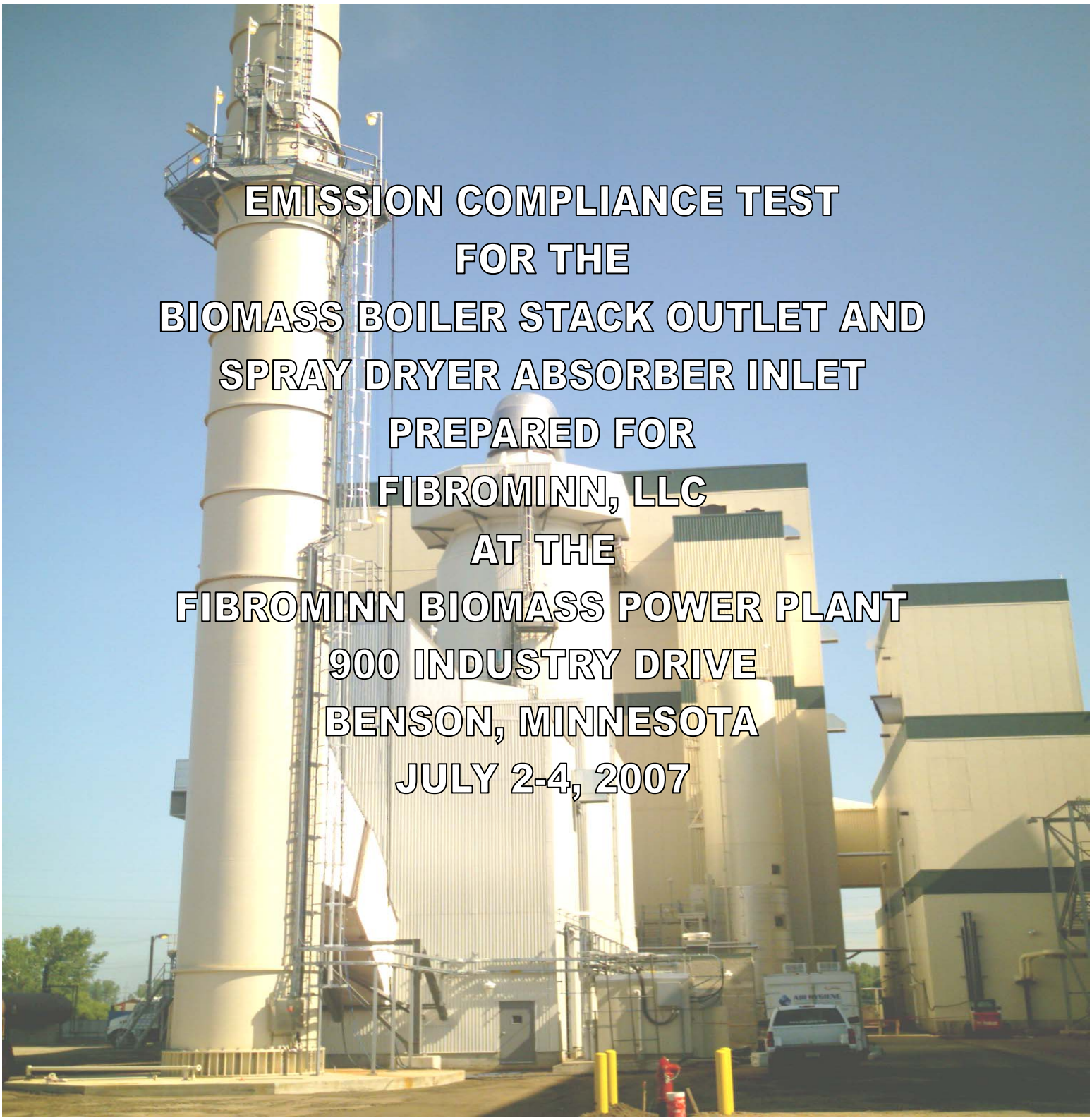
Air Hygiene International, Inc.

The Clear Choice



EMISSION COMPLIANCE TEST
FOR THE
BIOMASS BOILER STACK OUTLET AND
SPRAY DRYER ABSORBER INLET
PREPARED FOR
FIBROMINN, LLC
AT THE
FIBROMINN BIOMASS POWER PLANT
900 INDUSTRY DRIVE
BENSON, MINNESOTA
JULY 2-4, 2007

Air Hygiene International, Inc.

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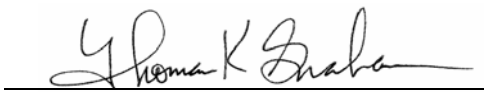
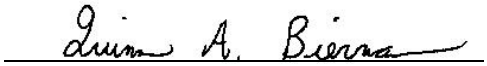
Prepared and Reviewed by:



Thomas K. Graham, PE, Director of Operations



Quinn A. Bierman, President

Minn R. 7017.2040 Certification Statements

Certification of sampling procedures
I certify under penalty of law that the sampling procedures were performed in accordance with the approved test plan and that the data presented in this test report are, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.

Thomas K. Graham, PE, Director of Operations

Exceptions: None

Certification of analytical procedures
I certify under penalty of law that the analytical procedures were performed in accordance with the requirements of the test methods and that the data presented for use in the test report were, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.

Pandu Sattvika, Laboratory Manager

Exceptions: None

Certification of test report by testing company
I certify under penalty of law that this test report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the test information submitted. Based on my inquiry of the person or persons who performed sampling and analysis relating to the performance test, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.

Quinn A. Bierman, President

Exceptions: None

Certification of test report by owner or operator of emission facility
I certify under penalty of law that the information submitted in this test report accurately reflects the operating conditions at the emission facility during this performance test and describes the date and nature of all operational and maintenance activities that were performed on process and control equipment during the month prior to the performance test. Based on my inquiry of the person or persons who performed the operational and maintenance activities, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.

Exceptions:

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APPENDICES

Emissions Compliance Test
Biomass Boiler Stack Outlet and Spray Dryer Absorber Inlet
Fibrominn, LLC
Fibrominn Biomass Power Plant
Benson, Minnesota
July 2-4, 2007

1.0 INTRODUCTION

Air Hygiene International, Inc. (Air Hygiene) has completed the emissions testing study for nitrogen oxides (NOx), carbon monoxide (CO), sulfur dioxide (SO_2), hydrochloric acid (HCl), particulate matter (PM), opacity, carbon dioxide (CO_2), and oxygen (O_2) from the Biomass Boiler Stack Outlet and Spray Dryer Absorber Inlet for Fibrominn, LLC at the Fibrominn Biomass Power Plant near Benson, Minnesota. This report details the background, results, process description, and the sampling/analysis methodology of the stack sampling survey conducted on July 2-4, 2007.

1.1 TEST PURPOSE AND OBJECTIVES

The purpose of the test was to conduct an initial compliance emission test to document levels of selected pollutants at a maximum test load (greater than 90 percent). The information will be used to confirm compliance with the operating permit issued by the Minnesota Pollution Control Agency (MPCA). The specific objective was to determine the emission concentration of NOx, CO, SO_2, HCl, PM, opacity, CO_2, and O_2 from Fibrominn, LLC's Biomass Boiler Stack Outlet and Spray Dryer Absorber Inlet.

1.2 SUMMARY OF TEST PROGRAM

The following list details pertinent information related to this specific project:

1.2.1 Participating Organizations
- Minnesota Pollution Control Agency (MPCA)
- Fibrominn, LLC
- SNC - Lavalin
- Air Hygiene

1.2.2 Industry
- Biomass Fired Electric Utility / Electric Services

1.2.3 Air Permit
- Permit Number: 15100038-004
- AQ Facility ID No: 4065

1.2.4 Plant Location
- Fibrominn Biomass Power Plant near Benson, Minnesota

1.2.5 Equipment Tested
- Biomass Boiler Stack Outlet and Spray Dryer Absorber Inlet

1.2.6 Emission Points
- Biomass Boiler Stack Outlet and Spray Dryer Absorber Inlet
- For NOx, CO, SO_2, CO_2, and O_2, 12 sampling points from the Biomass Boiler Stack Outlet and Spray Dryer Absorber Inlet (SO_2 and O_2, only), determined after conducting a stratification test (refer to Appendix E

- For all HCl testing, one sample point in the Biomass Boiler Stack Outlet and Spray Dryer Absorber Inlet (refer to Appendix B)
- For all PM testing, twelve sample points in the Biomass Boiler Stack Outlet (refer to Appendix B)
- For opacity, one sample visual observation point from the exit of the exhaust duct to the atmosphere from the Biomass Boiler Stack Outlet

1.2.7 Pollutants Measured

- NOx
- CO
- SO_2
- HCl
- PM
- Opacity
- CO_2
- O_2

1.2.8 Dates of Emission Test

- July 2-4, 2007

1.3 KEY PERSONNEL

Fibrominn, LLC:	Chuck Wagoner	320-843-9013
MPCA:	Steven Gorg	651-296-8766
CiSCO:	Brad Shibata	303-790-1000
SNC:	Victor Myers	320-843-5170
Air Hygiene:	Thomas Graham	918-307-8865

2.0 SUMMARY OF TEST RESULTS

Results from the sampling conducted on Fibrominn, LLC's Biomass Boiler Stack Outlet and Spray Dryer Absorber Inlet located at the Fibrominn Biomass Power Plant on July 2-4, 2007 are summarized in the following tables.

TABLE 1.1
BIOMASS BOILER, UNIT #1 SDA INLET DATA SUmmARY

Parameter	High Load, Run - In-1	High Load, Run - In-2	High Load, Run - In-3	Average	Permit Limits
Date (mm/dd/yy)	07/03/07	07/03/07	07/03/07	07/03/07	--
Start Time (hh:mm:ss)	17:58:14	19:40:14	21:39:14	17:58:14	--
End Time (hh:mm:ss)	18:57:44	20:39:44	22:38:44	22:38:44	--
Run Duration (min)	60	60	60	60	--
Bar. Pressure (in. Hg)	29.43	29.44	29.46	29.44	--
Amb. Temp. (°F)	81	78	77	79	--
Rel. Humidity (%)	71	72	71	71	--
Spec. Humidity (lb water / lb air)	0.016438	0.014868	0.014450	0.015252	--
SO_2 (ppmvd)	337.80	337.81	334.51	336.71	--
SO_2 GeoAvg (ppmvd)	335.87	336.02	330.47	334.12	--
HCl (ppm)	60.82	81.46	41.28	61.19	--
O_2 (%)	5.24	5.22	4.89	5.11	--

TABLE 1.2
BIOMASS BOILER, UNIT #1 STACK OUTLET DATA SUmmARY

Parameter	High Load, Run - Out-1	High Load, Run - Out-2	High Load, Run - Out-3	Average	Permit Limits
Date (mm/dd/yy)	07/03/07	07/03/07	07/03/07	07/03/07	--
Start Time (hh:mm:ss)	17:58:14	19:40:14	21:39:14	17:58:14	--
End Time (hh:mm:ss)	18:57:44	20:39:44	22:38:44	22:38:44	--
Run Duration (min)	60	60	60	60	--
Bar. Pressure (in. Hg)	29.43	29.44	29.46	29.44	--
Amb. Temp. (°F)	81	78	77	79	--
Rel. Humidity (%)	71	72	71	71	--
Spec. Humidity (lb water / lb air)	0.016438	0.014868	0.014450	0.015252	--
Stack Flow (M2) (SCFH)	10,257,198	9,847,715	10,305,362	10,136,759	--
Stack Moisture (% Method 4)	25.7	26.0	24.9	25.5	--
Heat Input (MMBtu/hr)	784.4	774.1	777.9	778.8	--
Gross Power Output (gross MW)	61.3	61.8	62.8	62.0	--
Steam Rate (lb/hr)	487,155.4	487,320.0	490,766.8	488,414.1	--
Biomass Flow (TPH)	83.9	83.3	88.5	85.22	--
Urea Injection (gal/hr)	89.3	89.0	94.1	90.82	--
Feedwater Flow (lb/hr)	496,079.1	486,900.6	492,715.3	491,898.33	--
Secondary Air Flow (lb/hr)	354,765.7	339,053.9	354,522.2	349,447.27	--
Primary Air Flow (lb/hr)	249,174.1	244,226.6	258,475.4	250,625.36	--
Dist. Air Flow (lb/hr)	70,974.0	71,209.3	72,455.2	71,546.16	--
SDA Slurry Flow (GPM)	27.1	22.3	30.9	26.76	--
SDA Quench Flow (GPM)	14.4	14.5	8.6	12.50	--
Sootblower Flow (lb/hr)	4,414.2	2,176.5	2,648.5	3,079.75	--
SH Steam Temp (°F)	968.0	970.6	968.9	969.19	--
SH Steam Pres. (psi)	1,499.7	1,503.8	1,498.8	1,500.78	--
NOx (ppmvd)	90.31	77.80	101.11	89.74	--
NOx (ppm@7%O_2)	80.71	67.52	91.25	79.83	--
NOx (lb/hr)	110.64	91.50	124.45	108.86	--
NOx (ton/year) at 8760 hr/year	484.59	400.78	545.10	476.82	--
NOx (lb/MMBtu)	0.141	0.118	0.160	0.140	0.16
CO (ppmvd)	229.25	260.13	165.12	218.17	--
CO (ppm@7%O_2)	204.89	225.77	149.01	193.22	--
CO (lb/hr)	170.91	186.20	123.68	160.26	--
CO (ton/year) at 8760 hr/year	748.60	815.54	541.72	701.95	--
CO (lb/MMBtu)	0.218	0.241	0.159	0.206	0.24
SO_2 (ppmvd)	64.35	65.95	66.90	65.73	--
SO_2 (ppm@7%O_2)	57.51	57.24	60.38	58.37	--
SO_2 (lb/hr)	109.65	107.90	114.55	110.70	--
SO_2 (ton/year) at 8760 hr/year	480.28	472.59	501.71	484.86	--
SO_2 (lb/MMBtu)	0.140	0.139	0.147	0.142	--
SO_2 (% reduction)	80.95	80.48	80.00	80.48	--
SO_2 GeoAvg (ppmvd)	64.21	63.09	64.56	63.95	--
SO_2 GeoAvg (ppm@7%O_2)	56.83	55.88	59.15	57.29	--
SO_2 GeoAvg (lb/hr)	108.36	105.34	112.23	108.64	--
SO_2 GeoAvg (ton/year) at 8760 hr/year	480.28	472.59	501.71	484.86	--
SO_2 GeoAvg (lb/MMBtu)	0.138	0.136	0.145	0.140	0.07
SO_2 GeoAvg (% reduction)	80.88	81.23	80.47	80.86	80
HCl (ppm)	4.83	14.84	11.02	10.23	--
HCl (ppm@7%O_2)	4.32	12.88	9.94	9.05	--
HCl (lb/hr)	4.69	13.83	10.75	9.76	--
HCl (ton/year) at 8760 hr/year	20.44	60.24	46.81	42.50	--
HCl (lb/MMBtu)	0.006	0.018	0.014	0.013	0.034
HCl (% reduction)	92.05	81.78	73.30	82.38	95
Maximum Opacity (%)	15	15	5	12	20
CO_2 (%)	14.46	14.86	14.27	14.53	--
O_2 (%)	5.35	4.88	5.50	5.24	--

TABLE 1.3
BIOMASS BOILER, UNIT #1 STACK OUTLET PM DATA SUmmARY

Parameter	High Load, Run - 3-1	High Load, Run - 3-2	High Load, Run - 3-3	Average	Permit Limits
Date (mm/dd/yy)	07/03/07	07/04/07	07/04/07	07/03/07	--
Start Time (hh:mm:ss)	23:42	02:44	05:27	23:42	--
End Time (hh:mm:ss)	02:38	05:22	07:58	07:58	--
Sample Time (min)	150	150	150	150	--
Bar. Pressure (in. Hg)	29.49	29.49	29.49	29.49	--
Gross Power Output (gross MW)	62.4	62.6	62.8	62.6	--
Steam Rate (lb/hr)	483,806	482,478	483,952	483,412.1	--
Biomass Flow (TPH)	84.2	81.1	81.0	82.12	--
Urea Injection (gal/hr)	95.8	90.1	93.5	93.13	--
Feedwater Flow (lb/hr)	499,002	488,761	495,380	494,380.93	--
Secondary Air Flow (lb/hr)	358,166	350,944	359,827	356,312.66	--
Primary Air Flow (lb/hr)	262,704	254,618	261,366	259,562.48	--
Dist. Air Flow (lb/hr)	72,757	73,188	73,838	73,260.72	--
SDA Slurry Flow (GPM)	34.7	26.1	27.6	29.49	--
SDA Quench Flow (GPM)	7.1	10.1	12.7	9.95	--
Sootblower Flow (lb/hr)	9,746	2,493	9,618	7,285.56	--
SH Steam Temp (°F)	970	970	971	970.15	--
SH Steam Pres. (psi)	1,500	1,502	1,502	1,501.47	--
Total PM/PM10 (mg)	241.84	292.66	276.34	270.28	--
Total PM/PM10 (g/dscf)	2.24E-03	2.63E-03	2.32E-03	2.40E-03	--
Total PM/PM10 (gr/dscf)	3.46E-02	4.05E-02	3.58E-02	3.70E-02	--
Total PM/PM10 (kg/hr)	23.72	26.25	26.20	25.39	--
Total PM/PM10 (lb/hr)	52.30	57.88	57.76	55.98	--
Total PM/PM10 (ton/year) at 8760 hr/year	229.07	253.52	253.00	245.20	--
Total PM/PM10 (lb/MMBtu)	0.061	0.073	0.069	0.068	--
Front Half PM (mg)	21.28	19.23	15.89	18.80	--
Front Half PM (g/dscf)	1.97E-04	1.73E-04	1.34E-04	1.68E-04	--
Front Half PM (gr/dscf)	3.04E-03	2.66E-03	2.06E-03	2.59E-03	--
Front Half PM (kg/hr)	2.09	1.73	1.51	1.77	--
Front Half PM (lb/hr)	4.60	3.80	3.32	3.91	--
Front Half PM (ton/year) at 8760 hr/year	20.16	16.66	14.55	17.12	--
Front Half PM (lb/MMBtu)	0.005	0.005	0.004	0.005	0.02
Back Half PM10 (mg)	220.56	273.43	260.45	251.48	--
Back Half PM10 (g/dscf)	2.04E-03	2.45E-03	2.19E-03	2.23E-03	--
Back Half PM10 (gr/dscf)	3.15E-02	3.79E-02	3.38E-02	3.44E-02	--
Back Half PM10 (kg/hr)	21.64	24.53	24.69	23.62	--
Back Half PM10 (lb/hr)	47.70	54.08	54.44	52.07	--
Back Half PM10 (ton/year) at 8760 hr/year	208.92	236.86	238.45	228.08	--
Back Half PM10 (lb/MMBtu)	0.055	0.068	0.065	0.063	--

All measured pollutant concentrations and calculated rates were below the given permit limits with the exception of SO_2 in units of pounds per million British thermal units (lb/MMBtu). Instead, SO_2 passed under a permit limit based on total percent reduction. Also, due to the testing timeframe, based on periods of proper / maximum operation of the source, the third opacity run was performed on the following day, as the sun had set and no light was available for proper opacity readings. All other measurements and calculations were performed as stated and approved in the attached testing protocol (Appendix G) without any real or apparent errors. Unit loads during testing were at or above 90 percent of maximum.

