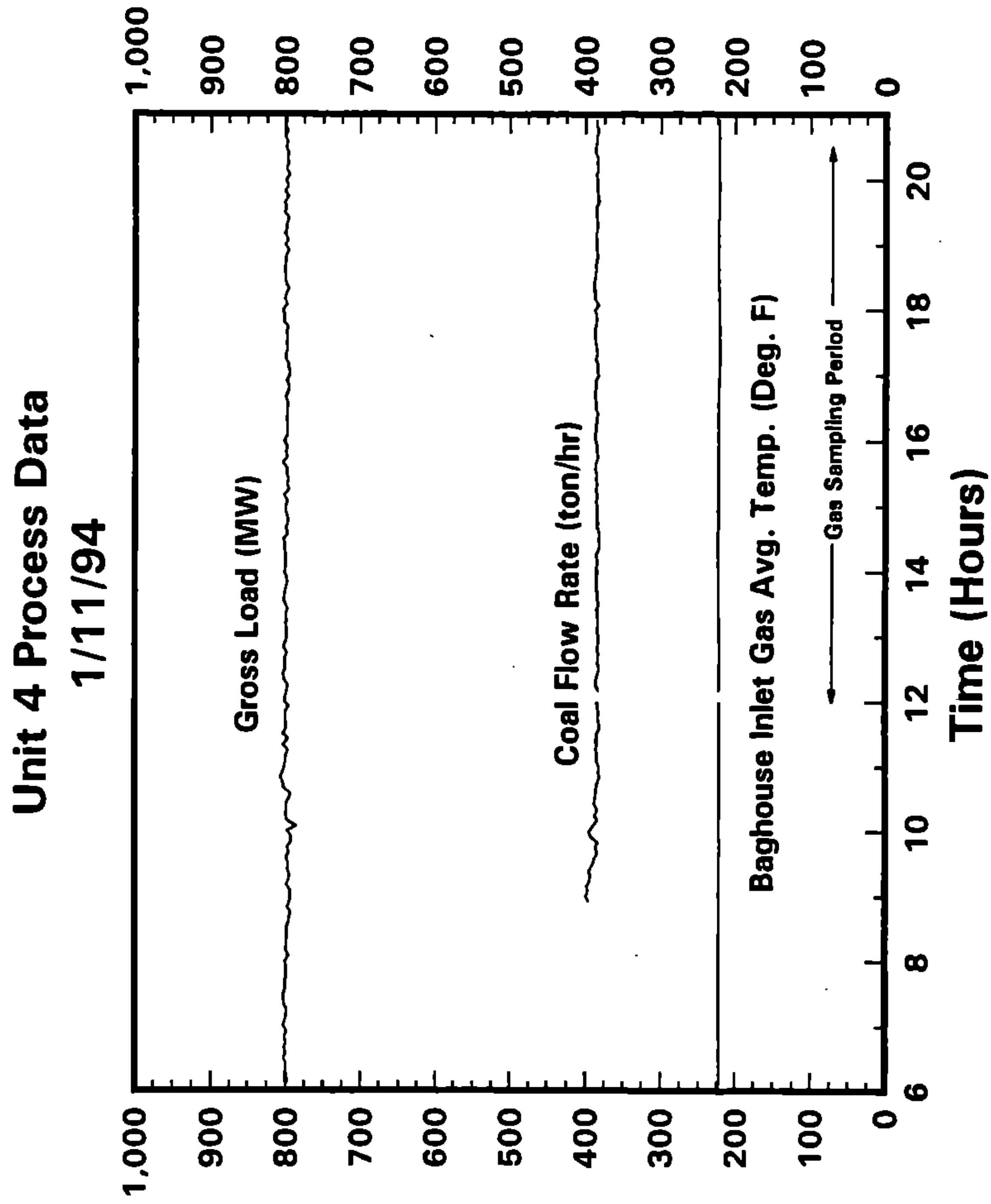
Table F-7
FCEM Site 101R - Stack Anions Sampling Data Summary