3.0 SOURCE OPERATION

3.1 PROCESS DESCRIPTION

PowerMinn 9090, LLC (PowerMinn) owns and Fibrominn, LLC (Fibrominn) operates the Fibrominn Biomass Power Plant in Swift County, Benson, Minnesota. The plant consists of one boiler, fueled principally with poultry litter. Vegetative biomass may also be burned. The facility generates a nominal 50 megawatts (MW) of electricity for export and has a peak electrical export capacity of 55 MW with a peak gross electrical generating capacity of 65 MW.

Emissions from the boiler are controlled by a spray dryer absorber followed by a fabric filter baghouse to control particulate matter and particulate matter / particulate matter less than 10 microns in diameter (PM/PM_{10}), SO_2, sulfuric acid mist (H_2SO_4), and HCl. Selective non-catalytic reduction (SNCR) is used to control NOx. Good combustion practices are used to control CO and volatile organic compounds (VOCs).

3.2 SAMPLING LOCATION

Compliance testing was performed on the unit at the spray dryer absorber (SDA) inlet and the stack outlet. The SDA inlet duct is circular and measures 10.8 feet (ft) (129 inches) in diameter at the test ports which are approximately 120 ft above grade level. The test ports are located approximately 101.8 ft (1,222 inches) downstream and approximately 29.2 ft (350 inches) upstream from the nearest disturbances.

The stack exhaust is circular and measures 9 feet (ft) (108 inches) in diameter at the test ports which are approximately 104 ft above grade level with an exit elevation of approximately 300 ft above grade level. The test ports are located approximately 75.8 ft (910 inches) downstream and approximately 196.5 ft (2,358 inches) upstream from the nearest disturbances.

All samples for NOx, CO, SO_2, CO_2, and O_2 emissions were continuously drawn from the stack exhaust and SDA Inlet (SO_2 and O_2, only) at 12 sample points determined after conducting an initial stratification test (Appendix E). During the stratification test 12 points were traversed from each location. The probe was allowed to remain at each point for two times the systems response time. For PM testing on the stack exhaust, an initial velocity traverse was performed across the stack from 12 total points. All PM sampling occurred from the same 12 points by leaving the probe at each for an equal amount of time in order to draw at least 100 dry standard cubic feet of gas through the sample train. All HCl testing on the stack exhaust and the SDA inlet occurred from single sampling points near the center of each location, per MPCA proposed variation approval. All opacity observations were made by viewing the point where the exhaust system exited to the atmosphere at the top of the exhaust stack.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

The emission test on the Biomass Boiler Stack Outlet and Spray Dryer Absorber Inlet at the Fibrominn Biomass Power Plant was performed following United States Environmental Protection Agency (EPA) methods described by the Code of Federal Regulations (CFR). Table 4.1 outlines the specific methods performed on July 2-4, 2007.

TABLE 4.1
SUMMARY OF SAMPLING METHODS

Pollutant or Parameter	Sampling Method	Analysis Method
Sample Point Location	EPA Method 1	Equal Area Method
Stack Flow Rate	EPA Method 2	S-Type Pitot Tube
Oxygen	EPA Method 3a	Paramagnetic Cell
Carbon Dioxide	EPA Method 3a	Nondispersive Infrared Analyzer
Stack Moisture Content	EPA Method 4	Gravimetric Analysis
Particulate Matter	EPA Method 5	Front Half Filterables
Sulfur Dioxide	EPA Method 6c	Ultraviolet
Nitrogen Oxides	EPA Method 7e	Chemiluminescent Analyzer
Opacity	EPA Method 9	Visual Observation
Carbon Monoxide	EPA Method 10	Nondispersive Infrared Analyzer
Fuel Based F-Factor	EPA Method 19	CO_2 Based F Factor
Hydrochloric Acid	EPA Method 26a	Chemiluminescent Analyzer
Particulate Matter	EPA Method 202	Back Half Condensables

4.2 INSTRUMENT CONFIGURATION AND OPERATIONS FOR GAS ANALYSIS

The sampling and analysis procedures used during these tests conform with the methods outlined in the Code of Federal Regulations (CFR), Title 40, Part 60, Appendix A, Methods 1, 2, 3a, 4, 5, 6c, 7e, 9, 10, 19, 26a, and 40 CFR 51, Appendix M, 202.

Figure 4.1 depicts the sample system used for the NOx, CO, SO_2, CO_2, and O_2 tests. An identical system was used to monitor SO_2 and O_2 at the SDA inlet. A heated stainless steel probe was inserted into the sample ports of the stack exhaust and the SDA inlet to extract gas measurements from the emission stream at twelve points in the stacks determined after conducting an initial stratification test. The gas sample was continuously pulled through the probe and transported via heat-traced Teflon® tubing to a stainless steel minimum-contact condenser designed to dry the sample and through Teflon® tubing via a stainless steel/Teflon® diaphragm pump and into the sample manifold within the mobile laboratory. From the manifold, the sample was partitioned to the NOx, CO, SO_2, CO_2, and O_2 analyzers through rotameters that controlled the flow rate of the sample.

Figure 4.1 shows that the sample systems were also equipped with a separate path through which a calibration gas could be delivered to the probe and back through the entire sampling systems. This allowed for convenient performance of system bias checks as required by the testing methods.

All instruments were housed in an air-conditioned trailer-mounted mobile laboratory. Gaseous calibration standards were provided in aluminum cylinders with the concentrations certified by the vendor. EPA Protocol No. 1 was used to determine the cylinder concentrations where applicable (i.e. NOx calibration gases).

Table 4.2 provides a description of the analyzers used for the instrument portion of the tests. All data from the continuous monitoring instruments were recorded on a Logic Beach Portable Data Logging System Hyperlogger which retrieves calibrated electronic data from each instrument every one second and reports an average of the collected data every 30 seconds. Data records can be found in Appendix A and B of this report.

Figure 4.2 represent the sample system used for the PM tests. A heated stainless steel probe with an inconel liner and stainless steel nozzle was inserted into the sample ports of the stack to extract gas measurements from the emission stream through a filter and glass impinger train. Flow rates are monitored with oil filled manometers and total sample volumes are measured with a dry gas meter. An identical system was utilized for the HCl testing, however the nozzle and liner were glass and the impinger contents were changed to reflect the requirements of the reference method.

Three test runs of approximately 60 minutes each were conducted on the Biomass Boiler Stack Outlet and Spray Dryer Absorber Inlet at the maximum test load simultaneously for NOx, CO, SO_2, HCl, opacity, CO_2, and O_2 on the stack exhaust and SO_2, HCl, and O_2 on the SDA inlet. Three test runs pulling at least 100 dry standard cubic feet of sample were run at at the maximum test load for the PM testing at the stack exhaust.

The stack gas analysis for O_2 and CO_2 concentrations was performed in accordance with procedures set forth in EPA Method 3a. The O_2 analyzer uses a paramagnetic cell detector and the CO_2 analyzer uses a continuous nondispersive infrared analyzer.

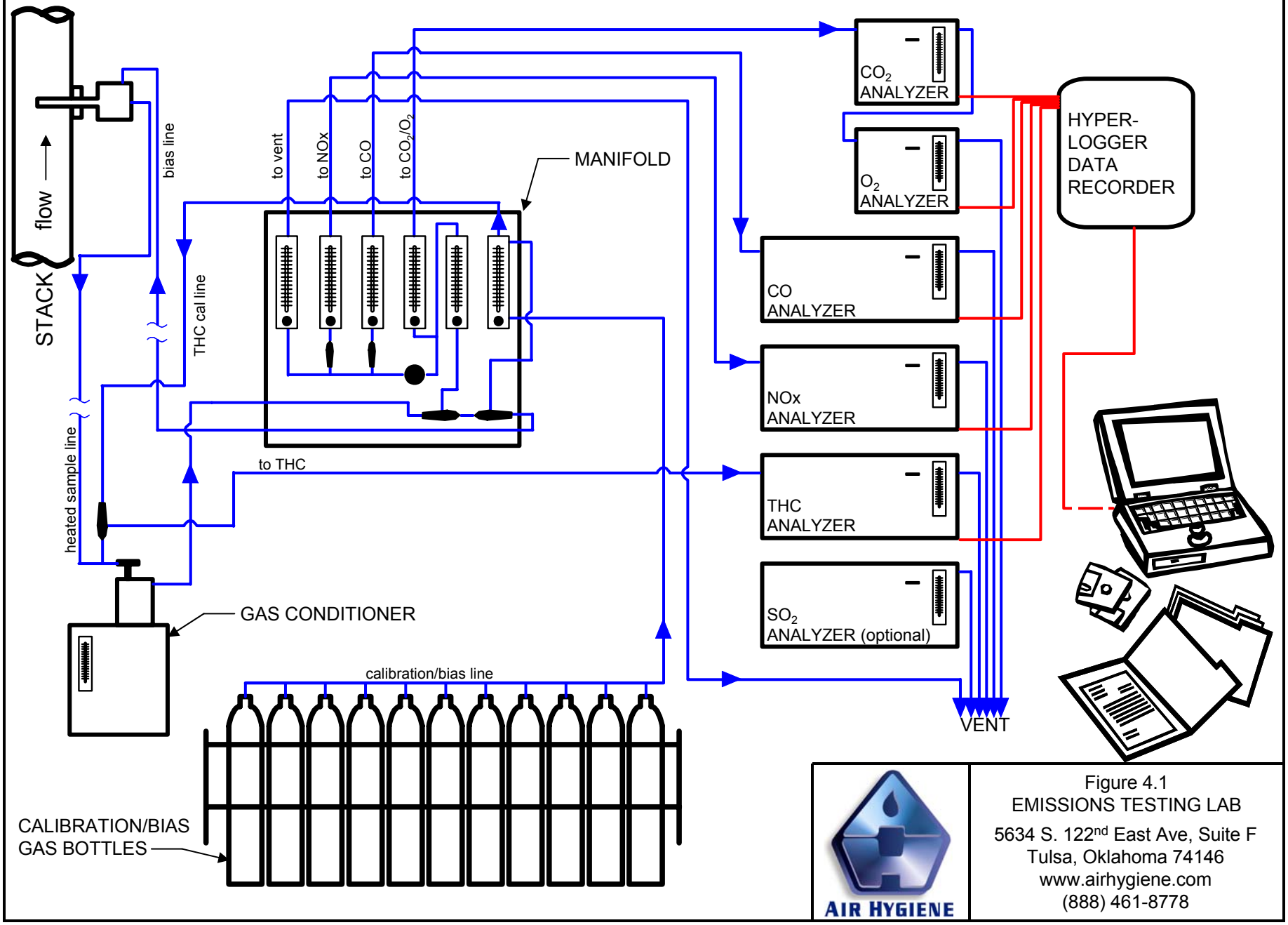
EPA Method 6c was used to determine the concentrations of SO_2. An ultraviolet analyzer was used to determine the sulfur dioxide concentrations in the gas stream.

EPA Method 7e was used to determine concentrations of NOx. A chemiluminescence analyzer was used to determine the nitrogen oxides concentration in the gas stream. A NO_2 in nitrogen certified gas cylinder was used to verify at least a 90 percent NO_2 conversion on the day of the test.

CO emission concentrations were quantified in accordance with procedures set forth in EPA Method 10. A continuous nondispersive infrared (NDIR) analyzer was used for this purpose.

TABLE 4.2
ANALYTICAL INSTRUMENTATION

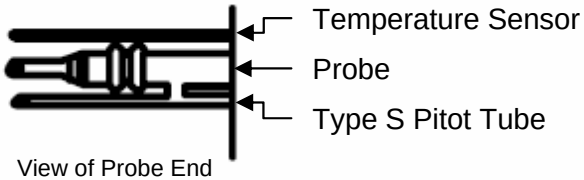
Parameter	Model & Manufacturer	Max. Ranges	Sensitivity	Detection Principle
NOx	Outlet: THERMO 42C	User may select up to 5,000 ppm	0.1 ppm	Thermal reduction of NO_2 to NO Chemilumines-cence of reaction of NO with O_3. Detection by PMT. Inherently linear for listed ranges.
CO	Outlet: THERMO 48C	User may select up to 3,000 ppm	0.1 ppm	Infrared absorption, gas filter correlation detector, microprocessor based linearization.
CO_2	Outlet: SERV 1440	0-20%	0.1%	Nondispersive infrared
SO_2	Outlet: THERMO 43C Inlet: Ametek 721M	User may select up to 10,000 ppm	0.1 ppm	Ultraviolet
O_2	Outlet: SERV 1400 Inlet: M&C PMA 22	0-25%	0.1%	Paramagnetic cell, inherently linear.



AIR HYGIENE

Figure 4.1
EMISSIONS TESTING LAB

5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
www.airhygiene.com
(888) 461-8778



View of Probe End
(from the bottom)

Wet Chemistry Assembly
(photo)

Temperature Sensor

Temperature Sensor

Stack Wall

Liner (glass, stainless steel, or inconel)

Probe Housing (heated opt.)

could add more impingers or other components to system

Impingers

Temperature Sensor

Nozzle

Type S Pitot Tube

Glass Filter Holder

Ice Water Bath

Vacuum Line

Heated Area

Oil-Filler Manometer

Hot Box

Filled with water or other various chemicals to cause capture of condensed liquid or reaction with target compounds

Cold Box

Vacuum Gauge

Temperature Sensor

Temperature Sensor

Orifice

By-pass Valve

Main Valve

Dry Gas Meter

Air-Tight Pump

Oil-Filler Manometer

AIR HYGIENE

Figure 4.2
WET CHEMISTRY ASSEMBLY

5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
www.airhygiene.com
(888) 461-8778

APPENDIX A

TEST RESULTS AND CALCULATIONS

TABLE A.1:
EMISSIONS TESTING SCHEDULE

Unit	Load	Test Type	Run	Date	Start	Stop	Time Sync
1	High	Stratification Test	1	07/02/07	07:10	07:49	DAHS
1	High	Gases	1	07/03/07	17:58	18:57	DAHS
1	High	Gases	2	07/03/07	19:40	20:39	DAHS
1	High	Gases	3	07/03/07	21:39	22:38	DAHS
1	High	HCl	1	07/03/07	17:58	18:57	DAHS
1	High	HCl	2	07/03/07	19:40	20:39	DAHS
1	High	HCl	3	07/03/07	21:39	22:38	DAHS
1	High	PM	1	07/03/07	23:42	02:38	DAHS
1	High	PM	2	07/04/07	02:44	05:22	DAHS
1	High	PM	3	07/04/07	05:27	07:58	DAHS
1	High	Opacity	1	07/03/07	17:58	18:57	DAHS
1	High	Opacity	2	07/03/07	19:40	20:39	DAHS
1	High	Opacity	3	07/04/07	14:52	15:52	DAHS

Note: DAHS Time (CST)

TEST RESULTS AND CALCULATIONS

NOx, CO, SO_2, CO_2, and O_2 Emissions Data

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Outlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.43	in. Hg
Relative Humidity	71	%
Ambient Temperature	81	^{o}F
Specific Humidity	0.016438	lb H_2O / lb air

Unit Data

Gross Unit Load	61.3	gross MW
Heat Input	784	MMBtu/hr
Steam Rate	487,155	Steam lb/hr
Meas. Stack Moisture	25.7	%
Stack Exhaust Flow (M2)	10,257,198	SCFH

High Load, Run - Out-1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%)	SO_2 (ppmvd)
07/03/07 17:58:14	28680	4.58	92.61	205.79	14.75	65.24
07/03/07 17:58:44	28710	4.87	88.71	255.16	14.49	65.96
07/03/07 17:59:14	28740	4.87	92.13	76.87	14.49	64.80
07/03/07 17:59:44	28770	4.08	102.36	63.08	15.23	64.29
07/03/07 18:00:14	28800	5.52	88.46	118.74	13.97	70.87
07/03/07 18:00:44	28830	6.02	103.88	48.80	13.40	69.56
07/03/07 18:01:14	28860	5.15	81.14	52.14	14.18	59.34
07/03/07 18:01:44	28890	4.30	79.17	278.74	15.07	59.66
07/03/07 18:02:14	28920	5.69	98.82	282.02	13.70	71.90
07/03/07 18:02:44	28950	4.41	87.42	135.21	14.91	69.94
07/03/07 18:03:14	28980	6.21	76.24	142.04	13.32	72.68
07/03/07 18:03:44	29010	5.59	81.80	57.13	13.74	70.10
07/03/07 18:04:14	29040	4.98	88.17	36.49	14.40	62.10
07/03/07 18:04:44	29070	5.56	94.39	36.40	13.82	64.19
07/03/07 18:05:14	29100	4.70	95.63	106.69	14.69	65.21
07/03/07 18:05:44	29130	5.90	91.89	102.47	13.53	72.59
07/03/07 18:06:14	29160	6.31	84.32	61.17	13.13	68.94
07/03/07 18:06:44	29190	4.87	79.56	70.55	14.50	61.21
07/03/07 18:07:14	29220	6.02	73.35	175.44	13.45	63.84
07/03/07 18:07:44	29250	5.26	65.53	262.73	14.03	62.67
07/03/07 18:08:14	29280	5.00	47.13	1,181.94	14.36	60.77
07/03/07 18:08:44	29310	5.21	42.26	879.03	14.19	60.05
07/03/07 18:09:14	29340	5.49	61.61	271.01	13.89	51.04
07/03/07 18:09:44	29370	4.89	67.04	86.86	14.50	45.71
07/03/07 18:10:14	29400	5.67	72.42	74.01	13.79	49.03
07/03/07 18:10:44	29430	5.05	67.45	336.03	14.26	50.62
07/03/07 18:11:14	29460	4.97	48.01	831.42	14.39	55.93
07/03/07 18:11:44	29490	4.87	58.59	553.05	14.47	59.71
07/03/07 18:12:14	29520	5.84	80.98	237.93	13.69	56.38
07/03/07 18:12:44	29550	5.29	79.69	176.39	14.02	55.91
07/03/07 18:13:14	29580	5.35	76.18	336.45	14.04	57.92
07/03/07 18:13:44	29610	4.20	82.39	312.30	15.08	64.74
07/03/07 18:14:14	29640	4.51	84.36	243.55	14.90	70.50
07/03/07 18:14:44	29670	4.94	114.44	88.85	14.43	76.66
07/03/07 18:15:14	29700	5.19	85.96	324.21	14.24	73.67
07/03/07 18:15:44	29730	6.25	87.21	287.09	13.32	71.79
07/03/07 18:16:14	29760	6.60	71.16	128.43	12.74	69.43
07/03/07 18:16:44	29790	4.03	68.25	339.42	15.27	61.26
07/03/07 18:17:14	29820	5.12	68.53	312.61	14.27	65.28
07/03/07 18:17:44	29850	3.78	78.03	428.77	15.39	65.60
07/03/07 18:18:14	29880	3.93	64.11	1,300.34	15.40	71.05
07/03/07 18:18:44	29910	4.66	78.55	381.91	14.71	78.71
07/03/07 18:19:14	29940	4.76	92.24	111.30	14.68	70.00
07/03/07 18:19:44	29970	5.16	84.47	82.99	14.21	69.51
07/03/07 18:20:14	30000	4.63	94.82	59.70	14.69	67.46
07/03/07 18:20:44	30030	3.94	101.13	318.27	15.35	69.89
07/03/07 18:21:14	30060	4.91	71.27	582.20	14.59	82.61
07/03/07 18:21:44	30090	5.66	87.91	196.03	13.68	85.13
07/03/07 18:22:14	30120	4.40	81.92	153.30	14.90	74.15
07/03/07 18:22:44	30150	4.81	85.16	315.09	14.63	77.37
07/03/07 18:23:14	30180	5.04	106.29	204.62	14.32	80.40