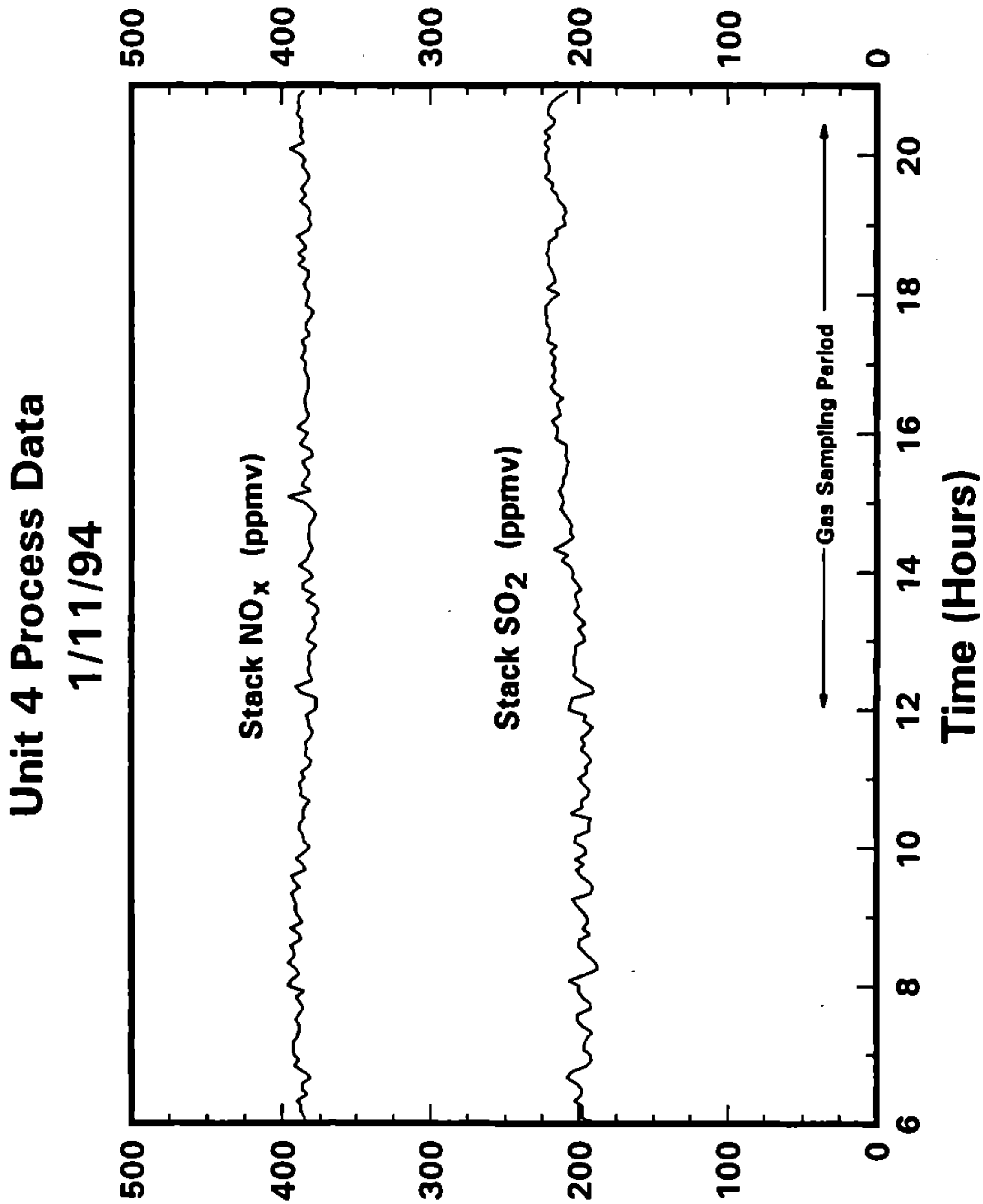
Anions Sampling Data Summary			
Run No.	1	2	3
Date	01/11/94	01/12/93	01/13/94
Time Start	1337	0930	0900
Time Finish	1819	1348	1302
Operator	DJV	DJV	DJV
Initial Leak Rate	0.001	0.004	0.002
Final Leak Rate	0.001	0.002	0.004
Duct Dimensions (ft)			
Stack Diameter (ft)	28.0	28.0	28.0
Pitot Tube Correction Factor (Cp)	0.84	0.84	0.84
Dry Gas Meter Calibration (Yd)	1.002	1.002	1.002
Nozzle Diameter (inches)	0.185	0.185	0.185
Barometric Pressure ("Hg)	24.75	24.75	24.77
Static Pressure ("H_2O)	-0.45	-0.48	-0.52
Meter Volume (acf)	101.30	100.13	104.05
Average square root of delta p	1.033	1.051	1.063
Average delta H (" H_2O)	1.04	1.06	1.07
Average Stack Temperature (°F)	141	135	142
Average DGM Temp (°F)	88.3	86.0	89.0
Test Duration (minutes)	160.0	160.0	160.0
Condensed Water (g)	220.2	223.0	226.3
Filter Weight Gain (g)	0.0083	0.0046	0.0083
PNR Weight Gain (g)	N/A	N/A	N/A
Impinger Residue (g)	N/D	N/D	N/D
% CO_2	13.3	12.9	11.8
% O_2	5.8	7.2	5.3
% N_2	80.9	79.9	82.9
Meter Volume (dscf)	81.112	80.508	83.276
Flue Gas Moisture (%)	11.4	11.6	11.4
Gas Molecular Weight (Wet) (g/g-mole)	28.96	28.92	28.72
Absolute Stack Pressure (" Hg)	24.72	24.71	24.73
Absolute Stack Temperature (R)	601	595	602
Average Gas Velocity (f/sec)	67.97	68.83	70.25
Avg Flow Rate (acfm)	2,511,227	2,542,975	2,595,419
Avg Flow Rate (dscfm)	1,615,157	1,647,845	1,667,070
Isokinetic Sampling Rate (%)	103.55	100.74	103.01

N/A = Not analyzed.

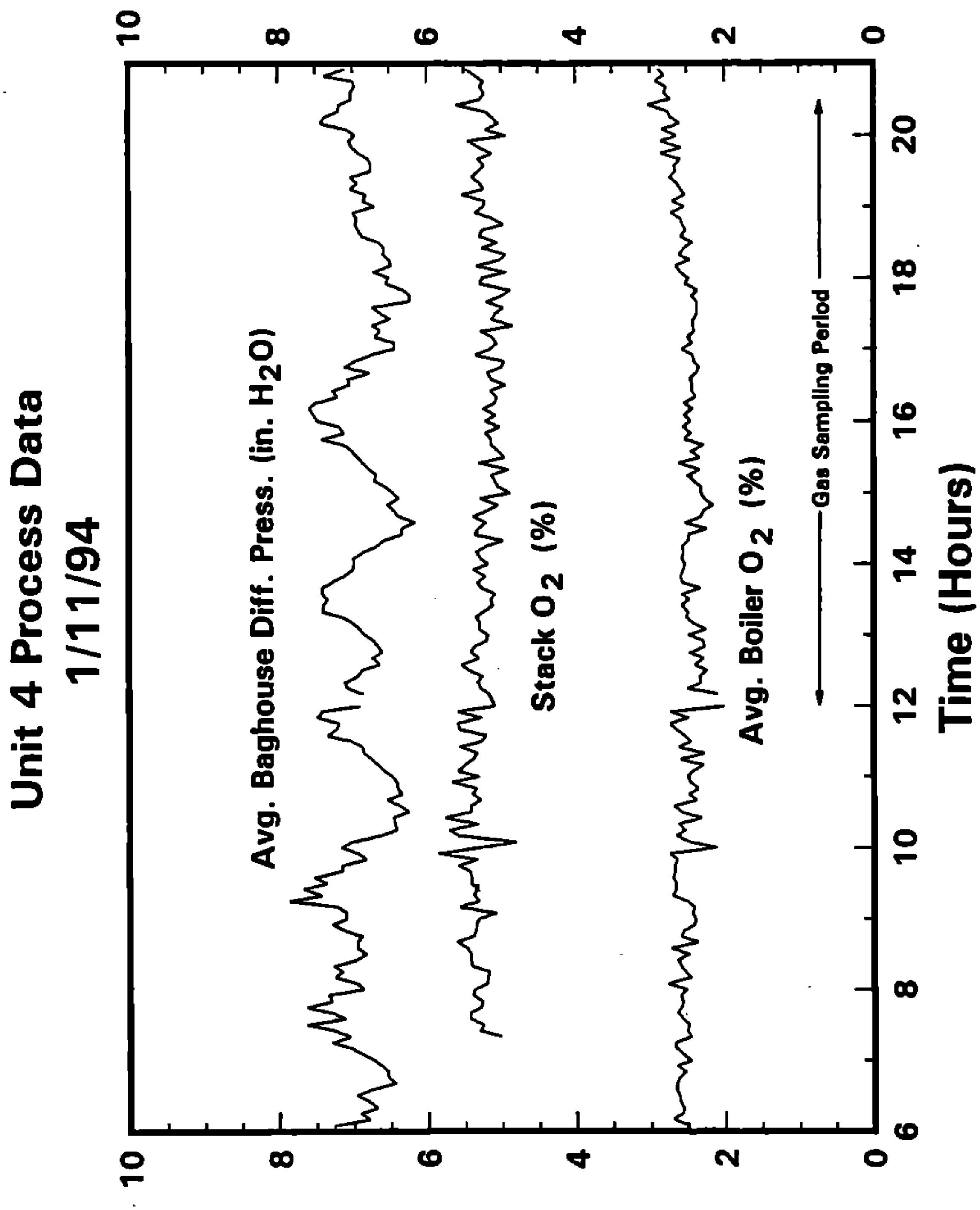
N/D = Not determined.