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Outlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.43	in. Hg
Relative Humidity	71	%
Ambient Temperature	81	^{o}F
Specific Humidity	0.016438	lb H_2O / lb air

Unit Data

Gross Unit Load	61.3	gross MW
Heat Input	784	MMBtu/hr
Steam Rate	487,155	Steam lb/hr
Meas. Stack Moisture	25.7	%
Stack Exhaust Flow (M2)	10,257,198	SCFH

High Load, Run - Out-1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%)	SO_2 (ppmvd)
07/03/07 18:23:44	30210	5.82	92.67	274.79	13.65	74.24
07/03/07 18:24:14	30240	6.01	97.99	79.43	13.45	69.63
07/03/07 18:24:44	30270	4.76	113.87	73.97	14.58	63.28
07/03/07 18:25:14	30300	4.23	96.02	213.36	15.10	66.91
07/03/07 18:25:44	30330	6.29	86.91	415.19	13.30	78.06
07/03/07 18:26:14	30360	5.95	79.90	156.03	13.44	79.74
07/03/07 18:26:44	30390	4.80	97.55	93.23	14.57	73.03
07/03/07 18:27:14	30420	6.04	99.25	79.34	13.44	73.31
07/03/07 18:27:44	30450	5.28	93.87	46.20	14.09	69.26
07/03/07 18:28:14	30480	5.74	97.56	36.96	13.73	68.12
07/03/07 18:28:44	30510	5.29	102.77	48.72	14.05	68.46
07/03/07 18:29:14	30540	4.07	86.36	192.50	15.25	70.82
07/03/07 18:29:44	30570	5.08	85.30	334.31	14.41	84.92
07/03/07 18:30:14	30600	5.81	82.07	280.06	13.58	91.82
07/03/07 18:30:44	30630	5.37	107.81	52.77	14.04	78.59
07/03/07 18:31:14	30660	4.78	90.99	96.50	14.55	73.05
07/03/07 18:31:44	30690	4.34	84.61	170.41	15.07	74.21
07/03/07 18:32:14	30720	5.49	76.09	186.49	13.83	80.62
07/03/07 18:32:44	30750	4.24	58.06	1,546.44	15.06	79.96
07/03/07 18:33:14	30780	3.75	77.85	1,815.28	15.46	86.54
07/03/07 18:33:44	30810	5.40	80.34	1,381.59	14.06	87.16
07/03/07 18:34:14	30840	5.94	106.21	178.73	13.47	77.56
07/03/07 18:34:44	30870	4.39	99.65	392.62	14.97	63.81
07/03/07 18:35:14	30900	5.12	92.04	452.28	14.25	71.23
07/03/07 18:35:44	30930	5.95	112.34	77.01	13.57	70.46
07/03/07 18:36:14	30960	6.38	96.93	50.07	13.07	67.56
07/03/07 18:36:44	30990	5.45	86.84	55.91	13.97	61.81
07/03/07 18:37:14	31020	6.78	92.41	70.28	12.71	62.60
07/03/07 18:37:44	31050	5.38	90.27	56.07	14.01	62.51
07/03/07 18:38:14	31080	5.76	99.46	47.62	13.67	61.75
07/03/07 18:38:44	31110	5.57	109.37	30.71	13.82	59.50
07/03/07 18:39:14	31140	4.45	109.87	36.00	14.89	58.05
07/03/07 18:39:44	31170	6.64	112.83	44.58	12.99	62.57
07/03/07 18:40:14	31200	7.03	82.87	42.01	12.31	62.75
07/03/07 18:40:44	31230	4.88	88.80	39.45	14.49	53.14
07/03/07 18:41:14	31260	5.76	112.33	34.27	13.68	53.50
07/03/07 18:41:44	31290	5.24	104.09	37.75	14.14	55.10
07/03/07 18:42:14	31320	5.96	110.45	38.24	13.46	56.55
07/03/07 18:42:44	31350	5.85	103.63	31.09	13.57	56.35
07/03/07 18:43:14	31380	4.61	110.70	82.18	14.73	56.91
07/03/07 18:43:44	31410	5.14	94.05	159.70	14.28	65.34
07/03/07 18:44:14	31440	7.75	92.53	75.55	11.78	69.13
07/03/07 18:44:44	31470	4.69	72.19	209.61	14.52	62.23
07/03/07 18:45:14	31500	4.13	71.62	434.55	15.18	61.70
07/03/07 18:45:44	31530	5.22	96.04	141.57	14.22	72.19
07/03/07 18:46:14	31560	5.93	114.63	41.80	13.52	69.38
07/03/07 18:46:44	31590	5.46	93.16	37.23	13.90	61.12
07/03/07 18:47:14	31620	5.21	98.35	53.36	14.17	58.22
07/03/07 18:47:44	31650	5.99	107.77	41.14	13.51	58.76
07/03/07 18:48:14	31680	5.28	98.42	59.46	14.10	56.09
07/03/07 18:48:44	31710	6.39	94.87	83.17	13.10	55.36

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Outlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.43	in. Hg
Relative Humidity	71	%
Ambient Temperature	81	^{o}F
Specific Humidity	0.016438	lb H_2O / lb air

Unit Data

Gross Unit Load	61.3	gross MW
Heat Input	784	MMBtu/hr
Steam Rate	487,155	Steam lb/hr
Meas. Stack Moisture	25.7	%
Stack Exhaust Flow (M2)	10,257,198	SCFH

High Load, Run - Out-1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%)	SO_2 (ppmvd)
07/03/07 18:49:14	31740	4.98	77.14	65.23	14.29	52.84
07/03/07 18:49:44	31770	5.52	64.14	347.58	13.99	55.93
07/03/07 18:50:14	31800	5.58	73.32	246.25	13.74	65.95
07/03/07 18:50:44	31830	4.90	67.54	302.20	14.48	63.76
07/03/07 18:51:14	31860	6.82	69.33	159.39	12.75	65.82
07/03/07 18:51:44	31890	5.82	59.45	127.17	13.55	58.06
07/03/07 18:52:14	31920	5.59	77.93	105.13	13.84	46.35
07/03/07 18:52:44	31950	6.67	89.71	40.92	12.84	43.31
07/03/07 18:53:14	31980	5.04	76.19	55.95	14.30	40.91
07/03/07 18:53:44	32010	5.08	76.80	106.17	14.32	44.34
07/03/07 18:54:14	32040	5.64	73.49	113.17	13.75	53.85
07/03/07 18:54:44	32070	5.48	85.45	297.76	14.03	53.82
07/03/07 18:55:14	32100	5.70	83.59	253.07	13.64	56.00
07/03/07 18:55:44	32130	5.77	83.11	325.61	13.70	54.04
07/03/07 18:56:14	32160	5.23	82.17	143.53	14.13	53.01
07/03/07 18:56:44	32190	5.61	76.76	97.44	13.86	53.00
07/03/07 18:57:14	32220	5.38	83.84	75.20	13.92	53.39
07/03/07 18:57:44	32250	5.32	67.88	420.84	14.14	53.00
RAW AVERAGE		**5.30**	**86.21**	**230.77**	**14.09**	**64.96**

		O_2	NOx	CO	CO_2	SO_2	
	Serial Number:	INST-22-0002	INST-NX-0012	INST-CO-0001	INST-22-0002	INST-S2-0002	
		(%)	**(ppmvd)**	**(ppmvd)**	**(%)**	**(ppmvd)**	
Bias	**Initial Zero**	0.02	-0.49	0.59	0.08	0.91	
	Final Zero	-0.02	0.53	1.51	0.05	0.83	
	Avg. Zero	0.00	0.02	1.05	0.07	0.87	
	Initial UpScale	11.94	106.88	221.78	8.75	47.44	**Calcs by**
	Final UpScale	11.85	105.04	221.23	8.79	45.74	**Geo Mean**
	Avg. UpScale	11.90	105.96	221.51	8.77	46.59	**SO_2 avg**
							64.21
Upscale Cal Gas		12.00	111.00	220.00	8.97	45.90	**CO_2 avg**
							14.44

EMISSIONS DATA	O_2	NOx	CO	CO_2	SO_2	$SO_{2\ GEO}$
Corrected Raw Average (ppm/% dry basis)	5.35	90.31	229.25	14.46	64.35	63.59
Concentration (ppm@ 7%O_2)	N/A	80.71	204.89	N/A	57.51	56.83
Emission Rate (lb/hr)	N/A	110.64	170.91	N/A	109.65	108.36
Emission Rate (tons/year) at 8760 hr/yr	N/A	484.59	748.60	N/A	480.28	480.28
Emission Rate (lb/MMBtu)	N/A	0.141	0.218	N/A	0.140	0.138

Fibrominn, LLC
July 3, 2007
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Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.44	in. Hg
Relative Humidity	72	%
Ambient Temperature	78	^{o}F
Specific Humidity	0.014868	lb H_2O / lb air

Unit Data

Gross Unit Load	61.8	gross MW
Heat Input	774	MMBtu/hr
Steam Rate	487,320	Steam lb/hr
Meas. Stack Moisture	26.0	%
Stack Exhaust Flow (M2)	9,847,715	SCFH

High Load, Run - Out-2

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%)	SO_2 (ppmvd)
07/03/07 19:40:14	34800	4.44	36.34	1,444.56	14.94	45.94
07/03/07 19:40:44	34830	4.90	63.77	602.17	14.38	42.23
07/03/07 19:41:14	34860	4.86	64.13	262.76	14.49	27.19
07/03/07 19:41:44	34890	5.17	73.41	123.90	14.26	29.81
07/03/07 19:42:14	34920	5.60	63.37	110.87	13.73	32.52
07/03/07 19:42:44	34950	3.90	39.34	716.02	15.31	36.93
07/03/07 19:43:14	34980	6.15	49.73	797.63	13.34	48.99
07/03/07 19:43:44	35010	5.45	78.06	100.32	13.85	49.08
07/03/07 19:44:14	35040	4.50	76.85	79.46	14.84	37.92
07/03/07 19:44:44	35070	4.32	68.22	177.32	14.88	41.50
07/03/07 19:45:14	35100	4.47	74.70	372.95	14.88	50.96
07/03/07 19:45:44	35130	5.11	80.94	106.96	14.26	66.57
07/03/07 19:46:14	35160	4.56	72.99	95.00	14.75	63.13
07/03/07 19:46:44	35190	5.44	62.17	173.84	13.96	61.38
07/03/07 19:47:14	35220	5.85	75.66	3.66	13.52	56.63
07/03/07 19:47:44	35250	4.37	76.10	146.99	14.89	52.35
07/03/07 19:48:14	35280	4.48	65.08	183.72	14.80	59.32
07/03/07 19:48:44	35310	4.55	66.00	66.68	14.75	63.45
07/03/07 19:49:14	35340	3.90	74.47	253.22	15.34	64.62
07/03/07 19:49:44	35370	4.99	70.04	436.84	14.41	74.51
07/03/07 19:50:14	35400	6.29	73.93	103.78	13.16	71.23
07/03/07 19:50:44	35430	5.13	61.23	28.34	14.11	59.88
07/03/07 19:51:14	35460	4.77	52.93	199.95	14.55	51.16
07/03/07 19:51:44	35490	3.91	62.07	162.07	15.26	56.78
07/03/07 19:52:14	35520	4.07	61.63	255.09	15.24	63.13
07/03/07 19:52:44	35550	4.81	67.11	117.68	14.48	77.80
07/03/07 19:53:14	35580	4.28	66.79	235.09	14.97	71.08
07/03/07 19:53:44	35610	4.16	50.54	914.36	15.13	75.30
07/03/07 19:54:14	35640	5.38	71.99	389.08	14.00	78.94
07/03/07 19:54:44	35670	5.34	86.06	16.17	14.00	66.91
07/03/07 19:55:14	35700	4.03	67.91	117.64	15.19	57.23
07/03/07 19:55:44	35730	5.02	56.37	404.65	14.32	61.73
07/03/07 19:56:14	35760	4.30	70.75	286.37	14.94	66.23
07/03/07 19:56:44	35790	4.65	71.10	285.50	14.69	68.36
07/03/07 19:57:14	35820	5.48	81.26	124.06	13.85	66.48
07/03/07 19:57:44	35850	4.29	66.35	372.68	15.04	58.85
07/03/07 19:58:14	35880	5.37	72.01	351.17	13.99	60.65
07/03/07 19:58:44	35910	4.25	93.27	32.29	14.98	53.71
07/03/07 19:59:14	35940	4.06	79.13	267.41	15.19	56.57
07/03/07 19:59:44	35970	3.69	57.67	556.59	15.55	71.97
07/03/07 20:00:14	36000	5.14	70.52	534.02	14.25	79.05
07/03/07 20:00:44	36030	5.97	87.36	91.14	13.39	71.53
07/03/07 20:01:14	36060	3.64	77.31	1,258.25	15.48	61.90
07/03/07 20:01:44	36090	4.13	56.91	1,684.63	15.14	75.25
07/03/07 20:02:14	36120	4.90	55.10	592.73	14.49	67.33
07/03/07 20:02:44	36150	5.75	86.27	64.18	13.63	54.27
07/03/07 20:03:14	36180	4.56	90.74	51.58	14.72	39.86
07/03/07 20:03:44	36210	5.53	77.06	119.37	13.87	40.59
07/03/07 20:04:14	36240	5.47	67.20	3.06	13.84	42.37
07/03/07 20:04:44	36270	5.41	71.32	4.53	13.96	41.50
07/03/07 20:05:14	36300	4.30	76.44	71.70	14.96	47.33

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Outlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.44	in. Hg
Relative Humidity	72	%
Ambient Temperature	78	^{o}F
Specific Humidity	0.014868	lb H_2O / lb air

Unit Data

Gross Unit Load	61.8	gross MW
Heat Input	774	MMBtu/hr
Steam Rate	487,320	Steam lb/hr
Meas. Stack Moisture	26.0	%
Stack Exhaust Flow (M2)	9,847,715	SCFH

High Load, Run - Out-2

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%)	SO_2 (ppmvd)
07/03/07 20:05:44	36330	5.09	84.91	82.24	14.34	56.69
07/03/07 20:06:14	36360	6.02	80.89	12.17	13.33	63.53
07/03/07 20:06:44	36390	4.45	61.38	133.80	14.87	59.16
07/03/07 20:07:14	36420	4.75	70.37	241.78	14.60	66.53
07/03/07 20:07:44	36450	5.83	85.62	171.66	13.56	69.71
07/03/07 20:08:14	36480	5.68	83.24	55.44	13.75	65.22
07/03/07 20:08:44	36510	4.56	63.99	204.80	14.69	60.50
07/03/07 20:09:14	36540	5.16	67.98	285.71	14.23	63.25
07/03/07 20:09:44	36570	5.07	79.94	43.15	14.24	66.37
07/03/07 20:10:14	36600	4.55	75.00	98.61	14.82	66.18
07/03/07 20:10:44	36630	5.37	72.55	65.81	14.00	72.46
07/03/07 20:11:14	36660	5.84	82.32	8.83	13.59	67.04
07/03/07 20:11:44	36690	5.39	94.03	29.68	13.94	60.94
07/03/07 20:12:14	36720	4.71	92.09	31.37	14.63	59.57
07/03/07 20:12:44	36750	4.80	91.15	23.40	14.53	65.74
07/03/07 20:13:14	36780	4.80	74.80	52.24	14.57	69.38
07/03/07 20:13:44	36810	5.24	70.44	66.83	14.18	72.21
07/03/07 20:14:14	36840	6.55	80.81	8.41	12.99	70.23
07/03/07 20:14:44	36870	5.61	76.26	5.91	13.64	63.37
07/03/07 20:15:14	36900	4.53	67.67	336.42	14.79	56.09
07/03/07 20:15:44	36930	3.19	64.83	1,006.78	15.90	64.63
07/03/07 20:16:14	36960	3.67	55.38	1,559.50	15.56	80.84
07/03/07 20:16:44	36990	3.73	66.64	780.48	15.57	85.52
07/03/07 20:17:14	37020	5.76	62.86	341.79	13.70	80.94
07/03/07 20:17:44	37050	4.78	55.59	105.06	14.52	67.86
07/03/07 20:18:14	37080	5.03	52.20	109.58	14.37	51.15
07/03/07 20:18:44	37110	3.79	61.41	275.34	15.47	49.81
07/03/07 20:19:14	37140	4.22	59.84	541.30	15.12	56.77
07/03/07 20:19:44	37170	5.26	70.68	383.20	14.14	62.41
07/03/07 20:20:14	37200	4.75	62.82	86.68	14.58	55.02
07/03/07 20:20:44	37230	3.84	60.08	183.36	15.41	53.28
07/03/07 20:21:14	37260	4.85	64.36	415.39	14.57	63.59
07/03/07 20:21:44	37290	4.66	86.07	202.34	14.64	66.16
07/03/07 20:22:14	37320	4.28	67.01	220.54	15.03	62.50
07/03/07 20:22:44	37350	4.42	79.27	82.98	14.98	65.00
07/03/07 20:23:14	37380	4.49	80.48	67.53	14.81	71.56
07/03/07 20:23:44	37410	3.80	77.07	221.23	15.50	75.87
07/03/07 20:24:14	37440	3.91	64.18	231.45	15.37	84.28
07/03/07 20:24:44	37470	4.22	61.46	275.86	15.19	85.72
07/03/07 20:25:14	37500	5.41	88.61	112.61	13.96	86.55
07/03/07 20:25:44	37530	5.04	87.65	27.47	14.39	71.89
07/03/07 20:26:14	37560	5.38	88.43	12.72	13.99	64.48
07/03/07 20:26:44	37590	4.43	75.09	120.81	14.86	58.03
07/03/07 20:27:14	37620	3.49	67.73	394.98	15.72	62.24
07/03/07 20:27:44	37650	3.96	57.90	979.00	15.36	80.53
07/03/07 20:28:14	37680	5.30	78.88	515.14	14.04	90.99
07/03/07 20:28:44	37710	5.52	81.52	52.93	13.93	69.96
07/03/07 20:29:14	37740	4.58	66.44	4.85	14.73	57.90
07/03/07 20:29:44	37770	4.28	79.91	10.29	15.07	58.72
07/03/07 20:30:14	37800	4.08	85.00	47.73	15.19	67.28
07/03/07 20:30:44	37830	4.53	74.04	492.11	14.89	72.81

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Outlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.44	in. Hg
Relative Humidity	72	%
Ambient Temperature	78	^{o}F
Specific Humidity	0.014868	lb H_2O / lb air

Unit Data

Gross Unit Load	61.8	gross MW
Heat Input	774	MMBtu/hr
Steam Rate	487,320	Steam lb/hr
Meas. Stack Moisture	26.0	%
Stack Exhaust Flow (M2)	9,847,715	SCFH

High Load, Run - Out-2

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%)	SO_2 (ppmvd)
07/03/07 20:31:14	37860	4.61	78.81	312.31	14.67	78.41
07/03/07 20:31:44	37890	5.47	84.55	222.89	14.00	71.54
07/03/07 20:32:14	37920	4.68	95.44	89.78	14.62	69.02
07/03/07 20:32:44	37950	4.59	84.62	172.68	14.76	73.00
07/03/07 20:33:14	37980	4.36	84.37	211.03	14.99	83.41
07/03/07 20:33:44	38010	6.78	91.02	286.81	12.73	89.53
07/03/07 20:34:14	38040	5.01	88.32	31.18	14.31	79.91
07/03/07 20:34:44	38070	4.26	86.95	107.41	15.10	71.62
07/03/07 20:35:14	38100	5.52	98.11	92.59	13.86	78.33
07/03/07 20:35:44	38130	4.32	91.29	170.86	14.96	76.44
07/03/07 20:36:14	38160	5.11	83.74	334.21	14.38	81.66
07/03/07 20:36:44	38190	5.27	83.88	209.66	14.01	87.07
07/03/07 20:37:14	38220	4.46	79.01	304.28	14.92	79.44
07/03/07 20:37:44	38250	5.07	77.42	144.44	14.37	86.09
07/03/07 20:38:14	38280	4.85	102.96	110.50	14.48	80.53
07/03/07 20:38:44	38310	4.91	96.96	515.77	14.46	77.79
07/03/07 20:39:14	38340	5.35	108.60	171.14	14.14	76.26
07/03/07 20:39:44	38370	5.20	98.18	149.01	14.16	73.87
RAW AVERAGE		**4.81**	**73.92**	**261.72**	**14.52**	**64.60**

		O_2	NOx	CO	CO_2	SO_2	
	Serial Number:	INST-22-0002	INST-NX-0012	INST-CO-0001	INST-22-0002	INST-S2-0002	
		(%)	**(ppmvd)**	**(ppmvd)**	**(%)**	**(ppmvd)**	
Bias	**Initial Zero**	-0.02	0.53	1.51	0.05	0.83	
	Final Zero	-0.02	1.00	0.91	0.12	0.24	
	Avg. Zero	-0.02	0.77	1.21	0.09	0.54	
	Initial UpScale	11.85	105.04	221.23	8.79	45.74	**Calcs by**
	Final UpScale	11.86	105.25	221.82	8.81	44.51	**Geo Mean**
	Avg. UpScale	11.86	105.15	221.53	8.80	45.13	**SO_2 avg**
							63.09
Upscale Cal Gas		12.00	111.00	220.00	8.97	45.90	**CO_2 avg**
							14.85

EMISSIONS DATA	O_2	NOx	CO	CO_2	SO_2	$SO_{2\ GEO}$
Corrected Raw Average (ppm/% dry basis)	4.88	77.80	260.13	14.86	65.95	64.39
Concentration (ppm@ 7%O_2)	N/A	67.52	225.77	N/A	57.24	55.88
Emission Rate (lb/hr)	N/A	91.50	186.20	N/A	107.90	105.34
Emission Rate (tons/year) at 8760 hr/yr	N/A	400.78	815.54	N/A	472.59	472.59
Emission Rate (lb/MMBtu)	N/A	0.118	0.241	N/A	0.139	0.136

Fibrominn, LLC
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Biomass Boiler, Unit #Outlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.46	in. Hg
Relative Humidity	71	%
Ambient Temperature	77	^{o}F
Specific Humidity	0.014450	lb H_2O / lb air

Unit Data

Gross Unit Load	62.8	gross MW
Heat Input	778	MMBtu/hr
Steam Rate	490,767	Steam lb/hr
Meas. Stack Moisture	24.9	%
Stack Exhaust Flow (M2)	10,305,362	SCFH

High Load, Run - Out-3

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%)	SO_2 (ppmvd)
07/03/07 21:39:14	41940	4.58	95.19	203.69	14.75	68.20
07/03/07 21:39:44	41970	4.42	88.33	268.93	14.95	73.93
07/03/07 21:40:14	42000	6.12	97.53	136.44	13.37	76.13
07/03/07 21:40:44	42030	5.68	108.21	36.88	13.64	68.15
07/03/07 21:41:14	42060	3.55	94.72	306.41	15.64	59.44
07/03/07 21:41:44	42090	3.55	80.50	454.95	15.68	73.84
07/03/07 21:42:14	42120	4.56	80.77	635.48	14.77	88.54
07/03/07 21:42:44	42150	2.97	93.81	1,331.19	16.01	88.52
07/03/07 21:43:14	42180	5.54	63.31	1,999.47	13.87	88.53
07/03/07 21:43:44	42210	4.36	93.83	622.77	14.83	88.48
07/03/07 21:44:14	42240	4.55	73.02	601.19	14.78	87.88
07/03/07 21:44:44	42270	4.05	90.05	268.82	15.17	76.68
07/03/07 21:45:14	42300	3.79	91.85	415.95	15.48	70.67
07/03/07 21:45:44	42330	4.30	89.59	598.08	14.92	80.28
07/03/07 21:46:14	42360	4.98	85.66	468.30	14.49	81.65
07/03/07 21:46:44	42390	5.42	103.04	142.11	13.89	82.56
07/03/07 21:47:14	42420	3.79	94.82	87.64	15.45	70.73
07/03/07 21:47:44	42450	4.98	98.44	123.95	14.46	77.33
07/03/07 21:48:14	42480	5.36	112.29	67.10	13.92	79.60
07/03/07 21:48:44	42510	4.03	91.67	356.45	15.26	73.31
07/03/07 21:49:14	42540	5.13	83.00	239.25	14.28	83.26
07/03/07 21:49:44	42570	5.72	107.19	44.98	13.70	80.58
07/03/07 21:50:14	42600	5.42	114.52	26.09	13.95	71.97
07/03/07 21:50:44	42630	4.84	96.37	47.37	14.46	69.58
07/03/07 21:51:14	42660	3.99	103.87	209.57	15.26	75.47
07/03/07 21:51:44	42690	4.67	82.32	774.44	14.73	87.54
07/03/07 21:52:14	42720	5.19	112.05	334.76	14.15	88.60
07/03/07 21:52:44	42750	5.11	113.75	55.07	14.28	88.60
07/03/07 21:53:14	42780	3.71	108.45	161.21	15.46	88.59
07/03/07 21:53:44	42810	3.09	76.18	904.41	16.10	88.48
07/03/07 21:54:14	42840	4.50	80.14	629.52	14.86	88.49
07/03/07 21:54:44	42870	4.19	97.78	250.23	15.10	88.60
07/03/07 21:55:14	42900	4.45	65.67	497.05	14.88	88.65
07/03/07 21:55:44	42930	4.90	80.51	226.91	14.47	82.97
07/03/07 21:56:14	42960	4.48	99.88	74.19	14.86	71.02
07/03/07 21:56:44	42990	4.89	89.04	91.51	14.44	67.95
07/03/07 21:57:14	43020	3.57	84.30	201.48	15.63	67.13
07/03/07 21:57:44	43050	3.85	74.21	403.16	15.45	78.28
07/03/07 21:58:14	43080	4.52	97.78	195.86	14.87	88.54
07/03/07 21:58:44	43110	6.54	117.39	67.29	12.97	88.14
07/03/07 21:59:14	43140	6.29	104.90	29.66	13.08	78.77
07/03/07 21:59:44	43170	5.82	105.20	27.23	13.62	61.15
07/03/07 22:00:14	43200	5.25	112.83	34.64	14.10	57.73
07/03/07 22:00:44	43230	6.54	105.83	36.34	12.93	58.52
07/03/07 22:01:14	43260	5.71	104.10	27.95	13.65	55.54
07/03/07 22:01:44	43290	5.96	104.16	28.46	13.46	53.61
07/03/07 22:02:14	43320	4.95	118.05	29.37	14.31	54.67
07/03/07 22:02:44	43350	4.09	108.29	248.59	15.23	59.35
07/03/07 22:03:14	43380	5.50	118.38	141.75	13.90	80.00
07/03/07 22:03:44	43410	5.69	135.06	28.48	13.71	79.55
07/03/07 22:04:14	43440	5.35	120.47	25.62	13.98	71.26

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Outlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.46	in. Hg
Relative Humidity	71	%
Ambient Temperature	77	^{o}F
Specific Humidity	0.014450	lb H_2O / lb air

Unit Data

Gross Unit Load	62.8	gross MW
Heat Input	778	MMBtu/hr
Steam Rate	490,767	Steam lb/hr
Meas. Stack Moisture	24.9	%
Stack Exhaust Flow (M2)	10,305,362	SCFH

High Load, Run - Out-3

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%)	SO_2 (ppmvd)
07/03/07 22:04:44	43470	5.74	110.26	32.84	13.79	68.92
07/03/07 22:05:14	43500	7.20	97.98	30.91	12.24	68.82
07/03/07 22:05:44	43530	6.14	94.29	27.91	13.21	57.36
07/03/07 22:06:14	43560	5.41	102.14	32.87	14.00	51.85
07/03/07 22:06:44	43590	4.92	100.12	56.27	14.34	57.66
07/03/07 22:07:14	43620	5.52	101.46	261.44	13.95	64.65
07/03/07 22:07:44	43650	5.48	105.84	101.96	13.87	75.21
07/03/07 22:08:14	43680	5.70	116.44	44.42	13.68	71.73
07/03/07 22:08:44	43710	5.39	124.46	23.39	13.96	68.18
07/03/07 22:09:14	43740	5.79	113.98	24.90	13.68	67.80
07/03/07 22:09:44	43770	6.88	95.66	28.56	12.49	67.44
07/03/07 22:10:14	43800	4.22	85.00	245.90	15.02	59.37
07/03/07 22:10:44	43830	5.31	82.10	426.08	14.07	68.77
07/03/07 22:11:14	43860	7.10	122.13	76.61	12.49	72.27
07/03/07 22:11:44	43890	7.32	84.42	35.98	12.03	65.12
07/03/07 22:12:14	43920	5.30	87.38	28.83	14.06	47.77
07/03/07 22:12:44	43950	5.79	105.57	25.30	13.61	47.13
07/03/07 22:13:14	43980	5.23	114.47	25.28	14.14	51.18
07/03/07 22:13:44	44010	6.78	113.74	26.28	12.71	55.84
07/03/07 22:14:14	44040	5.99	93.55	27.23	13.43	52.21
07/03/07 22:14:44	44070	5.59	107.15	23.72	13.76	49.99
07/03/07 22:15:14	44100	6.13	101.96	26.46	13.34	54.27
07/03/07 22:15:44	44130	7.04	93.66	27.67	12.45	53.61
07/03/07 22:16:14	44160	6.70	85.00	28.48	12.66	46.70
07/03/07 22:16:44	44190	4.41	87.46	73.99	14.88	44.26
07/03/07 22:17:14	44220	5.49	103.02	59.28	13.95	56.47
07/03/07 22:17:44	44250	6.19	118.76	27.66	13.16	65.70
07/03/07 22:18:14	44280	5.82	107.20	34.22	13.63	61.00
07/03/07 22:18:44	44310	6.74	99.47	30.30	12.69	61.09
07/03/07 22:19:14	44340	6.45	87.42	26.92	13.00	55.35
07/03/07 22:19:44	44370	6.01	93.55	25.07	13.38	50.89
07/03/07 22:20:14	44400	6.51	86.26	28.50	12.95	51.24
07/03/07 22:20:44	44430	6.33	87.54	27.27	13.08	49.83
07/03/07 22:21:14	44460	5.75	98.28	25.20	13.58	47.48
07/03/07 22:21:44	44490	5.18	96.10	39.83	14.21	50.51
07/03/07 22:22:14	44520	5.88	104.35	29.11	13.53	61.78
07/03/07 22:22:44	44550	5.68	110.10	24.48	13.68	61.31
07/03/07 22:23:14	44580	5.39	112.21	25.12	14.01	61.72
07/03/07 22:23:44	44610	6.98	114.92	23.81	12.54	63.73
07/03/07 22:24:14	44640	6.13	84.93	25.84	13.23	58.72
07/03/07 22:24:44	44670	5.64	96.67	22.40	13.76	53.31
07/03/07 22:25:14	44700	5.91	99.50	23.04	13.42	55.95
07/03/07 22:25:44	44730	4.74	96.99	78.13	14.64	57.49
07/03/07 22:26:14	44760	5.75	85.92	74.07	13.59	71.31
07/03/07 22:26:44	44790	6.28	85.97	66.44	13.28	72.76
07/03/07 22:27:14	44820	6.88	81.19	47.31	12.47	71.45
07/03/07 22:27:44	44850	4.63	86.84	31.70	14.67	59.21
07/03/07 22:28:14	44880	6.68	97.22	34.71	12.87	61.85
07/03/07 22:28:44	44910	6.68	73.24	32.21	12.66	62.15
07/03/07 22:29:14	44940	5.81	85.23	27.20	13.55	51.68
07/03/07 22:29:44	44970	5.44	101.58	27.95	14.00	51.80

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Outlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.46	in. Hg
Relative Humidity	71	%
Ambient Temperature	77	^{o}F
Specific Humidity	0.014450	lb H_2O / lb air

Unit Data

Gross Unit Load	62.8	gross MW
Heat Input	778	MMBtu/hr
Steam Rate	490,767	Steam lb/hr
Meas. Stack Moisture	24.9	%
Stack Exhaust Flow (M2)	10,305,362	SCFH

High Load, Run - Out-3

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%)	SO_2 (ppmvd)
07/03/07 22:30:14	45000	6.28	92.26	35.37	13.06	56.39
07/03/07 22:30:44	45030	5.59	83.86	151.11	13.88	55.09
07/03/07 22:31:14	45060	6.82	97.01	70.90	12.66	58.25
07/03/07 22:31:44	45090	5.97	94.09	27.16	13.34	51.09
07/03/07 22:32:14	45120	5.56	98.03	46.88	13.89	49.48
07/03/07 22:32:44	45150	5.85	88.13	41.91	13.51	57.39
07/03/07 22:33:14	45180	6.80	99.73	23.82	12.73	54.97
07/03/07 22:33:44	45210	6.14	78.07	31.26	13.21	51.32
07/03/07 22:34:14	45240	4.79	86.34	36.46	14.55	48.79
07/03/07 22:34:44	45270	6.85	90.37	36.62	12.63	56.34
07/03/07 22:35:14	45300	5.60	89.69	27.27	13.75	56.29
07/03/07 22:35:44	45330	6.43	96.46	23.61	13.05	54.23
07/03/07 22:36:14	45360	7.04	74.71	28.37	12.40	50.29
07/03/07 22:36:44	45390	5.72	63.78	30.87	13.60	40.25
07/03/07 22:37:14	45420	4.24	74.76	99.07	15.02	40.10
07/03/07 22:37:44	45450	4.57	68.71	519.48	14.66	55.62
07/03/07 22:38:14	45480	3.94	71.97	503.01	15.38	71.21
07/03/07 22:38:44	45510	6.55	71.72	377.41	12.92	87.29
RAW AVERAGE		**5.43**	**95.74**	**166.75**	**13.94**	**65.88**

		O_2	NOx	CO	CO_2	SO_2	
	Serial Number:	INST-22-0002	INST-NX-0012	INST-CO-0001	INST-22-0002	INST-S2-0002	
		(%)	**(ppmvd)**	**(ppmvd)**	**(%)**	**(ppmvd)**	
Bias	**Initial Zero**	-0.02	1.00	0.91	0.12	0.24	
	Final Zero	-0.01	0.67	1.52	0.13	0.87	
	Avg. Zero	-0.02	0.84	1.22	0.13	0.56	
	Initial UpScale	11.86	105.25	221.82	8.81	44.51	**Calcs by**
	Final UpScale	11.87	104.79	221.71	8.81	46.23	**Geo Mean**
	Avg. UpScale	11.87	105.02	221.77	8.81	45.37	**SO_2 avg**
							64.56
Upscale Cal Gas		12.00	111.00	220.00	8.97	45.90	**CO_2 avg**
							14.24

EMISSIONS DATA	O_2	NOx	CO	CO_2	SO_2	$SO_{2\ GEO}$
Corrected Raw Average (ppm/% dry basis)	5.50	101.11	165.12	14.27	66.90	65.55
Concentration (ppm@ 7%O_2)	N/A	91.25	149.01	N/A	60.38	59.15
Emission Rate (lb/hr)	N/A	124.45	123.68	N/A	114.55	112.23
Emission Rate (tons/year) at 8760 hr/yr	N/A	545.10	541.72	N/A	501.71	501.71
Emission Rate (lb/MMBtu)	N/A	0.160	0.159	N/A	0.147	0.145

EXAMPLE CALCULATIONS (INFORMATION)

Specific Humidity (RH_{sp})

Note: RHsp (gr/lb) calculated using temperature, relative humidity, and barometric pressure with psychrometric chart, psychrometric calculator, or built in psychrometric algorithm.

$$RH_{sp}(lb/lb) = \left[\left(\frac{gr}{lb}\right) \times \frac{lb}{7000\ gr}\right]$$

RH_{sp}= 115.06 gr / lb x 1 lb / 7000 gr = 0.016438 lb H_2O / lb Air

EXAMPLE CALCULATIONS (CALIBRATION)

Analyzer Calibration Error

RM 7E, (08-15-06), 12.2 Analyzer Calibration Error. For non-dilution systems, use Equation 7E-1 to calculate the analyzer calibration error for the low-, mid-, and high-level calibration gases. (calc for NOx analyzer mid gas, if applicable)

$$ACE = \left(\frac{C_{Dir} - C_V}{CS}\right) \times 100$$ Eq. 7E-1

ACE = (109.64 ppm - 111.00 ppm) / 254.00 ppm x 100 = -0.54 %

EXAMPLE CALCULATIONS (BIAS, DRIFT, AND CORRECTED RAW AVERAGE)