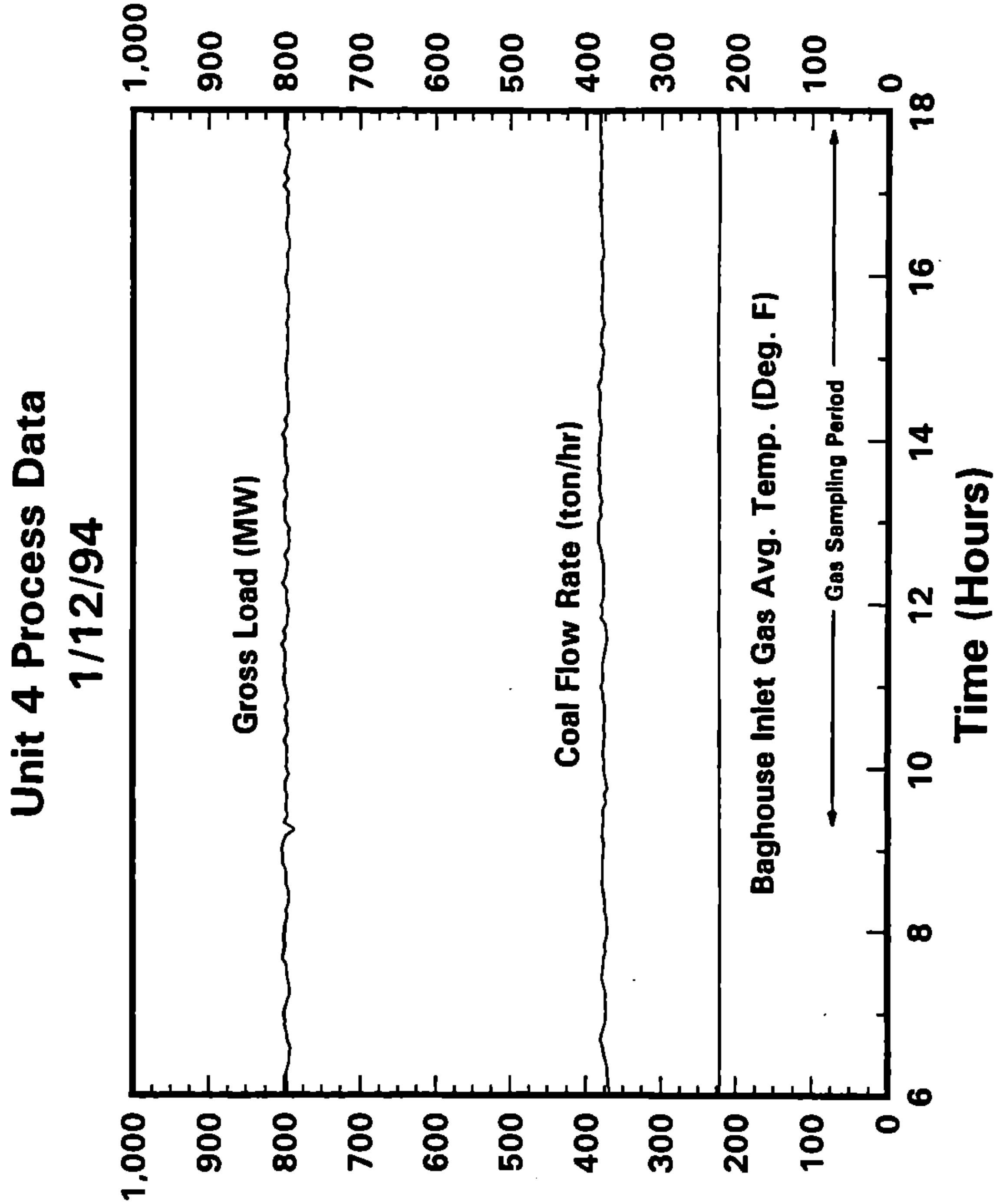
APPENDIX G: PROCESS DATA

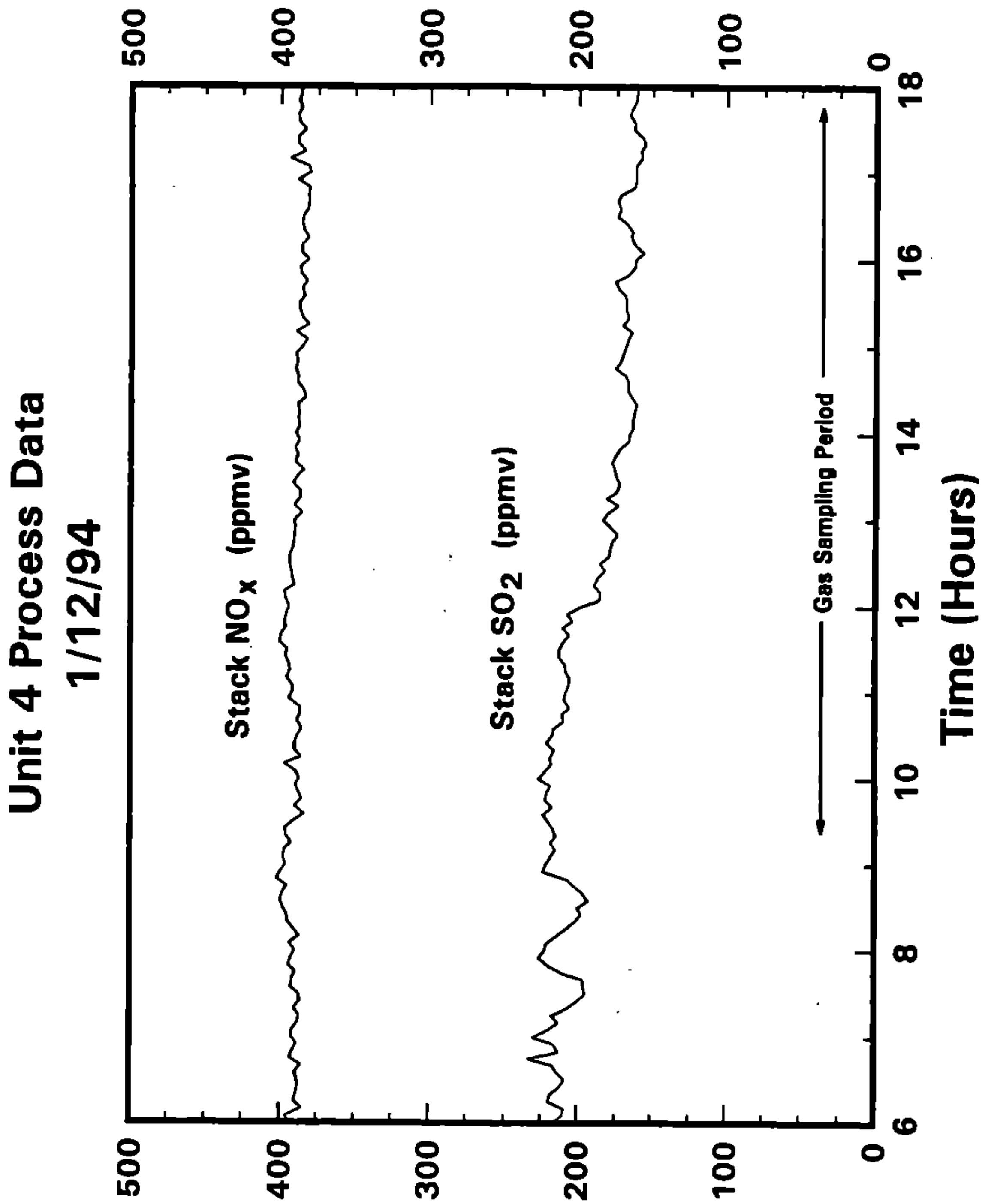

Unit 4 Process Data
1/11/94
Gross Load (MW)
Coal Flow Rate (ton/hr)
Baghouse Inlet Gas Avg. Temp. (Deg. F)
Gas Sampling Period
Time (Hours)
6