System Bias

RM 7E, (08-15-06), 12.3 System Bias. For non-dilution systems, use Equation 7E-2 to calculate the system bias separately for the low-level and upscale calibration gases. (calc for NOx analyzer upscale gas, Run 1 initial bias, if applicable)

$$SB = \left(\frac{C_S - C_{Dir}}{CS}\right) \times 100$$ Eq. 7E-2

SB = (106.88 ppm - 111.00 ppm) / 254.00 ppm x 100 = -1.62 %

Drift Assessment

RM 7E, (08-15-06), 12.5 Drift Assessment. Use Equation 7E-4 to separately calculate the low-level and upscale drift over each test run. (calc for NOx analyzer upscale drift, Run 1, if applicable)

$$D = \left|SB_{final} - SB_i\right|$$ Eq. 7E-4

D = | -1.81 % - -1.09 % | = 0.72 %

Alternative Drift and Bias

RM 7E, (08-15-06), 13.2 / 13.3 System Bias and Drift. Alternatively, the results are acceptable if |Cs – Cdir| is ≤ 0.5 ppmv or if |Cs – Cv| is ≤ 0.5 ppmv (as applicable). (calc for NOx analyzer initial upscale, Run 1, if applicable)

$$SB / D_{Alt} = \left|C_S - C_{Dir}\right|$$ Eq. Section 13.2 and 13.3

SB / D_{Alt} = | 106.88 ppm - 111.00 ppm | = 4.12 ppm

Bias Adjusted Average

RM 7E, (08-15-06), 12.6 Effluent Gas Concentration. For each test run, calculate Cavg, the arithmetic average of all valid NOx concentration values (e.g., 1-minute averages). Then adjust the value of Cavg for bias, using Equation 7E-5. (calc for NOx analyzer, Run 1, if applicable)

$$C_{Gas} = \left(C_{Avg} - C_O\right) \times \left(\frac{C_{MA}}{C_M - C_O}\right)$$ Eq. 7E-5

C_{Gas} = (86.21 ppm - 0.02 ppm) x (111.00 ppm / (105.96 ppm - 0.02 ppm)) = 90.31 ppm

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (RUNS)

Moisture Correction

RM 7E, (08-15-06), RM7E, (08-15-06), 12.10 Moisture Correction. Use Equation 7E-10 if your measurements need to be corrected to a dry basis. (calc for NOx analyzer, Run 1, if applicable) Note: Calculations may not match as Run 1 results are typically also bias adjusted

$$C_D = \frac{C_W}{1 - B_{WS}} \qquad C_W = C_D \times (1 - B_{WS})$$

Eq. 7E-10 C_D = 67.10 ppmvw / (1 - 0.26) = 90.31 ppmvd or inversely, C_W = 90.31 ppmvd x (1 - 0.26) = 67.10 ppmvw

Diluent-Corrected Polutant Concentration, O_2 Based

RM 20, (11-26-02), 7.3.1 Correction of Pollutant Concentration Using O2 Concentration. Calculate the O2 corrected pollutant concentration, as follows: (calc for NOx gas, Run 1, if applicable)

$$C_{adj} = C_{Gas(T\,arget)} \times \left(\frac{20.9\% - AdjFactor}{20.9\% - C_{Gas(O2)}} \right)$$

Eq. 20-4 C_{adj} = 90.31 ppm x ((20.9% - 7.00 %) / (20.9% - 5.35 %)) = 80.71 ppm@7%O_2

EXAMPLE CALCULATIONS (RUNS)

Emissions Rate (lb/hr)

Calculation for pound per hour emission rate. Calculate, as follows: (calc for NOx gas Run 1, if applicable)

$$E_{lb/hr} = \frac{C_{Gas}}{10^6} \times \frac{Q_S \times MW}{G}$$

$E_{lb/hr}$ = (90.31 ppm / 10^6 ppm/part) x (10,257,198 SCFH x 46.01 lb/lb-mol / 385.23 SCF/lb-mol) = 110.64 lb/hr

Emissions Rate (ton/year)

Calculation for tons per year emission rate based on 8760 hours per year. Calculate, as follows: (calc for NOx gas Run 1, if applicable)

$$E_{ton/yr} = \frac{E_{lb/hr} \times hr_{year}}{2000}$$

$E_{ton/yr}$ = (110.64 lb/hr) x (8,760 hr/year) x (ton/2000 lb) = 484.59 ton/year

Emissions Rate (lb/MMBtu)

RM 19, (07-19-06), 12.2 Emission Rates of PM, SO2, and NOx. Select from the following sections the applicable procedure to compute the PM, SO2, or NOx emission rate (E) in ng/J (lb/million Btu). (calc for NOx gas Run 1, if applicable)

Carbon Dioxide Based

12.2.4 Carbon Dioxide-Based F Factor, Dry Basis. When measurements are on a dry basis for both CO_2 (%CO_2d) and pollutant (Cd) concentrations, use the following equation:

$$E_{lb/MMBtu} = \frac{C_{Gas} \times F_c Factor \times Conv_C \times 100\%}{C_{Gas(CO2)}}$$

Eq. 19-6

$E_{lb/MMBtu}$ = (90.31 ppm x 1,890.34 SCF/MMBtu x 0.0000001194 lb/ppm*ft^3 x 100%) / 14.46 % = 0.141 lb/MMBtu

Conversion Constant

Convc for NOx

$$Conv_c(lb/ppm \cdot ft^3) = \frac{\frac{MW}{G}}{10^6}$$

$Conv_c$ = (46.01 lb/lb•mole x lb•mole/385.23 SCF) / 10^6 = 0.0000001194 lb/ppm-ft^3

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

RM 7E, (08-15-06), 12.1 Nomenclature. The terms used in the equations are defined as follows:

ACE = Analyzer calibration error, percent of calibration span.
B_{WS} = Moisture content of sample gas as measured by Method 4 or other approved method, percent/100.
C_{Avg} = Average unadjusted gas concentration indicated by data recorder for the test run.
C_D = Pollutant concentration adjusted to dry conditions.
C_{Dir} = Measured concentration of a calibration gas (low, mid, or high) when introduced in direct calibration mode.
C_{Gas} = Average effluent gas concentration adjusted for bias.
C_M = Average of initial and final system calibration bias (or 2-point system calibration error) check responses for the upscale calibration gas.
C_{MA} = Actual concentration of the upscale calibration gas, ppmv.
C_O = Average of the initial and final system calibration bias (or 2-point system calibration error) check responses from the low-level (or zero) calibration gas.
C_S = Measured concentration of a calibration gas (low, mid, or high) when introduced in system calibration mode.
C_{SS} = Concentration of NOx measured in the spiked sample.
C_{Spike} = Concentration of NOx in the undiluted spike gas.
C_{Calc} = Calculated concentration of NOx in the spike gas diluted in the sample.
C_V = Manufacturer certified concentration of a calibration gas (low, mid, or high).
C_W = Pollutant concentration measured under moist sample conditions, wet basis.
CS = Calibration span.
D = Drift assessment, percent of calibration span.
E_p = The predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level response.
Eff_{NO2} = NO_2 to NO converter efficiency, percent.
H = High calibration gas, designator.
L = Low calibration gas, designator.
M = Mid calibration gas, designator.
NOFinal = The average NO concentration observed with the analyzer in the NO mode during the converter efficiency test in Section 16.2.2.
NOxCorr = The NOx concentration corrected for the converter efficiency.
NOxFinal = The final NOx concentration observed during the converter efficiency test in Section 16.2.2.
NOxPeak = The highest NOx concentration observed during the converter efficiency test in Section 16.2.2.
Q_{Spike} = Flow rate of spike gas introduced in system calibration mode, L/min.
Q_{Total} = Total sample flow rate during the spike test, L/min.
R = Spike recovery, percent.
SB = System bias, percent of calibration span.
SB_i = Pre-run system bias, percent of calibration span.
SB_f = Post-run system bias, percent of calibration span.
SB / D_{Alt} = Alternative absolute difference criteria to pass bias and/or drift checks.
SCE = System calibration error, percent of calibration span.
SCE_i = Pre-run system calibration error, percent of calibration span.
SCE_{final} = Post-run system calibration error, percent of calibration span.
Z = Zero calibration gas, designator.

RM 19, (07-29-06), 12.1 Nomenclature. The terms used in the equations are defined as follows:

AdjFactor = percent oxygen or carbon dioxide adjustment applied to a target polltant
B_{wa} = Moisture fraction of ambient air, percent.
Btu = British thermal unit
$\%_C$ = Concentration of carbon from an ultimate analysis of fuel, weight percent.
$\%_{CO2d}$,$\%_{CO2w}$ = Concentration of carbon dioxide on a dry and wet basis, respectively, percent.
CIP / CDP = Combustor inlet pressure / compressor discharge pressure (mm Hg); note, some manufactures reference as PCD.
E = Pollutant emission rate, ng/J (lb/million Btu).
E_a = Average pollutant rate for the specified performance test period, ng/J (lb/million Btu).
E_{ao}, E_{ai} = Average pollutant rate of the control device, outlet and inlet, respectively, for the performance test period, ng/J (lb/million Btu).
E_{bi} = Pollutant rate from the steam generating unit, ng/J (lb/million Btu).
E_{bo} = Pollutant emission rate from the steam generating unit, ng/J (lb/million Btu).
E_{ci} = Pollutant rate in combined effluent, ng/J (lb/million Btu).
E_{co} = Pollutant emission rate in combined effluent, ng/J (lb/million Btu).
E_d = Average pollutant rate for each sampling period (e.g.,24-hr Method 6B sample or 24-hr fuel sample) or for each fuel lot (e.g., amount of fuel bunkered), ng/J (lb/million Btu).
E_{di} = Average inlet SO_2 rate for each sampling period d, ng/J (lb/million Btu).
E_g = Pollutant rate from gas turbine, ng/J (lb/million Btu).
E_{ga} = Daily geometric average pollutant rate, ng/J (lbs/million Btu) or ppm corrected to 7 percent O_2.
E_{jo},E_{ji} = Matched pair hourly arithmetic average pollutant rate, outlet and inlet, respectively, ng/J (lb/million Btu) or ppm corrected to 7 percent O_2.
E_h = Hourly average pollutant, ng/J (lb/million Btu).
E_{hj} = Hourly arithmetic average pollutant rate for hour "j," ng/J (lb/million Btu) or ppm corrected to 7 percent O_2.
EXP = Natural logarithmic base (2.718) raised to the value enclosed by brackets.
Fc = Ratio of the volume of carbon dioxide produced to the gross calorific value of the fuel from Method 19
F_d, F_w, F_c = Volumes of combustion components per unit of heat content, scm/J (scf/million Btu).
ft^3 = cubic feet
G = ideal gas conversion factor
(385.23 SCF/lb-mol at 68 deg F & 14.696 psia)
GCM = gross Btu per SCF (constant, compound based)
GCV = Gross calorific value of the fuel consistent with the ultimate analysis, kJ/kg (Btu/lb).
GCV_p, GCV_r = Gross calorific value for the product and raw fuel lots, respectively, dry basis, kJ/kg (Btu/lb).
$\%_H$ = Concentration of hydrogen from an ultimate analysis of fuel, weight percent.
H_b = Heat input rate to the steam generating unit from fuels fired in the steam generating unit, J/hr (million Btu/hr).
H_g = Heat input rate to gas turbine from all fuels fired in the gas turbine, J/hr (million Btu/hr).
$\%_{H2O}$ = Concentration of water from an ultimate analysis of fuel, weight percent.
H_r = Total numbers of hours in the performance test period (e.g., 720 hours for 30-day performance test period).
K = volume of combustion component per pound of component (constant)
K = Conversion factor, 10^{-5} (kJ/J)/(%) [10^6 Btu/million Btu].
K_c = (9.57 scm/kg)/% [(1.53 scf/lb)/%].
K_{cc} = (2.0 scm/kg)/% [(0.321 scf/lb)/%].
K_{hd} = (22.7 scm/kg)/% [(3.64 scf/lb)/%].
K_{hw} = (34.74 scm/kg)/% [(5.57 scf/lb)/%].
K_n = (0.86 scm/kg)/% [(0.14 scf/lb)/%].
K_o = (2.85 scm/kg)/% [(0.46 scf/lb)/%].
K_s = (3.54 scm/kg)/% [(0.57 scf/lb)/%].
K_{sulfur} = $2x10^4$ Btu/wt%-MMBtu
K_w = (1.30 scm/kg)/% [(0.21 scf/lb)/%].
lb = pound
ln = Natural log of indicated value.
L_p,L_r = Weight of the product and raw fuel lots, respectively, metric ton (ton).
$\%_N$ = Concentration of nitrogen from an ultimate analysis of fuel, weight percent.
$M_{\%}$ = mole percent
mol = mole
MW = molecular weight (lb/lb-mol)
MW_{AIR} = molecular weight of air (28.9625 lb/lb-mole)[1]
NCM = net Btu per SCF (constant based on compound)
$\%_O$ = Concentration of oxygen from an ultimate analysis of fuel, weight percent.
$\%_{O2d}$, $\%_{O2w}$ = Concentration of oxygen on a dry and wet basis, respectively, percent.
P_B = barometirc pressure, in Hg
P_s = Potential SO2 emissions, percent.
$\%_S$ = Sulfur content of as-fired fuel lot, dry basis, weight percent.
S_e = Standard deviation of the hourly average pollutant rates for each performance test period, ng/J (lb/million Btu).
$\%_{Sf}$ = Concentration of sulfur from an ultimate analysis of fuel, weight percent.
S(wt%) = weight percent of sulfur, per lab analysis by appropriate ASTM standard
S_i = Standard deviation of the hourly average inlet pollutant rates for each performance test period, ng/J (lb/million Btu).
S_o = Standard deviation of the hourly average emission rates for each performance test period, ng/J (lb/million Btu).
$\%S_p$, $\%S_r$ = Sulfur content of the product and raw fuel lots respectively, dry basis, weight percent.
SCF = standard cubic feet
SH = specific humidity, pounds of water per pound of air
$t_{0.95}$ = Values shown in Table 19-3 for the indicated number of data points n.
T_{amb} = ambient temperature, ^oF
W/D Factor = 1.0236 = conv. at 14.696 psia and
68 deg F (ref. Civil Eng. Ref. Manual, 7th Ed.)
X_{CO2}=CO_2 Correction factor, percent.
X_k = Fraction of total heat input from each type of fuel k.

Calculations, Formulas, and Constants

The following information supports the spreadsheets for this testing project.

Given Data:

Ideal Gas Conversion Factor = 385.23 SCF/lb-mol at 68 deg F & 14.696 psia

Fuel Heating Value is based upon Air Hygiene's fuel gas calculation sheet. All calculations are based upon a correction to 68 deg F & 14.696 psia

High Heating Values (HHV) are used for the Fuel Heating Value, F-Factor, and Fuel Flow Data per EPA requirements.

ASTM D 3588

Molecular Weight of NOx (lb/lb-mole) =	46.01
Molecular Weight of CO (lb/lb-mole) =	28.00
Molecular Weight of SO2 (lb/lb-mole) =	64.00
Molecular Weight of THC (propane) (lb/lb-mole) =	44.00
Molecular Weight of VOC (methane) (lb/lb-mole) =	16.00
Molecular Weight of NH3 (lb/lb-mole) =	17.03
Molecular Weight of HCHO (lb/lb-mole) =	30.03

40CFR60, App. A., RM 19, Table 19-1

Conversion Constant for NOx =	0.0000001194351
Conversion Constant for CO =	0.0000000726839
Conversion Constant for SO2 =	0.0000001661345
Conversion Constant for THC =	0.0000001142175
Conversion Constant for VOC (methane) =	0.0000000415336
Conversion Constant for NH_3 =	0.0000000442074
Conversion Constant for HCHO =	0.0000000779534

NOTE: units are lb/ppm*ft^3

Formulas:

1. Corrected Raw Average (C_{Gas}), 40CFR60, App. A, RM 7E, Eq. 7E-5 (08/15/06)

$$C_{Gas} = \left(C_{Avg} - C_O\right) \times \left(\frac{C_{MA}}{C_M - C_O}\right)$$

2. Correction to % O_2, 40CFR60, App. A, RM 20, Eq. 20-5 (11/26/02)

$$C_{adj} = C_{Gas(Target)} \times \left(\frac{20.9\% - AdjFactor}{20.9\% - C_{Gas(O2)}}\right)$$

3. Emission Rate in lb/hr

$$E_{lb/hr} = \frac{C_{Gas}}{10^6} \times \frac{Q_S \times MW}{G}$$

4. Emission Concentration in lb/MMBtu (O_2 based)

$$E_{lb/MMBtu} = \frac{C_{Gas} \times F_d Factor \times Conv_C \times 20.9\%}{20.9\% - C_{Gas(O2)}}$$

5. Emission Concentration in lb/MMBtu (CO_2 based)

$$E_{lb/MMBtu} = \frac{C_{Gas} \times F_c Factor \times Conv_C \times 100\%}{C_{Gas(CO2)}}$$

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Inlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.43	in. Hg
Relative Humidity	71	%
Ambient Temperature	81	^{o}F
Specific Humidity	0.016438	lb H_2O / lb air

Unit Data

Gross Unit Load	61.3	gross MW
Heat Input	784	MMBtu/hr
Steam Rate	487,155	Steam lb/hr
Meas. Stack Moisture	18.5	%
Stack Exhaust Flow (M2)	8,106,276	SCFH

High Load, Run - In-1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	SO_2 (ppmvd)	
07/03/07 17:58:14	28680	4.22	322.95	10.0
07/03/07 17:58:44	28710	4.83	329.00	
07/03/07 17:59:14	28740	4.75	322.83	
07/03/07 17:59:44	28770	4.00	331.78	
07/03/07 18:00:14	28800	5.28	348.50	
07/03/07 18:00:44	28830	5.91	293.31	
07/03/07 18:01:14	28860	5.17	294.52	
07/03/07 18:01:44	28890	3.74	335.30	
07/03/07 18:02:14	28920	5.91	328.43	
07/03/07 18:02:44	28950	4.27	311.55	
07/03/07 18:03:14	28980	5.92	334.07	
07/03/07 18:03:44	29010	5.60	278.88	
07/03/07 18:04:14	29040	5.02	300.43	
07/03/07 18:04:44	29070	5.48	307.97	
07/03/07 18:05:14	29100	4.19	322.32	
07/03/07 18:05:44	29130	6.06	316.55	
07/03/07 18:06:14	29160	6.30	287.00	
07/03/07 18:06:44	29190	4.51	287.62	
07/03/07 18:07:14	29220	5.87	314.81	
07/03/07 18:07:44	29250	5.46	288.67	
07/03/07 18:08:14	29280	4.77	331.95	
07/03/07 18:08:44	29310	4.97	325.51	
07/03/07 18:09:14	29340	5.56	307.35	
07/03/07 18:09:44	29370	4.75	309.81	
07/03/07 18:10:14	29400	5.53	318.32	
07/03/07 18:10:44	29430	4.80	301.40	
07/03/07 18:11:14	29460	4.97	333.97	
07/03/07 18:11:44	29490	4.79	330.59	
07/03/07 18:12:14	29520	5.43	338.35	
07/03/07 18:12:44	29550	5.23	293.69	
07/03/07 18:13:14	29580	5.40	336.12	
07/03/07 18:13:44	29610	3.87	332.09	
07/03/07 18:14:14	29640	4.49	363.05	
07/03/07 18:14:44	29670	5.01	328.10	
07/03/07 18:15:14	29700	5.01	343.08	
07/03/07 18:15:44	29730	5.75	319.25	
07/03/07 18:16:14	29760	7.00	267.94	
07/03/07 18:16:44	29790	3.68	324.38	
07/03/07 18:17:14	29820	4.96	351.88	
07/03/07 18:17:44	29850	4.90	317.52	
07/03/07 18:18:14	29880	4.81	314.14	
07/03/07 18:18:44	29910	4.87	313.50	
07/03/07 18:19:14	29940	4.90	312.65	
07/03/07 18:19:44	29970	4.89	311.13	
07/03/07 18:20:14	30000	4.91	310.46	
07/03/07 18:20:44	30030	4.98	308.95	
07/03/07 18:21:14	30060	5.01	306.85	
07/03/07 18:21:44	30090	4.99	304.46	
07/03/07 18:22:14	30120	5.01	301.66	
07/03/07 18:22:44	30150	5.10	298.18	
07/03/07 18:23:14	30180	5.77	294.66	

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Inlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.43	in. Hg
Relative Humidity	71	%
Ambient Temperature	81	^{o}F
Specific Humidity	0.016438	lb H_2O / lb air

Unit Data

Gross Unit Load	61.3	gross MW
Heat Input	784	MMBtu/hr
Steam Rate	487,155	Steam lb/hr
Meas. Stack Moisture	18.5	%
Stack Exhaust Flow (M2)	8,106,276	SCFH

High Load, Run - In-1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	SO_2 (ppmvd)
07/03/07 18:23:44	30210	7.74	290.64
07/03/07 18:24:14	30240	5.91	326.02
07/03/07 18:24:44	30270	4.68	329.93
07/03/07 18:25:14	30300	4.54	272.92
07/03/07 18:25:44	30330	5.94	326.91
07/03/07 18:26:14	30360	5.71	295.93
07/03/07 18:26:44	30390	4.39	323.82
07/03/07 18:27:14	30420	6.00	335.20
07/03/07 18:27:44	30450	5.09	310.22
07/03/07 18:28:14	30480	5.53	327.89
07/03/07 18:28:44	30510	5.23	308.75
07/03/07 18:29:14	30540	3.94	360.55
07/03/07 18:29:44	30570	4.66	380.12
07/03/07 18:30:14	30600	5.78	327.27
07/03/07 18:30:44	30630	5.26	330.88
07/03/07 18:31:14	30660	4.56	334.65
07/03/07 18:31:44	30690	3.80	369.96
07/03/07 18:32:14	30720	5.67	338.72
07/03/07 18:32:44	30750	3.90	411.86
07/03/07 18:33:14	30780	5.93	406.72
07/03/07 18:33:44	30810	5.95	405.92
07/03/07 18:34:14	30840	5.97	405.88
07/03/07 18:34:44	30870	5.96	405.39
07/03/07 18:35:14	30900	5.94	404.61
07/03/07 18:35:44	30930	5.92	403.58
07/03/07 18:36:14	30960	5.89	402.87
07/03/07 18:36:44	30990	5.90	402.17
07/03/07 18:37:14	31020	5.87	401.62
07/03/07 18:37:44	31050	4.19	389.58
07/03/07 18:38:14	31080	5.79	341.06
07/03/07 18:38:44	31110	5.88	258.70
07/03/07 18:39:14	31140	4.36	307.95
07/03/07 18:39:44	31170	6.41	335.22
07/03/07 18:40:14	31200	6.89	262.66
07/03/07 18:40:44	31230	4.59	307.47
07/03/07 18:41:14	31260	5.67	317.61
07/03/07 18:41:44	31290	4.72	307.69
07/03/07 18:42:14	31320	6.07	309.01
07/03/07 18:42:44	31350	5.70	299.92
07/03/07 18:43:14	31380	4.18	321.70
07/03/07 18:43:44	31410	5.01	346.16
07/03/07 18:44:14	31440	7.96	305.12
07/03/07 18:44:44	31470	4.05	306.65
07/03/07 18:45:14	31500	3.99	381.63
07/03/07 18:45:44	31530	4.46	374.84
07/03/07 18:46:14	31560	4.69	372.97
07/03/07 18:46:44	31590	4.70	371.67
07/03/07 18:47:14	31620	4.68	370.61
07/03/07 18:47:44	31650	4.67	369.47
07/03/07 18:48:14	31680	4.64	368.02
07/03/07 18:48:44	31710	4.63	366.09

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Inlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.43	in. Hg
Relative Humidity	71	%
Ambient Temperature	81	^{o}F
Specific Humidity	0.016438	lb H_2O / lb air

Unit Data

Gross Unit Load	61.3	gross MW
Heat Input	784	MMBtu/hr
Steam Rate	487,155	Steam lb/hr
Meas. Stack Moisture	18.5	%
Stack Exhaust Flow (M2)	8,106,276	SCFH

High Load, Run - In-1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	SO_2 (ppmvd)	
07/03/07 18:49:14	31740	4.59	363.77	
07/03/07 18:49:44	31770	4.52	360.96	
07/03/07 18:50:14	31800	4.48	357.30	
07/03/07 18:50:44	31830	4.45	353.30	
07/03/07 18:51:14	31860	4.43	349.16	
07/03/07 18:51:44	31890	4.40	345.12	
07/03/07 18:52:14	31920	5.67	317.04	
07/03/07 18:52:44	31950	6.07	258.91	
07/03/07 18:53:14	31980	4.92	240.33	
07/03/07 18:53:44	32010	4.85	315.52	
07/03/07 18:54:14	32040	5.49	314.64	
07/03/07 18:54:44	32070	4.99	337.32	
07/03/07 18:55:14	32100	5.42	299.36	
07/03/07 18:55:44	32130	5.80	334.11	
07/03/07 18:56:14	32160	4.92	309.52	
07/03/07 18:56:44	32190	5.36	329.71	
07/03/07 18:57:14	32220	5.37	298.96	**Calcs by**
07/03/07 18:57:44	32250	4.92	353.35	**Geo Mean**
RAW AVERAGE		**5.16**	**329.82**	**327.96**

		O_2	SO_2	SO_2
	Serial Number:	INST-O2-0008	205246	
		(%)	**(ppmvd)**	
Bias	**Initial Zero**	-0.09	3.08	
	Final Zero	-0.01	4.87	
	Avg. Zero	-0.05	3.98	
	Initial UpScale	11.94	249.73	
	Final UpScale	11.82	244.39	
	Avg. UpScale	11.88	247.06	
Upscale Cal Gas		12.00	252.00	

EMISSIONS DATA	O_2	SO_2	$SO_{2\ GEO}$
Corrected Raw Average (ppm/% dry basis)	5.24	337.80	335.87

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Inlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.44	in. Hg
Relative Humidity	72	%
Ambient Temperature	78	^{o}F
Specific Humidity	0.014868	lb H_2O / lb air

Unit Data

Gross Unit Load	61.8	gross MW
Heat Input	774	MMBtu/hr
Steam Rate	487,320	Steam lb/hr
Meas. Stack Moisture	23.0	%
Stack Exhaust Flow (M2)	8,438,795	SCFH

High Load, Run - In-2

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	SO_2 (ppmvd)
07/03/07 19:40:14	34800	4.28	412.07
07/03/07 19:40:44	34830	4.39	343.07
07/03/07 19:41:14	34860	4.74	362.91
07/03/07 19:41:44	34890	4.79	349.73
07/03/07 19:42:14	34920	5.20	316.86
07/03/07 19:42:44	34950	3.11	381.51
07/03/07 19:43:14	34980	6.43	363.20
07/03/07 19:43:44	35010	4.81	299.96
07/03/07 19:44:14	35040	4.00	344.81
07/03/07 19:44:44	35070	3.96	345.32
07/03/07 19:45:14	35100	4.26	386.80
07/03/07 19:45:44	35130	4.88	351.88
07/03/07 19:46:14	35160	3.94	340.14
07/03/07 19:46:44	35190	5.34	342.57
07/03/07 19:47:14	35220	5.77	306.91
07/03/07 19:47:44	35250	3.72	334.76
07/03/07 19:48:14	35280	4.27	357.73
07/03/07 19:48:44	35310	4.31	356.21
07/03/07 19:49:14	35340	3.39	369.91
07/03/07 19:49:44	35370	4.85	376.44
07/03/07 19:50:14	35400	6.08	318.27
07/03/07 19:50:44	35430	4.63	294.95
07/03/07 19:51:14	35460	4.52	340.47
07/03/07 19:51:44	35490	3.43	342.49
07/03/07 19:52:14	35520	3.74	395.34
07/03/07 19:52:44	35550	4.61	354.13
07/03/07 19:53:14	35580	3.95	354.33
07/03/07 19:53:44	35610	3.69	381.58
07/03/07 19:54:14	35640	5.16	349.95
07/03/07 19:54:44	35670	5.11	318.80
07/03/07 19:55:14	35700	3.46	339.06
07/03/07 19:55:44	35730	4.94	375.80
07/03/07 19:56:14	35760	3.77	352.41
07/03/07 19:56:44	35790	4.35	362.51
07/03/07 19:57:14	35820	5.39	327.48
07/03/07 19:57:44	35850	3.56	358.81
07/03/07 19:58:14	35880	5.25	333.90
07/03/07 19:58:44	35910	4.88	320.47
07/03/07 19:59:14	35940	4.90	320.25
07/03/07 19:59:44	35970	4.92	319.43
07/03/07 20:00:14	36000	4.91	317.95
07/03/07 20:00:44	36030	4.91	317.57
07/03/07 20:01:14	36060	4.91	316.49
07/03/07 20:01:44	36090	4.93	315.63
07/03/07 20:02:14	36120	4.93	314.21
07/03/07 20:02:44	36150	4.95	313.82
07/03/07 20:03:14	36180	4.95	313.01
07/03/07 20:03:44	36210	4.92	312.24
07/03/07 20:04:14	36240	4.93	311.23
07/03/07 20:04:44	36270	4.95	310.21
07/03/07 20:05:14	36300	4.95	308.86

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Inlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.44	in. Hg
Relative Humidity	72	%
Ambient Temperature	78	^{o}F
Specific Humidity	0.014868	lb H_2O / lb air

Unit Data

Gross Unit Load	61.8	gross MW
Heat Input	774	MMBtu/hr
Steam Rate	487,320	Steam lb/hr
Meas. Stack Moisture	23.0	%
Stack Exhaust Flow (M2)	8,438,795	SCFH

High Load, Run - In-2

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	SO_2 (ppmvd)
07/03/07 20:05:44	36330	4.93	307.69
07/03/07 20:06:14	36360	4.93	306.25
07/03/07 20:06:44	36390	4.94	304.46
07/03/07 20:07:14	36420	4.93	302.43
07/03/07 20:07:44	36450	4.91	300.71
07/03/07 20:08:14	36480	4.89	298.53
07/03/07 20:08:44	36510	4.90	296.58
07/03/07 20:09:14	36540	4.96	293.96
07/03/07 20:09:44	36570	5.34	291.35
07/03/07 20:10:14	36600	6.32	288.32
07/03/07 20:10:44	36630	7.95	285.92
07/03/07 20:11:14	36660	9.80	283.20
07/03/07 20:11:44	36690	11.57	279.80
07/03/07 20:12:14	36720	13.17	276.49
07/03/07 20:12:44	36750	14.57	273.17
07/03/07 20:13:14	36780	15.68	269.51
07/03/07 20:13:44	36810	16.54	265.45
07/03/07 20:14:14	36840	17.23	261.91
07/03/07 20:14:44	36870	14.95	267.44
07/03/07 20:15:14	36900	4.53	329.73
07/03/07 20:15:44	36930	4.25	284.89
07/03/07 20:16:14	36960	3.57	318.39
07/03/07 20:16:44	36990	3.39	386.78
07/03/07 20:17:14	37020	5.92	322.03
07/03/07 20:17:44	37050	3.88	308.23
07/03/07 20:18:14	37080	4.88	322.68
07/03/07 20:18:44	37110	2.98	352.17
07/03/07 20:19:14	37140	2.64	377.30
07/03/07 20:19:44	37170	2.64	375.07
07/03/07 20:20:14	37200	2.64	372.42
07/03/07 20:20:44	37230	2.63	370.85
07/03/07 20:21:14	37260	2.64	369.24
07/03/07 20:21:44	37290	2.60	367.59
07/03/07 20:22:14	37320	2.61	366.12
07/03/07 20:22:44	37350	2.66	364.99
07/03/07 20:23:14	37380	2.67	363.59
07/03/07 20:23:44	37410	2.68	362.16
07/03/07 20:24:14	37440	2.80	363.03
07/03/07 20:24:44	37470	4.72	334.19
07/03/07 20:25:14	37500	5.24	264.25
07/03/07 20:25:44	37530	4.95	267.59
07/03/07 20:26:14	37560	4.90	281.87
07/03/07 20:26:44	37590	3.97	313.82
07/03/07 20:27:14	37620	3.00	378.39
07/03/07 20:27:44	37650	3.79	410.45
07/03/07 20:28:14	37680	4.95	321.24
07/03/07 20:28:44	37710	5.45	318.39
07/03/07 20:29:14	37740	3.79	317.52
07/03/07 20:29:44	37770	4.02	348.67
07/03/07 20:30:14	37800	3.57	348.64
07/03/07 20:30:44	37830	4.51	394.31

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Inlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.44	in. Hg
Relative Humidity	72	%
Ambient Temperature	78	^{o}F
Specific Humidity	0.014868	lb H_2O / lb air

Unit Data

Gross Unit Load	61.8	gross MW
Heat Input	774	MMBtu/hr
Steam Rate	487,320	Steam lb/hr
Meas. Stack Moisture	23.0	%
Stack Exhaust Flow (M2)	8,438,795	SCFH

High Load, Run - In-2

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	SO_2 (ppmvd)	
07/03/07 20:31:14	37860	3.87	335.11	
07/03/07 20:31:44	37890	5.57	346.11	
07/03/07 20:32:14	37920	4.02	318.41	
07/03/07 20:32:44	37950	4.42	352.90	
07/03/07 20:33:14	37980	3.78	358.05	
07/03/07 20:33:44	38010	6.95	317.25	
07/03/07 20:34:14	38040	4.30	293.00	
07/03/07 20:34:44	38070	3.82	350.14	
07/03/07 20:35:14	38100	5.34	318.18	
07/03/07 20:35:44	38130	3.93	331.18	
07/03/07 20:36:14	38160	4.96	369.53	
07/03/07 20:36:44	38190	4.89	306.52	
07/03/07 20:37:14	38220	4.25	369.27	
07/03/07 20:37:44	38250	4.78	345.68	
07/03/07 20:38:14	38280	5.97	319.39	
07/03/07 20:38:44	38310	6.00	318.22	
07/03/07 20:39:14	38340	6.01	317.96	**Calcs by**
07/03/07 20:39:44	38370	6.01	317.55	**Geo Mean**
RAW AVERAGE		**5.13**	**331.41**	**329.68**

		O_2	SO_2	SO_2
	Serial Number:	INST-O2-0008	205246	
		(%)	**(ppmvd)**	
Bias	**Initial Zero**	-0.01	4.87	
	Final Zero	-0.01	5.26	
	Avg. Zero	-0.01	5.07	
	Initial UpScale	11.82	244.39	
	Final UpScale	11.82	252.63	
	Avg. UpScale	11.82	248.51	
Upscale Cal Gas		12.00	252.00	

EMISSIONS DATA	O_2	SO_2	$SO_{2\ GEO}$
Corrected Raw Average (ppm/% dry basis)	5.22	337.81	336.02

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Inlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.46	in. Hg
Relative Humidity	71	%
Ambient Temperature	77	^{o}F
Specific Humidity	0.014450	lb H_2O / lb air

Unit Data

Gross Unit Load	62.8	gross MW
Heat Input	778	MMBtu/hr
Steam Rate	490,767	Steam lb/hr
Meas. Stack Moisture	9.5	%
Stack Exhaust Flow (M2)	10,329,857	SCFH

High Load, Run - In-3

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	SO_2 (ppmvd)
07/03/07 21:39:14	41940	4.41	373.46
07/03/07 21:39:44	41970	4.05	385.89
07/03/07 21:40:14	42000	6.09	327.38
07/03/07 21:40:44	42030	5.11	299.25
07/03/07 21:41:14	42060	2.87	412.30
07/03/07 21:41:44	42090	3.18	442.25
07/03/07 21:42:14	42120	4.47	423.52
07/03/07 21:42:44	42150	2.14	517.68
07/03/07 21:43:14	42180	5.76	482.30
07/03/07 21:43:44	42210	3.62	378.29
07/03/07 21:44:14	42240	4.43	425.48
07/03/07 21:44:44	42270	3.52	378.98
07/03/07 21:45:14	42300	3.37	437.57
07/03/07 21:45:44	42330	4.03	395.30
07/03/07 21:46:14	42360	4.57	425.28
07/03/07 21:46:44	42390	5.94	399.11
07/03/07 21:47:14	42420	6.00	399.28
07/03/07 21:47:44	42450	6.01	399.75
07/03/07 21:48:14	42480	5.99	399.46
07/03/07 21:48:44	42510	6.00	398.39
07/03/07 21:49:14	42540	5.97	397.65
07/03/07 21:49:44	42570	5.91	396.87
07/03/07 21:50:14	42600	6.07	375.63
07/03/07 21:50:44	42630	4.16	309.75
07/03/07 21:51:14	42660	3.81	307.43
07/03/07 21:51:44	42690	4.45	361.92
07/03/07 21:52:14	42720	4.75	329.31
07/03/07 21:52:44	42750	4.88	344.55
07/03/07 21:53:14	42780	3.09	375.48
07/03/07 21:53:44	42810	2.65	497.55
07/03/07 21:54:14	42840	4.39	417.23
07/03/07 21:54:44	42870	3.75	390.23
07/03/07 21:55:14	42900	4.11	389.46
07/03/07 21:55:44	42930	4.68	356.07
07/03/07 21:56:14	42960	4.31	360.03
07/03/07 21:56:44	42990	4.38	359.94
07/03/07 21:57:14	43020	4.38	358.20
07/03/07 21:57:44	43050	4.41	357.37
07/03/07 21:58:14	43080	4.42	356.45
07/03/07 21:58:44	43110	4.45	355.29
07/03/07 21:59:14	43140	4.47	354.30
07/03/07 21:59:44	43170	4.47	353.05
07/03/07 22:00:14	43200	4.49	351.54
07/03/07 22:00:44	43230	4.49	349.68
07/03/07 22:01:14	43260	4.50	347.21
07/03/07 22:01:44	43290	4.26	351.58
07/03/07 22:02:14	43320	4.72	312.16
07/03/07 22:02:44	43350	3.74	299.00
07/03/07 22:03:14	43380	5.25	316.04
07/03/07 22:03:44	43410	5.37	306.68
07/03/07 22:04:14	43440	4.92	310.70

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Inlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.46	in. Hg
Relative Humidity	71	%
Ambient Temperature	77	^{o}F
Specific Humidity	0.014450	lb H_2O / lb air

Unit Data

Gross Unit Load	62.8	gross MW
Heat Input	778	MMBtu/hr
Steam Rate	490,767	Steam lb/hr
Meas. Stack Moisture	9.5	%
Stack Exhaust Flow (M2)	10,329,857	SCFH