8
10
12
14
16
18
20
0
100
200
300
400
500
600
700
800
900
1,000

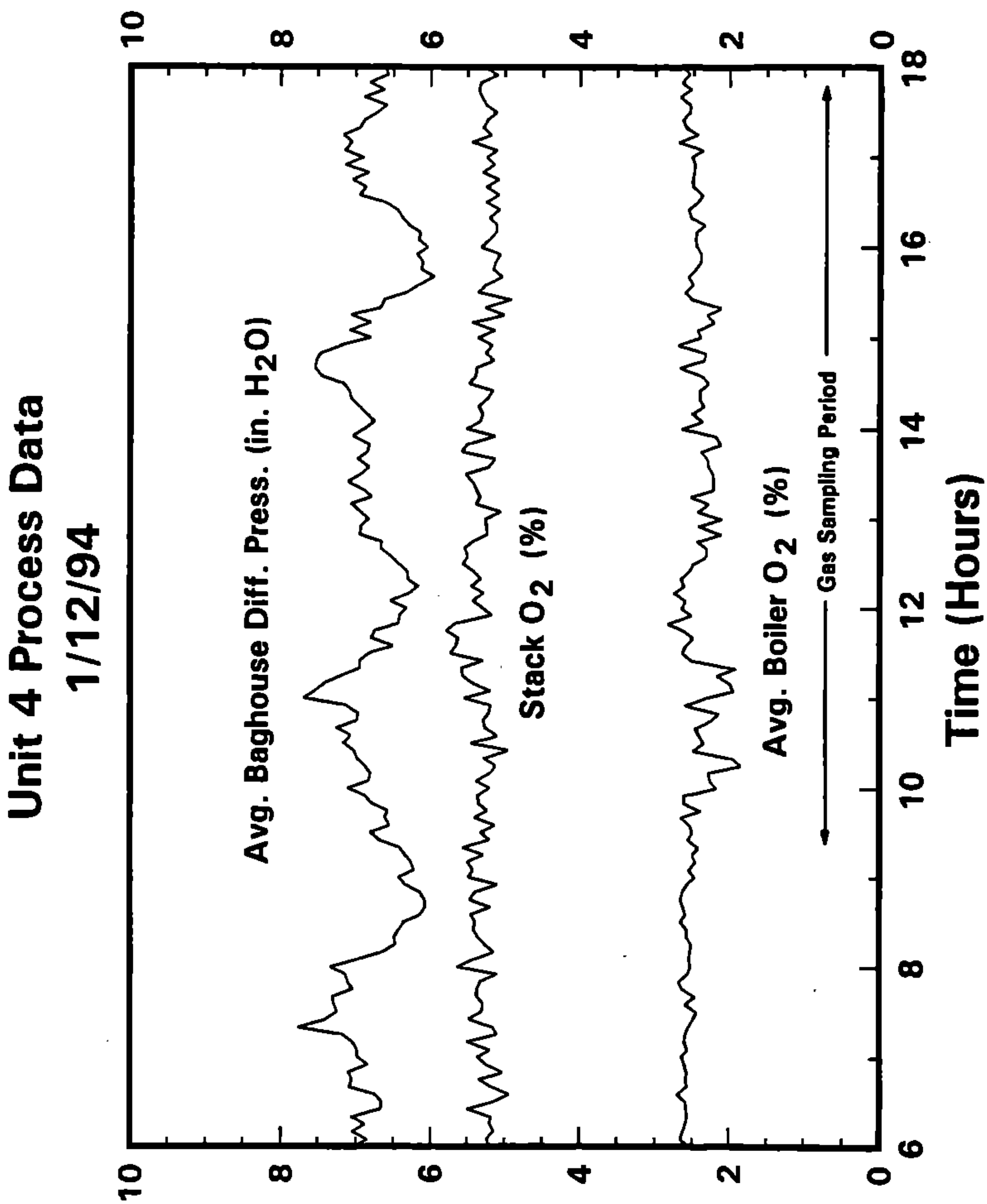


Unit 4 Process Data
1/11/94
Stack NO_x (ppmv)
Stack SO_2 (ppmv)
Gas Sampling Period
Time (Hours)
6
8
10
12
14
16
18
20
0
100
200
300
400
500

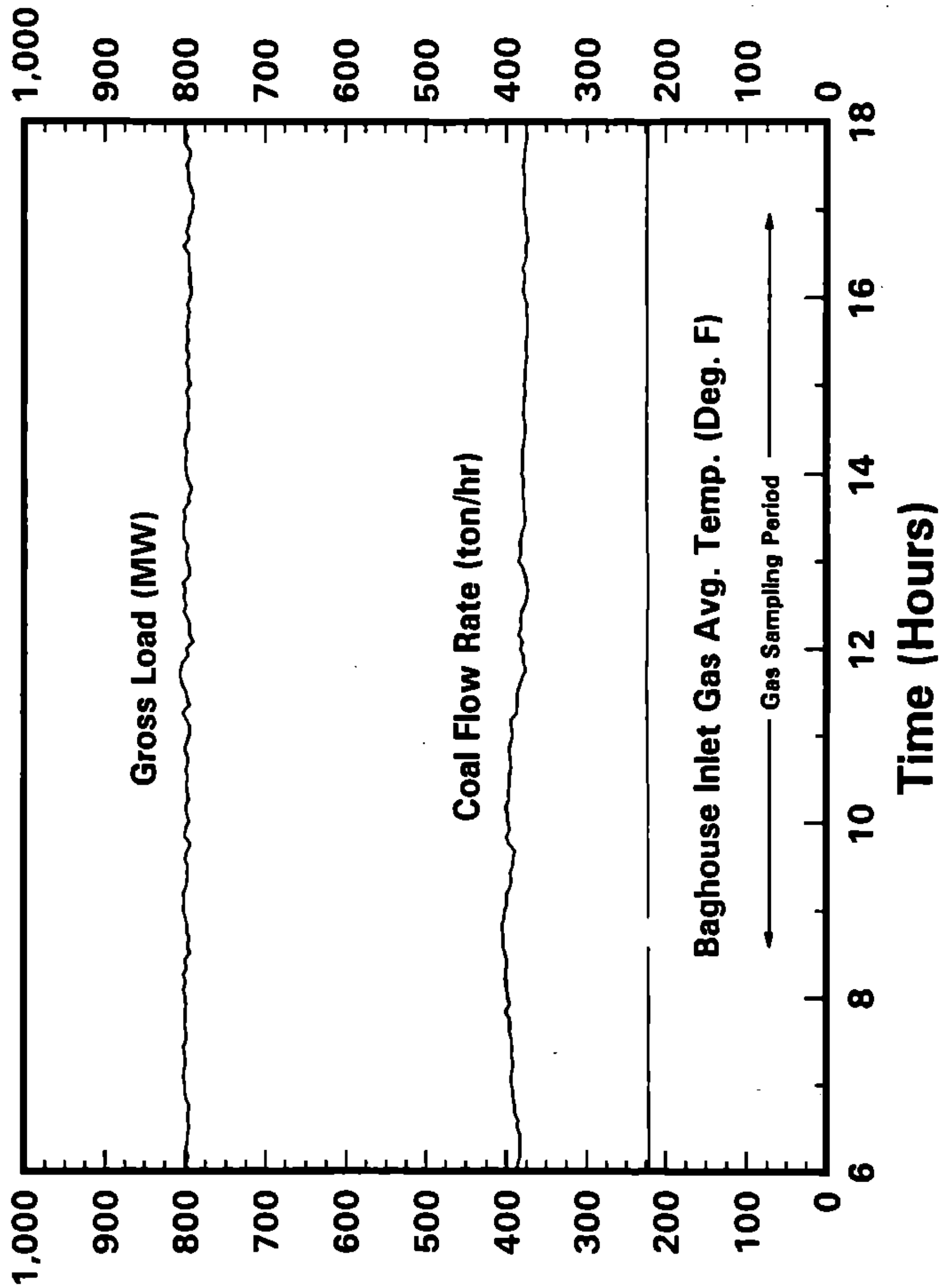

Unit 4 Process Data
1/11/94
Avg. Baghouse Diff. Press. (in. H2O)
Stack O2 (%)
Avg. Boiler O2 (%)
Gas Sampling Period
Time (Hours)
6
8
10
12
14
16
18
20
0
2
4
6
8
10