High Load, Run - In-3

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	SO_2 (ppmvd)
07/03/07 22:04:44	43470	5.71	332.46
07/03/07 22:05:14	43500	6.71	263.43
07/03/07 22:05:44	43530	5.54	272.32
07/03/07 22:06:14	43560	5.13	325.74
07/03/07 22:06:44	43590	4.30	318.49
07/03/07 22:07:14	43620	5.53	360.41
07/03/07 22:07:44	43650	4.90	316.95
07/03/07 22:08:14	43680	5.45	320.06
07/03/07 22:08:44	43710	5.01	322.07
07/03/07 22:09:14	43740	5.48	331.36
07/03/07 22:09:44	43770	6.67	275.79
07/03/07 22:10:14	43800	3.36	363.47
07/03/07 22:10:44	43830	5.20	360.95
07/03/07 22:11:14	43860	7.08	306.84
07/03/07 22:11:44	43890	6.74	242.61
07/03/07 22:12:14	43920	4.70	295.82
07/03/07 22:12:44	43950	5.63	308.33
07/03/07 22:13:14	43980	4.70	310.82
07/03/07 22:13:44	44010	6.72	299.24
07/03/07 22:14:14	44040	5.48	277.71
07/03/07 22:14:44	44070	4.86	294.20
07/03/07 22:15:14	44100	4.42	303.93
07/03/07 22:15:44	44130	4.47	301.84
07/03/07 22:16:14	44160	4.47	300.20
07/03/07 22:16:44	44190	4.44	298.79
07/03/07 22:17:14	44220	4.43	297.61
07/03/07 22:17:44	44250	4.42	296.73
07/03/07 22:18:14	44280	4.41	295.70
07/03/07 22:18:44	44310	4.41	294.23
07/03/07 22:19:14	44340	4.40	293.29
07/03/07 22:19:44	44370	4.42	292.23
07/03/07 22:20:14	44400	4.41	291.23
07/03/07 22:20:44	44430	5.61	289.80
07/03/07 22:21:14	44460	6.99	233.98
07/03/07 22:21:44	44490	5.55	234.88
07/03/07 22:22:14	44520	5.59	286.85
07/03/07 22:22:44	44550	5.23	298.93
07/03/07 22:23:14	44580	4.99	321.50
07/03/07 22:23:44	44610	7.04	292.93
07/03/07 22:24:14	44640	5.44	285.00
07/03/07 22:24:44	44670	5.28	321.59
07/03/07 22:25:14	44700	5.58	306.73
07/03/07 22:25:44	44730	4.25	373.84
07/03/07 22:26:14	44760	5.45	331.92
07/03/07 22:26:44	44790	6.21	348.41
07/03/07 22:27:14	44820	6.34	273.59
07/03/07 22:27:44	44850	3.83	332.36
07/03/07 22:28:14	44880	3.69	340.51
07/03/07 22:28:44	44910	3.68	336.47
07/03/07 22:29:14	44940	3.68	334.11
07/03/07 22:29:44	44970	3.74	332.52

Fibrominn, LLC
July 3, 2007
Biomass Boiler, Unit #Inlet
Fibrominn Biomass Power Plant

Fuel Data

Fuel F_c factor	1,890	SCF/MMBtu
Fuel Heating Value (HHV)	4,334	Btu/lb

Weather Data

Barometric Pressure	29.46	in. Hg
Relative Humidity	71	%
Ambient Temperature	77	^{o}F
Specific Humidity	0.014450	lb H_2O / lb air

Unit Data

Gross Unit Load	62.8	gross MW
Heat Input	778	MMBtu/hr
Steam Rate	490,767	Steam lb/hr
Meas. Stack Moisture	9.5	%
Stack Exhaust Flow (M2)	10,329,857	SCFH

High Load, Run - In-3

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	SO_2 (ppmvd)	
07/03/07 22:30:14	45000	3.75	330.59	
07/03/07 22:30:44	45030	3.76	328.55	
07/03/07 22:31:14	45060	3.77	326.56	
07/03/07 22:31:44	45090	3.75	324.62	
07/03/07 22:32:14	45120	3.76	322.93	
07/03/07 22:32:44	45150	3.77	321.17	
07/03/07 22:33:14	45180	3.78	319.27	
07/03/07 22:33:44	45210	3.82	317.43	
07/03/07 22:34:14	45240	3.83	316.30	
07/03/07 22:34:44	45270	5.94	325.87	
07/03/07 22:35:14	45300	6.71	236.50	
07/03/07 22:35:44	45330	6.64	235.88	
07/03/07 22:36:14	45360	6.63	248.23	
07/03/07 22:36:44	45390	4.91	281.76	
07/03/07 22:37:14	45420	3.78	370.23	
07/03/07 22:37:44	45450	4.34	384.65	
07/03/07 22:38:14	45480	3.73	460.66	**Calcs by**
07/03/07 22:38:44	45510	6.53	333.77	**Geo Mean**
RAW AVERAGE		**4.80**	**338.12**	**334.11**

		O_2	SO_2	SO_2
	Serial Number:	INST-O2-0008	205246	
		(%)	**(ppmvd)**	
Bias	**Initial Zero**	-0.01	5.26	
	Final Zero	-0.03	5.83	
	Avg. Zero	-0.02	5.55	
	Initial UpScale	11.82	252.63	
	Final UpScale	11.82	259.55	
	Avg. UpScale	11.82	256.09	
Upscale Cal Gas		12.00	252.00	

EMISSIONS DATA	O_2	SO_2	$SO_{2\ GEO}$
Corrected Raw Average (ppm/% dry basis)	4.89	334.51	330.47

TEST RESULTS AND CALCULATIONS

HCl Emissions Data

HCl ANALYSIS

Air Hygiene International, Inc.
5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
(888) 461-8778
www.airhygiene.com

PARAMETER	UNITS	RUN			
		1	2	3	BLANK
Sample Number		IN-HCl-1	IN-HCl-2	IN-HCl-3	Blank
Lab Log Number		070307-OUT-HCl1	070307-OUT-HCl2	070307-OUT-HCl3	070307-OUT-HCl4
Concentration of Sample (S_x or B_x)	(mg Cl^-/L)	16	46.5	38.2	0.521
Sample Volume (V_{HCl})	(ml)	725	725	715	N/A
DGM Volume $(V_m)_{dscf}$	(dscf)	51.775	50.100	54.524	N/A
DGM Volume $(V_m)_{dstdL}$	(L_{dstd})	1466.09	1418.66	1543.95	N/A
Sum of HCl Ion (N)	(mg/L)	15.912	47.266	38.734	N/A
Volume of HCl (V_a)	(L)	0.00709	0.02105	0.01701	N/A
HCl Concentration (C_{HCl})	(ppmvd)	4.834	14.840	11.020	N/A

Equations & Constants:

Example Using Data from the 1st run

DGM Volume (L_{dstd})

$$(V_m)_{dstdL}\,(L_{dstd}) = (V_m)_{dscf} \times 28.31685$$

$(V_m)_{dstdL}$ (L_{dstd}) = 51.775 dscf x 28.31685 L/ft^3 = 1466.09 L_{dstd}

$(V_m)_{dscf}$ = Volume of gas sample measured by the DGM, corrected to standard conditions.

Sum of HCl Ion (mg/L) - modified 40 CFR 60, App A, Eq. 26-4

$$N(mg/L) = K_{HCl}\left(S_x - B_x\right)$$

$$\text{N (mg/L)} = \left(\frac{16.0\ \text{mg}}{\text{L}} - \frac{0.5\ \text{mg}}{\text{L}}\right) \times \frac{1.028\ \mu\text{g HCl/}\mu\text{g•mol}}{\mu\text{g } Cl^-/\mu\text{g•mol}} = \frac{15.9124\ \text{mg}}{\text{L}}$$

Total Sample Volume (ml)

$$S(ml) = \Sigma V_{NH\,3}$$

S (ml) = 725 ml

KHCl = Equation 26-4 conversion constant

MW = molecular weight (ref. ASTM D 3588)

Volume of HCl (L)

$$V_a(L) = \frac{\frac{N \times S}{1000} \times 22.4}{MW \times 1000}$$

$$V_a\text{ (L)} = \frac{15.9124\ \text{mg}}{\text{L}} \times 725\ \text{ml} \times \frac{\text{L}}{1000\ \text{ml}} \times \frac{22.4\ \text{L ideal gas}}{\text{g-mol substance}} \times \frac{\text{g-mol HCl}}{36.46094\ \text{g}} \times \frac{\text{g}}{1000\ \text{mg}} = 0.00709\ \text{L}$$

HCl Concentration (ppmvd)

$$C_{HCl}\,(ppmvd) = \frac{V_a}{(V_m)_{dstdL}} \times 10^6$$

$$C_{HCl}\text{ (ppmvd)} = \frac{0.00709\ \text{L}}{1466.09\ L_{dstd}} \times \frac{10^6\ \text{parts}}{1\ \text{part}} = 4.834\ \text{ppmvd}$$

22.4 = liters of ideal gas per mol of substance at 0^oC and 1 atm (ref. Civil Engineering Reference Manual, 7th ed. - Michael R. Lindeburg)

METHOD 26A (HYDROGEN CHLORIDE) - RESULTS

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TG	**Stack Type**	Circular

Historical Data						
Run Number		OUT-HCl-1	OUT-HCl-2	OUT-HCl-3	**Average**	
Run Start Time		17:58	19:40	21:39		hh:mm
Run Stop Time		18:58	20:40	22:39		hh:mm
Meter Calibration Factor	(Y)	1.002	1.002	1.002		
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840		
Average Nozzle Diameter	(D_{na})	0.247	0.247	0.247		in
Stack Test Data						
Initial Meter Volume	($V_m)_i$	259.650	313.260	365.350		ft3
Final Meter Volume	($V_m)_f$	312.930	364.940	421.450		ft3
Total Meter Volume	(V_m)	53.280	51.680	56.100	53.687	ft3
Total Sampling Time	(Θ)	60.0	60.0	60.0	60.0	min
Average Meter Temperature	($t_m)_{avg}$	79.4	80.5	79.8	79.9	oF
Average Stack Temperature	($t_s)_{avg}$	297.3	292.8	299.3	296.4	oF
Barometric Pressure	(P_b)	29.43	29.44	29.46	29.44	in Hg
Stack Static Pressure	(P_{static})	-0.23	-0.23	-0.23	-0.23	in H2O
Absolute Stack Pressure	(P_s)	29.41	29.42	29.44	29.43	in Hg
Average Orifice Pressure Drop	($\Delta H)_{avg}$	2.88	2.63	2.87	2.79	in H2O
Absolute Meter Pressure	(P_m)	29.56	29.57	29.59	29.58	in Hg
Avg Square Root Pitot Pressure	($\Delta p^{1/2})_{avg}$	1.26	1.21	1.26	1.24	(in H2O)1/2
Moisture Content Data						
Impingers 1-3 Water Volume Gain	(V_n)	362.0	359.3	369.7	363.7	ml
Impinger 4 Silica Gel Weight Gain	(W_n)	18.6	14.2	14.8	15.9	g
Total Water Volume Collected	(V_{lc})	380.6	373.6	384.5	379.5	ml
Standard Water Vapor Volume	($V_w)_{std}$	17.914	17.584	18.098	17.865	scf
Standard Meter Volume	($V_m)_{std}$	51.775	50.100	54.524	52.133	dscf
Calculated Stack Moisture	($B_{ws(calc)}$)	25.71	25.98	24.92	25.53	%
Saturated Stack Moisture	($B_{ws(svp)}$)	100.0	100.0	100.0	100.0	%
Reported Stack Moisture Content	(B_{ws})	25.71	25.98	24.92	25.53	%
Gas Analysis Data						
Carbon Dioxide Percentage	(%CO_2)	14.5	14.9	14.3	14.5	%
Oxygen Percentage	(%O_2)	5.3	4.9	5.5	5.2	%
Carbon Monoxide Percentage	(%CO)	0.0	0.0	0.0	0.0	%
Nitrogen Percentage	(%N_2)	80.2	80.2	80.2	80.2	%
Dry Gas Molecular Weight	(M_d)	30.53	30.57	30.50	30.53	lb/lb-mole
Wet Stack Gas Molecular Weight	(M_s)	27.31	27.31	27.39	27.33	lb/lb-mole
Calculated Fuel Factor	(F_o)	1.073	1.075	1.078	1.075	
Fuel F-Factor	(F_c)	1890	1890	1890	1890	dscf/MMBtu
Percent Excess Air	(%EA)	33.7	29.9	35.0	32.9	%
Volumetric Flow Rate Data						
Average Stack Gas Velocity	(v_s)	87.95	84.21	87.58	86.58	ft/sec
Stack Cross-Sectional Area	(A_s)	63.62	63.62	63.62	63.62	ft2
Actual Stack Flow Rate	(Q_{aw})	335,696	321,446	334,283	330,475	acfm
Wet Standard Stack Flow Rate	(Q_{sw})	13,806	13,304	13,726	13,612	wkscfh
Dry Standard Stack Flow Rate	(Q_{sd})	170,953	164,129	171,756	168,946	dscfm
Percent of Isokinetic Rate	(I)	96.4	97.2	101.6	98.4	%
HCl Rate Data						
Stack HCl Concentration	(c_{HCl})	4.834	14.840	11.020	10.231	ppm
	(c_{HCl}')	4.321	12.879	9.945	9.048	ppm@7%O_2
HCl Emission Rate	(E_{HCl})	4.69	13.83	10.75	9.76	lbs/hr
	(E_{HCl}')	20.44	60.24	46.81	42.5	tons/yr
	(E_{HCl}'')	0.006	0.018	0.014	0.013	lbs/MMBtu
(Pt 75 App F Sect. 5.2.1) **Heat Input**	(HI)	784.4	777.0	769.7	777.0	MMBtu/hr

METHOD 26A (HYDROGEN CHLORIDE) SOURCE SAMPLING TITLE PAGE

Source Information				
Plant Name	Fibrominn Biomass Power Plant			
Sampling Location	Stack Outlet			
Fuel or Source Type	Biomass			
Fuel F-Factor	1890	1890	1890	

Test Information			
Starting Test Date		07/03/07	
Project #		snc-07-benson.mn-comp#1	
Operator		TG	
Standard Temperature		68	oF
Standard Pressure		29.92	in Hg
Minimum Required Sample Vol.	indust. spec.	35	scf
Run Duration	chk Subpart	60	minutes
Unit Number		OUT-HCl	
Load	% or w/DB	100%	
Base Run Number		OUT-HCl	
Number of Ports Available		2	
Number of Ports Used		1	
Port Inside Diameter		5.00	in
Circular Stack			

Test Equipment Information					
Run		**1**	**2**	**3**	
Meter Box Number	from ACS	SAMP-CP-0016	SAMP-CP-0016	SAMP-CP-0016	
Meter Calibration Factor	(Y)	1.002	1.002	1.002	
Orifice Meter Coefficient	(ΔH@)	1.832	1.832	1.832	in H_2O
Pitot Identification	from ACS	SAMP-HP-0011	SAMP-HP-0011	SAMP-HP-0011	
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840	
Orsat Identification	from ACS	N/A	N/A	N/A	
Nozzle Number	from ACS	A-1	A-1	A-1	
Nozzle Diameter	(D_n)	0.247	0.247	0.247	in
Probe Number	from ACS	SAMP-HP-0011	SAMP-HP-0011	SAMP-HP-0011	
Probe Length		60.00	60.00	60.00	in
(SS, Glass ….) Liner Material	from list	glass	glass	glass	
Sample Case / Oven Number	from ACS	SAMP-BH-0027	SAMP-BH-0027	SAMP-BH-0027	
Impinger Case Number	from ACS	SAMP-BC-0021	SAMP-BC-0003	SAMP-BC-0021	

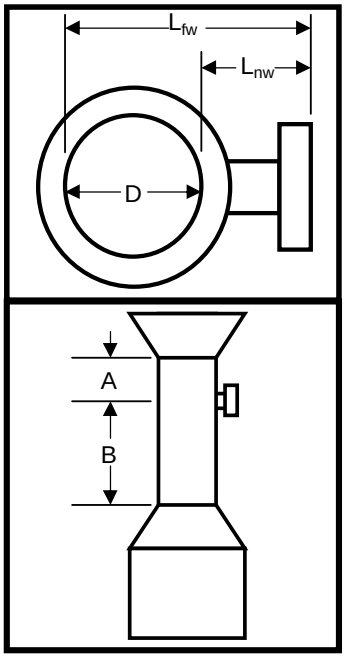
Testing Company Information	
Company Name	Air Hygiene International, Inc. (Tulsa, Oklahoma)
Address	5634 S. 122nd East Ave., Suite F
City, State Country Zip	Tulsa, Oklahoma 74146
Project Manager	Thomas K. Graham
Phone Number	(918) 307-8865
Fax Number	(918) 307-9131

METHOD 1 - SAMPLE AND VELOCITY TRAVERSES FOR CIRCULAR SOURCES

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TG	**# of Ports Available**	2
Stack Type	Circular	**# of Ports Used**	1
Stack Size	Large	**Port Inside Diameter**	5.00

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	129.00	in
Distance to Near Wall of Stack	(L_{nw})	21.00	in
Diameter of Stack	(D)	108.00	in
Area of Stack	(A_s)	63.62	ft2

Distance from Port to Disturbances			
Distance Upstream	(A)	2358.00	in
Diameters Upstream	(A_D)	21.83	diameters
Distance Downstream	(B)	910.00	in
Diameters Downstream	(B_D)	8.43	diameters



Number of Traverse Points Required			
Diameters to Flow Disturbance		**Minimum Number of[1] Traverse Points**	
Down Stream	**Up Stream**	**Particulate Points**	**Velocity Points**
2.00-4.99	0.50-1.24	24	16
5.00-5.99	1.25-1.49	20	16
6.00-6.99	1.50-1.74	16	12
7.00-7.99	1.75-1.99	12	12
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]
Upstream Spec		12	12
Downstream Spec		12	12
Traverse Pts Required		12	12

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

Number of Traverse Points Used			
1	**Ports by**	1	**Across**
1	**Pts Used**	1	**Required**
		Particulate Traverse	

Location of Traverse Points in Circular Stacks									
Traverse	(Fraction of Stack Dimension from Inside Wall to Traverse Point)								
Point	**Number of Traverse Points Across the Stack**								
Number	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**
1	.146	.067	.044	.032	.026	.021	.018	.016	.014
2	.854	.250	.146	.105	.082	.067	.057	.049	.044
3		.750	.296	.194	.146	.118	.099	.085	.075
4		.933	.704	.323	.226	.177	.146	.125	.109
5			.854	.677	.342	.250	.201	.169	.146
6			.956	.806	.658	.356	.269	.220	.188
7				.895	.774	.644	.366	.283	.236
8				.968	.854	.750	.634	.375	.296
9					.918	.823	.731	.625	.382
10					.974	.882	.799	.717	.618
11						.933	.854	.780	.704
12						.979	.901	.831	.764

Traverse Point Number	**Fraction of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
		in	in
1	0.50	64 4/8	71 4/8
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