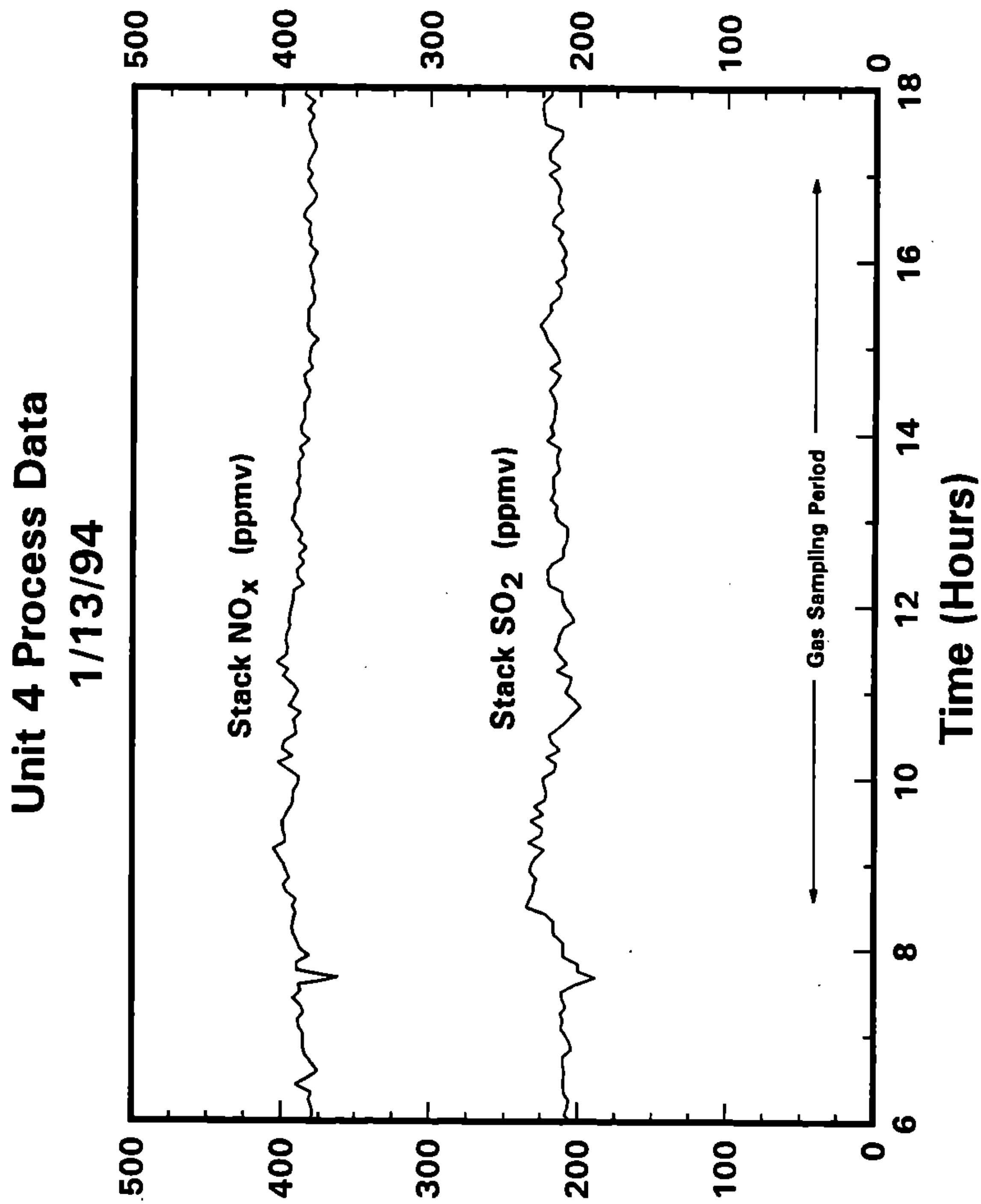

Unit 4 Process Data
1/12/94
Gross Load (MW)
Coal Flow Rate (ton/hr)
Baghouse Inlet Gas Avg. Temp. (Deg. F)
Gas Sampling Period
Time (Hours)
6
8
10
12
14
16
18
0
100
200
300
400
500
600
700
800
900
1,000

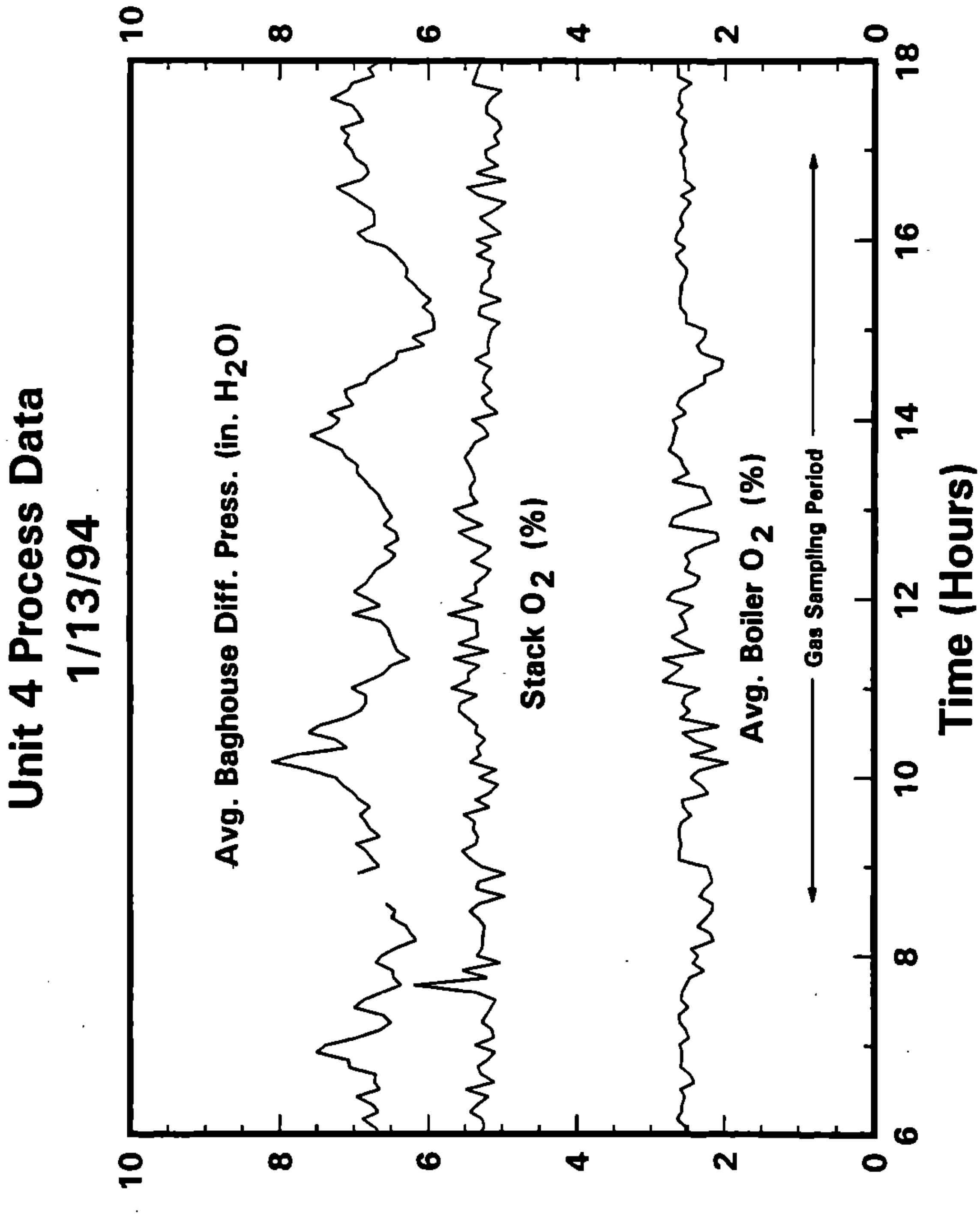

Unit 4 Process Data
1/12/94
Stack NO_x (ppmv)
Stack SO_2 (ppmv)
Gas Sampling Period
Time (Hours)
500
400
300
200
100
0
6
8
10
12
14
16
18


Unit 4 Process Data
1/12/94
Avg. Baghouse Diff. Press. (in. H_2O)
Stack O_2 (%)
Avg. Boiler O_2 (%)
Gas Sampling Period
Time (Hours)
6
8
10
12
14
16
18
0
2
4
6
8
10

Unit 4 Process Data
1/13/94




Unit 4 Process Data
1/13/94
Stack NOx (ppmv)
Stack SO2 (ppmv)
Gas Sampling Period
Time (Hours)
6
8
10
12
14
16
18
0
100
200
300
400
500


Unit 4 Process Data
1/13/94
Avg. Baghouse Diff. Press. (in. H_2O)
Stack O_2 (%)
Avg. Boiler O_2 (%)
Gas Sampling Period
Time (Hours)
6
8
10
12
14
16
18
0
2
4
6
8
10

Site 101 FGD Process Data

Date	Time	System				
		Bypass Damper (% open)	Inlet Temp (F)	Diff Press (In H2O)	Outlet Temp (F)	Feed Slurry Solids (%)
1/11/94	00:01	72	225	3.2	140	21.5
1/11/94	03:00	64	225	3.5	135	21.5
1/11/94	06:00	64	225	3.5	135	22.0
1/11/94	09:00	64	224	3.5	135	21.5
1/11/94	12:00	72	224	3.2	135	22.0
1/11/94	15:00	66	225	3.4	134	21.0
1/11/94	18:00	66	225	3.4	134	21.0
1/11/94	21:00	56	225	3.8	135	21.0
1/12/94	00:01	58	225	3.7	136	21.5
1/12/94	03:00	60	225	3.7	137	21.4
1/12/94	06:00	52	225	3.9	135	21.5
1/12/94	09:00	58	220	3.1	135	21.0
1/12/94	12:00	58	224	3.2	135	22.0
1/12/94	15:00	59	230	3.1	137	22.0
1/12/94	18:00	100	230	2.4	145	22.0
1/12/94	21:00	90	226	2.9	146	22.0
1/13/94	00:01	80	225	3.0	144	22.0
1/13/94	03:00	76	225	3.1	140	22.0
1/13/94	06:00	76	225	3.0	141	22.0
1/13/94	09:00	70	224	3.4	140	22.0
1/13/94	12:00	70	226	3.2	140	22.0
1/13/94	15:00	70	230	3.2	140	21.7
1/13/94	18:00	75	230	3.2	140	22.0
1/13/94	21:00	74	230	3.2	141	22.0

Site 101 FGD Process Data

		North Module (1)							
Date	Time	pH 1	pH 2	pH Avg	Recirc Tank Level (ft)	Slurry Solids (%)	Outlet Temp (F)	Demister Diff Press (In H2O)	Absorber Diff Press (In H2O)
1/11/94	00:01	6.0	6.5	6.25	28.0	12.5	115	0.24	2.0
1/11/94	03:00	6.2	6.7	6.45	28.4	10.8	115	0.26	2.3
1/11/94	06:00	6.1	6.7	6.40	28.0	12.6	115	0.27	2.3
1/11/94	09:00	6.1	6.7	6.40	27.0	13.0	115	0.26	2.3
1/11/94	12:00	6.3	6.0	6.15	28.0	12.5	115	0.21	2.0
1/11/94	15:00	6.0	5.9	5.95	27.4	14.5	118	0.21	1.8
1/11/94	18:00	6.2	6.0	6.10	28.0	15.0	118	0.22	1.9
1/11/94	21:00	6.2	6.0	6.10	29.0	12.5	115	0.28	2.1
1/12/94	00:01	6.0	5.9	5.95	27.0	12.5	115	0.26	2.1
1/12/94	03:00	6.1	5.9	6.00	27.6	12.5	115	0.23	2.1
1/12/94	06:00	6.0	5.8	5.90	28.0	13.0	115	0.27	2.2
1/12/94	09:00	6.0	5.9	5.95	28.0	14.0	115	0.24	2.0
1/12/94	12:00	6.0	6.0	6.00	27.4	13.0	115	0.26	2.1
1/12/94	15:00	5.9	5.9	5.90	28.8	13.4	115	0.26	2.1
1/12/94	18:00	6.0	5.9	5.95	27.6	13.0	115	0.16	1.5
1/12/94	21:00	6.0	5.9	5.95	28.4	15.0	115	0.14	1.4
1/13/94	00:01	6.0	5.9	5.95	28.8	13.0	115	0.16	1.5
1/13/94	03:00	6.0	5.9	5.95	27.0	13.0	115	0.19	1.6
1/13/94	06:00	6.0	5.9	5.95	27.6	15.0	115	0.18	1.6
1/13/94	09:00	6.0	5.9	5.95	28.0	13.0	115	0.18	1.6
1/13/94	12:00	6.0	6.0	6.00	27.0	13.4	115	0.17	1.6
1/13/94	15:00	6.1	6.0	6.05	28.8	14.0	115	0.18	1.6
1/13/94	18:00	6.0	5.9	5.95	27.7	15.5	115	0.16	1.5
1/13/94	21:00	6.1	6.0	6.05	28.0	15.5	115	0.16	1.5

Site 101 FGD Process Data

		North Center Module (2)							
Date	Time	pH 1	pH 2	pH Avg	Recirc Tank Level (ft)	Slurry Solids (%)	Outlet Temp (F)	Demister Diff Press (in H2O)	Absorber Diff Press (in H2O)
1/11/94	00:01	5.9	6.0	5.95	23.4	1.0	115	0.34	2.5
1/11/94	03:00	6.1	6.1	6.10	23.0	1.9	115	0.36	2.7
1/11/94	06:00	5.9	6.0	5.95	23.0	3.0	115	0.38	2.7
1/11/94	09:00	6.0	6.0	6.00	23.0	4.0	115	0.40	2.7
1/11/94	12:00	6.0	6.0	6.00	23.0	5.0	116	0.32	2.4
1/11/94	15:00	6.0	6.0	6.00	22.9	7.0	116	0.36	2.8
1/11/94	18:00	6.0	6.0	6.00	23.0	7.5	119	0.36	2.6
1/11/94	21:00	5.9	6.0	5.95	25.0	7.0	119	0.42	2.8
1/12/94	00:01	5.7	7.2	6.45	25.8	7.0	115	0.42	2.8
1/12/94	03:00	5.9	6.0	5.95	26.0	7.5	115	0.39	2.7
1/12/94	06:00	6.1	6.1	6.10	26.0	8.5	115	0.43	2.9
1/12/94	09:00	6.0	6.0	6.00	25.0	9.4	116	0.28	2.0
1/12/94	12:00	6.0	6.0	6.00	25.4	10.4	116	0.30	2.1
1/12/94	15:00	5.8	5.8	5.80	25.2	12.0	118	0.29	2.1
1/12/94	18:00	6.0	5.8	5.90	26.5	12.0	117	0.20	1.8
1/12/94	21:00	5.8	6.0	5.90	27.0	12.0	119	0.23	1.7
1/13/94	00:01	5.9	6.4	6.15	27.4	11.5	117	0.22	1.8
1/13/94	03:00	6.1	6.0	6.05	27.0	12.0	117	0.26	1.9
1/13/94	06:00	5.9	5.9	5.90	27.0	12.8	116	0.25	1.8
1/13/94	09:00	6.1	6.0	6.05	29.0	12.5	117	0.28	1.9
1/13/94	12:00	6.2	6.1	6.15	27.0	13.5	119	0.28	1.9
1/13/94	15:00	5.8	5.9	5.85	28.0	14.0	120	0.28	1.9
1/13/94	18:00	6.1	6.0	6.05	28.0	13.5	119	0.26	1.8
1/13/94	21:00	6.1	6.0	6.05	27.3	13.2	118	0.26	1.8

Site 101 FGD Process Data

Date	Time	Center Module (3)							
		pH 1	pH 2	pH Avg	Recirc Tank Level (ft)	Slurry Solids (%)	Outlet Temp (F)	Demister Diff Press (In H2O)	Absorber Diff Press (In H2O)
1/11/94	00:01	6.0	6.0	6.00	26.9	16.0	115	0.20	1.9
1/11/94	03:00	5.9	6.0	5.95	26.8	16.0	115	0.23	1.5
1/11/94	06:00	6.1	6.1	6.10	26.8	16.5	115	0.22	1.5
1/11/94	09:00	6.0	6.0	6.00	25.0	16.5	115	0.22	1.5
1/11/94	12:00	6.1	6.1	6.10	26.0	17.0	115	0.20	1.4
1/11/94	15:00	6.2	6.1	6.15	27.8	17.5	115	0.22	1.5
1/11/94	18:00	6.0	6.0	6.00	29.0	17.5	115	0.22	1.5
1/11/94	21:00	6.0	6.0	6.00	27.0	17.0	115	0.22	1.5
1/12/94	00:01	6.2	6.1	6.15	27.4	16.5	115	0.25	2.1
1/12/94	03:00	6.0	6.0	6.00	26.8	16.5	115	0.24	1.5
1/12/94	06:00	5.9	5.9	5.90	27.0	16.5	115	0.26	1.6
1/12/94	09:00	6.0	6.0	6.00	28.0	16.5	115	0.30	2.1
1/12/94	12:00	6.0	6.0	6.00	27.0	17.0	115	0.32	2.1
1/12/94	15:00	6.1	6.0	6.05	27.3	18.3	115	0.31	2.1
1/12/94	18:00	6.0	5.9	5.95	28.0	18.0	115	0.23	1.8
1/12/94	21:00	5.8	5.8	5.80	27.0	17.7	115	0.23	1.6
1/13/94	00:01	6.0	5.9	5.95	27.0	17.4	115	0.23	1.7
1/13/94	03:00	5.9	5.9	5.90	27.4	17.5	115	0.26	1.8
1/13/94	06:00	5.8	5.8	5.80	27.6	17.0	115	0.24	1.7
1/13/94	09:00	5.9	5.9	5.90	26.0	17.0	115	0.28	1.8
1/13/94	12:00	6.0	5.9	5.95	27.0	17.5	115	0.26	1.8
1/13/94	15:00	5.9	5.9	5.90	27.9	18.9	115	0.26	1.8
1/13/94	18:00	6.0	6.0	6.00	27.0	18.0	115	0.24	1.7
1/13/94	21:00	6.0	6.0	6.00	27.0	18.0	115	0.24	1.7

Site 101 FGD Process Data

		South Module (5)							
Date	Time	pH 1	pH 2	pH Avg	Recirc Tank Level (ft)	Slurry Solids (%)	Outlet Temp (F)	Demister Diff Press (in H2O)	Absorber Diff Press (in H2O)
1/11/94	00:01	5.9	6.0	5.95	28.9	17.5	112	0.16	1.2
1/11/94	03:00	6.0	5.9	5.95	27.0	16.5	115	0.19	1.3
1/11/94	06:00	6.1	6.0	6.05	28.0	16.5	115	0.19	1.4
1/11/94	09:00	6.0	5.9	5.95	28.0	16.0	115	0.18	1.3
1/11/94	12:00	6.1	6.0	6.05	28.0	17.0	115	0.16	1.3
1/11/94	15:00	5.6	5.9	5.75	28.0	16.0	115	0.16	1.2
1/11/94	18:00	6.0	6.2	6.10	27.0	16.0	115	0.16	1.2
1/11/94	21:00	5.9	6.2	6.05	29.0	16.0	115	0.16	1.2
1/12/94	00:01	5.8	5.9	5.85	27.0	16.0	115	0.20	1.3
1/12/94	03:00	5.7	5.8	5.75	28.0	15.4	115	0.18	1.3
1/12/94	06:00	5.8	5.9	5.85	28.6	15.5	115	0.20	1.4
1/12/94	09:00	5.8	5.8	5.80	27.0	15.0	115	0.28	2.0
1/12/94	12:00	5.8	5.9	5.85	28.0	16.0	115	0.28	2.0
1/12/94	15:00	5.8	5.8	5.80	29.0	16.5	115	0.28	2.0
1/12/94	18:00	6.0	6.1	6.05	27.6	16.0	115	0.20	1.6
1/12/94	21:00	6.1	6.3	6.20	28.2	16.5	115	0.16	1.4
1/13/94	00:01	6.0	6.1	6.05	28.8	16.0	116	0.18	1.4
1/13/94	03:00	6.0	6.1	6.05	27.6	16.0	116	0.20	1.5
1/13/94	06:00	6.0	6.0	6.00	28.0	16.0	116	0.19	1.4
1/13/94	09:00	6.0	6.0	6.00	27.0	15.0	116	0.21	1.5
1/13/94	12:00	5.9	6.0	5.95	27.5	15.7	116	0.20	1.5
1/13/94	15:00	5.8	5.7	5.75	29.0	16.0	117	0.20	1.5
1/13/94	18:00	6.2	6.2	6.20	28.0	16.0	115	0.20	1.5
1/13/94	21:00	6.3	6.3	6.30	28.1	15.8	115	0.20	1.5