METHOD 2 - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant Name	Fibrominn Biomass Power Plant				**Date**	06/30/07
Sampling Location	Stack Outlet				**Project #**	snc-07-benson.mn-comp#1
Operator	TG				**# of Ports Used**	1
Stack Type	Circular				**Pitot Identification**	samp-hp-0006
Pitot Leak Check	☑	**PreTest**	☑	**PostTest**	**Pitot Coefficient (C_p)**	0.84

Stack Dimensions			
Diameter or Length of Stack	(D)	108.00	in
Width of Stack	(W)		in
Area of Stack	(A_s)	63.62	ft2

Pressures			
Barometric Pressure	(P_b)	29.92	in Hg
Static Pressure	(P_{static})	-0.23	in H2O
Absolute Stack Pressure	(P_s)	29.90	in Hg

Stack Gas Composition			
Composition Data:		**Actual Composition**	
Carbon Dioxide Concentration	($\%CO_2$)	14.4	%
Oxygen Concentration	($\%O_2$)	4.8	%
Carbon Monoxide Concentration	(%CO)	0.0	%
Nitrogen Concentration	($\%N_2$)	80.8	%
Stack Moisture Content	(B_{ws})	30.000	%
Stack Dry Molecular Weight	(M_d)	30.50	lb/lb-mole
Stack Wet Molecular Weight	(M_s)	26.75	lb/lb-mole

Results			
Avg Stack Gas Velocity	(v_s)	72.7	ft/sec
Avg Stack Dry Std Flow Rate	(Q_{sd})	8,192,279	dscf/hr
Avg Stack Dry Std Flow Rate	(Q_{sd})	136,538	dscf/min
Avg Stack Wet Flow Rate	(Q_{aw})	277,654	acf/min
Avg Stack Wet Std Flow Rate	(Q_{sw})	11,703,256	ascf/hr

Stack Cross Section Schematic

Velocity Traverse Data				
Run Number		OUT-HCl-V1		
Run Time	**12:00**	**Start**	**12:10**	**End**
Traverse Point	**Velocity Head** (Δp)	**Null Angle** (N_a)	**Stack Temp** (t_s)	**Local Velocity** ($v_{s(l)}$)
	in H2O	deg	oF	ft/sec
A-1	1.00	0	291	69.6
A-2	1.30	-10	291	79.3
A-3	1.30	0	290	79.3
A-4	1.10	-5	290	72.9
A-5	1.30	0	290	79.3
A-6	0.14	0	290	26.0
B-1	1.30	0	293	79.4
B-2	1.00	0	293	69.7
B-3	1.20	0	293	76.3
B-4	1.30	0	292	79.4
B-5	1.30	-10	291	79.3
B-6	1.40	-15	290	82.3
Average	1.14	3	291	
	1.05	**= Square roots of Δp**		

METHOD 3a - DETERMINATION OF DRY MOLECULAR WEIGHT BY ANALYZER

Plant Name	Fibrominn Biomass Power Plant				**Date**	07/03/07	
Sampling Location	Stack Outlet				**Project #**	snc-07-benson.mn-comp#1	
Operator	TG				**# of Ports Used**	1	
Fuel Type	Biomass		**Minimum Fuel Factor**	1.000	**Maximum Fuel Factor**	1.120	
Orsat Leak Check	☑	**PreTest**	☑	**PostTest**	**Orsat Identification**	N/A	

Gas Analysis Data									
Run Number		OUT-HCl-1		**Run Start Time**		17:58	**Run Stop Time**		18:58
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
1:00	14.5	5.3	229.3	14.5	5.3	0.0	80.2	30.53	0.00
Results			**Averages**	14.5	5.3	0.0	80.2	30.53	
Average Calculated Fuel Factor			$(F_o)_{avg}$	1.073		**Molecular Wt Deviation < 0.3?**			☑
Average Excess Air			$(\%EA)_{avg}$	33.7	percent	**Fuel Factor in Handbook Range?**			☑

Gas Analysis Data									
Run Number		OUT-HCl-2		**Run Start Time**		19:40	**Run Stop Time**		20:40
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
1:00	14.9	4.9	260.1	14.9	4.9	0.0	80.2	30.57	0.00
Results			**Averages**	14.9	4.9	0.0	80.2	30.57	
Average Calculated Fuel Factor			$(F_o)_{avg}$	1.075		**Molecular Wt Deviation < 0.3?**			☑
Average Excess Air			$(\%EA)_{avg}$	29.9	percent	**Fuel Factor in Handbook Range?**			☑

Gas Analysis Data									
Run Number		OUT-HCl-3		**Run Start Time**		21:39	**Run Stop Time**		22:39
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
1:00	14.3	5.5	165.1	14.3	5.5	0.0	80.2	30.50	0.00
Results			**Averages**	14.3	5.5	0.0	80.2	30.50	
Average Calculated Fuel Factor			$(F_o)_{avg}$	1.078		**Molecular Wt Deviation < 0.3?**			☑
Average Excess Air			$(\%EA)_{avg}$	35.0	percent	**Fuel Factor in Handbook Range?**			☑

Fuel Factor Fo		
Fuel Type	**Minimum**	**Maximum**
Coal, Anthracite	1.016	1.130
Coal, Lignite	1.016	1.130
Coal, Bituminous	1.083	1.230
Oil, Distillate	1.260	1.413
Oil, Residual	1.210	1.370
Gas, Natural	1.600	1.836
Gas, Propane	1.434	1.586
Gas, Butane	1.405	1.553
Biomass	1.000	1.120
Wood Bark	1.003	1.130

METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

Plant Name	Fibrominn Biomass Power Plant				**Date**	07/03/07	
Sampling Location	Stack Outlet				**Project #**	snc-07-benson.mn-comp#1	
Operator	TG				**# of Ports Used**	1	
Stack Type	Circular				**Meter Box Number**	SAMP-CP-0016	
Train Leak Check	☑	**PreTest**	☑	**PostTest**	**Meter Cal Factor (Y)**	1.002	

Moisture Content Data									
Run Number		OUT-HCl-1			**Run Start Time**	17:58		**Run Stop Time**	18:58
Total Meter Volume	(V_m)	53.280	dcf		**Barometric Press.**	(P_b)	29.43		in Hg
Avg Stack Temp	(t_s)$_{avg}$	297	oF		**Stack Static Press.**	(P_{static})	-0.23		in H2O
Avg Meter Temp	(t_m)$_{avg}$	79	oF		**Avg Orifice Press.**	(ΔH)$_{avg}$	2.88		in H2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		g	g	g	g	g	g	g	g
Contents			H2SO4	H2SO4		Sil Gel			
Final Value	(V_f),(W_f)	935.20	889.80	750.50	647.60	908.70			
Initial Value	(V_i),(W_i)	695.60	776.20	748.60	641.40	890.10			
Net Value	(V_n),(W_n)	239.6	113.6	1.9	6.2	18.6			
Results									
Total Weight	(W_t)	379.90	g		**Water Vol Weighed**	($V_{wsg(std)}$)	17.912	scf	
Std Meter Volume	($V_{m(std)}$)	51.771	dscf		**Sat. Moisture Content**	($B_{ws(svp)}$)	100.0	%	
Calc Moisture Content	($B_{ws(calc)}$)	25.7	%		**Final Moisture Content**	(B_{ws})	25.7	%	

Moisture Content Data									
Run Number		OUT-HCl-2			**Run Start Time**	19:40		**Run Stop Time**	20:40
Total Meter Volume	(V_m)	51.680	dcf		**Barometric Press.**	(P_b)	29.44		in Hg
Avg Stack Temp	(t_s)$_{avg}$	293	oF		**Stack Static Press.**	(P_{static})	-0.23		in H2O
Avg Meter Temp	(t_m)$_{avg}$	81	oF		**Avg Orifice Press.**	(ΔH)$_{avg}$	2.63		in H2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		g	g	g	g	g	g	g	g
Contents			H2SO4	H2SO4		Sil Gel			
Final Value	(V_f),(W_f)	967.50	821.70	741.40	643.40	901.70			
Initial Value	(V_i),(W_i)	701.70	753.70	720.30	639.60	887.50			
Net Value	(V_n),(W_n)	265.8	68.0	21.1	3.8	14.2			
Results									
Total Weight	(W_t)	372.90	g		**Water Vol Weighed**	($V_{wsg(std)}$)	17.582	scf	
Std Meter Volume	($V_{m(std)}$)	50.102	dscf		**Sat. Moisture Content**	($B_{ws(svp)}$)	100.0	%	
Calc Moisture Content	(B_{ws})	26.0	%		**Final Moisture Content**	(B_{ws})	26.0	%	

Moisture Content Data									
Run Number		OUT-HCl-3			**Run Start Time**	21:39		**Run Stop Time**	22:39
Total Meter Volume	(V_m)	56.100	dcf		**Barometric Press.**	(P_b)	29.46		in Hg
Avg Stack Temp	(t_s)$_{avg}$	299	oF		**Stack Static Press.**	(P_{static})	-0.23		in H2O
Avg Meter Temp	(t_m)$_{avg}$	80	oF		**Avg Orifice Press.**	(ΔH)$_{avg}$	2.87		in H2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		g	g	g	g	g	g	g	g
Contents			H2SO4	H2SO4		Sil Gel			
Final Value	(V_f),(W_f)	936.30	870.50	772.00	647.20	923.50			
Initial Value	(V_i),(W_i)	689.40	776.50	750.20	640.90	908.70			
Net Value	(V_n),(W_n)	246.9	94.0	21.8	6.3	14.8			
Results									
Total Weight	(W_t)	383.80	g		**Water Vol Weighed**	($V_{wsg(std)}$)	18.096	scf	
Std Meter Volume	($V_{m(std)}$)	54.522	dscf		**Sat. Moisture Content**	($B_{ws(svp)}$)	100.0	%	
Calc Moisture Content	(B_{ws})	24.9	%		**Final Moisture Content**	(B_{ws})	24.9	%	

METHOD 26A (HYDROGEN CHLORIDE) ISOKINETIC SAMPLING DATA

Plant Name	Fibrominn Biomass Power Plant	**Date**	7/3/2007
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TG	**Run #**	OUT-HCl-1
# of Points Across	1	**# of Ports Used**	1

Leak Checks					
Train	**Pre**	0	ft3/min @	15	in Hg
OK? ☑	**Post**	0	ft3/min @	15	in Hg
Pitot	**Pre**	3/4	in. H_2O for	15	sec
OK? ☑	**Post**	3/4	in. H_2O for	15	sec
Orsat	OK? ☑				

Sampling Equipment			
Meter #	SAMP-CP-0016		
Meterbox Cal. Factor	(Y)	1.002	
Nozzle #	A-1		
Average Nozzle Diameter	(D_{na})	0.2473	in
Rec. Nozzle Diameter	(D_{ni})	0.2358	in
Probe # / Length	SAMP-HP-0011	/ 60	in
Liner Material	glass		
Sample Case / Oven #	SAMP-BH-0027		
Impinger Case #	SAMP-BC-0021		

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.84	
Avg Stack Temp	(t_s)	297	oF
Avg Gas Meter Temp	(t_m)	79	
DH @ 0.75 SCFM	($\Delta H@$)	1.83	in H2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.26	in H2O
Stack Moisture Content	(B_{ws})	25.70	%
Stack Dry Molecular Weight	(M_d)	30.53	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.750	acfm
DP to DH Isokinetic Factor	(K)	1.80	

Nozzle Measurements				
Pre	0.247	0.247	0.248	**PASS**
Post	0.247	0.247	0.248	**PASS**

Pressures			
Barometric Pressure	(P_b)	29.43	in Hg
Stack Static Pressure	(P_{static})	-0.23	in H2O
Absolute Stack Pressure	(P_s)	29.41	in Hg
Absolute Meter Pressure	(P_m)	29.56	in Hg

Run Time			
Start	17:58	**End**	18:58

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	695.60	776.20	748.60	641.40	890.10			
Post	935.20	889.80	750.50	647.60	908.70			

Wash Volume			
H_2O	50.0	ml	
MeCl		ml	

Filter #
M-1922

Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp**	**Filter Temp**	**Impinger Exit Temp**	**Aux Temp**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumulative Meter Volume (V_m)$_{std}$**	**Cumulative Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft3	in H2O	in H2O	in H2O	oF	oF	oF	oF	oF	oF	oF	in Hg	(in H2O)1/2	ft/sec	scf	%	scf
A-3	0.0	0:00:00	259.650	1.700	3.056	3.100	299	266	264	67		76	76	5.0	1.30	91.02	4.266	92.2	51.190
A-3	5.0	0:05:00	264.010	1.600	2.877	2.900	300	269	264	62		76	76	4.0	1.26	88.36	8.979	99.0	53.876
A-3	10.0	0:10:00	268.830	1.700	3.056	3.100	301	269	265	65		76	76	4.0	1.30	91.14	13.363	97.6	53.450
A-3	15.0	0:15:00	273.310	1.600	2.877	2.900	300	268	266	65		77	77	4.0	1.26	88.36	17.696	97.4	53.089
A-3	20.0	0:20:00	277.750	1.500	2.697	2.700	298	268	260	58		78	78	3.0	1.22	85.44	21.981	97.6	52.755
A-3	25.0	0:25:00	282.150	1.600	2.877	2.900	299	267	266	54		79	79	4.0	1.26	88.30	26.211	97.1	52.423
A-3	30.0	0:30:00	286.500	1.600	2.877	2.900	299	268	270	61		80	80	4.0	1.26	88.30	30.414	96.6	52.139
A-3	35.0	0:35:00	290.830	1.700	3.056	3.100	298	268	263	66		81	81	4.0	1.30	90.96	34.583	95.8	51.874
A-3	40.0	0:40:00	295.130	1.500	2.697	2.700	295	268	264	58		82	82	4.0	1.22	85.27	38.807	95.9	51.742
A-3	45.0	0:45:00	299.500	1.600	2.877	2.900	294	268	268	57		82	82	5.0	1.26	88.01	43.139	96.0	51.767
A-3	50.0	0:50:00	303.980	1.500	2.697	2.700	292	268	265	63		83	83	5.0	1.22	85.10	47.452	96.2	51.766
A-3	55.0	0:55:00	308.450	1.500	2.697	2.700	292	267	264	64		83	83	5.0	1.22	85.10	51.775	96.4	51.775
Last Pt	60.0	1:00:00	312.930																
Final Val	60.0	1:00:00	312.930										**Max Vac**	5.0	**Final Values**		51.775	96.4	
Average Values				1.59		2.88	297	268	265	62		79	79		1.26	87.95			

METHOD 26A (HYDROGEN CHLORIDE) ISOKINETIC SAMPLING DATA

Plant Name	Fibrominn Biomass Power Plant	**Date**	7/3/2007
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TG	**Run #**	OUT-HCl-2
# of Points Across	1	**# of Ports Used**	1

Leak Checks					
Train	**Pre**	0	ft3/min @	15	in Hg
OK? ☑	**Post**	0	ft3/min @	15	in Hg
Pitot	**Pre**	3/4	in. H_2O for	15	sec
OK? ☑	**Post**	3/4	in. H_2O for	15	sec
Orsat	OK? ☑				

Sampling Equipment			
Meter #	SAMP-CP-0016		
Meterbox Cal. Factor	(Y)	1.002	
Nozzle #	A-1		
Average Nozzle Diameter	(D_{na})	0.2473	in
Rec. Nozzle Diameter	(D_{ni})	0.2590	in
Probe # / Length	SAMP-HP-0011	/ 60	in
Liner Material	glass		
Sample Case / Oven #	SAMP-BH-0027		
Impinger Case #	SAMP-BC-0003		

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.84	
Avg Stack Temp	(t_s)	293	oF
Avg Gas Meter Temp	(t_m)	81	
DH @ 0.75 SCFM	($\Delta H@$)	1.83	in H2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.21	in H2O
Stack Moisture Content	(B_{ws})	25.98	%
Stack Dry Molecular Weight	(M_d)	30.53	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.888	acfm
DP to DH Isokinetic Factor	(K)	1.80	

Nozzle Measurements				
Pre	0.247	0.247	0.248	**PASS**
Post	0.247	0.247	0.248	**PASS**

Pressures			
Barometric Pressure	(P_b)	29.44	in Hg
Stack Static Pressure	(P_{static})	-0.23	in H2O
Absolute Stack Pressure	(P_s)	29.42	in Hg
Absolute Meter Pressure	(P_m)	29.57	in Hg

Run Time			
Start	19:40	**End**	20:40

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	701.70	753.70	720.30	639.60	887.50			
Post	967.50	821.70	741.40	643.40	901.70			

Wash Volume			
	H_2O	50.0	ml
	MeCl		ml

Filter #
M-1922

Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp**	**Filter Temp**	**Impinger Exit Temp**	**Aux Temp**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumulative Meter Volume (V_m)$_{std}$**	**Cumulative Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft3	in H2O	in H2O	in H2O	oF	oF	oF	oF	oF	oF	oF	in Hg	(in H2O)1/2	ft/sec	scf	%	scf
A-3	0.0	0:00:00	313.260	1.400	2.521	2.500	292	269	264	59		78	78	4.0	1.18	82.25	4.148	98.6	49.773
A-3	5.0	0:05:00	317.520	1.500	2.702	2.700	292	269	263	56		78	78	4.0	1.22	85.14	8.327	97.3	49.960
A-3	10.0	0:10:00	321.810	1.500	2.702	2.700	293	268	265	58		78	78	4.0	1.22	85.20	12.467	96.6	49.867
A-3	15.0	0:15:00	326.060	1.500	2.702	2.700	292	268	264	60		79	79	4.0	1.22	85.14	16.716	96.9	50.147
A-3	20.0	0:20:00	330.430	1.400	2.521	2.500	293	268	265	55		79	79	4.0	1.18	82.31	20.846	97.1	50.031
A-3	25.0	0:25:00	334.680	1.600	2.882	2.900	293	268	264	53		80	80	4.0	1.26	87.99	24.915	96.1	49.829
A-3	30.0	0:30:00	338.870	1.500	2.702	2.700	293	268	263	52		81	81	4.0	1.22	85.20	28.915	95.5	49.569
A-3	35.0	0:35:00	343.000	1.400	2.521	2.500	293	269	263	52		82	82	4.0	1.18	82.31	32.955	95.6	49.433
A-3	40.0	0:40:00	347.180	1.400	2.521	2.500	292	268	264	56		82	82	4.0	1.18	82.25	36.985	95.6	49.314
A-3	45.0	0:45:00	351.350	1.400	2.521	2.500	292	268	265	58		83	83	4.0	1.18	82.25	41.172	96.0	49.406
A-3	50.0	0:50:00	355.690	1.500	2.702	2.700	292	268	263	61		83	83	4.0	1.22	85.14	45.679	96.7	49.832
A-3	55.0	0:55:00	360.360	1.500	2.702	2.700	296	269	264	57		83	83	5.0	1.22	85.37	50.100	97.2	50.100
Last Pt	60.0	1:00:00	364.940																
Final Val	60.0	1:00:00	364.940										**Max Vac**	5.0	**Final Values**		50.100	97.2	
Average Values				1.47		2.63	293	268	264	56		81	81		1.21	84.21			

METHOD 26A (HYDROGEN CHLORIDE) ISOKINETIC SAMPLING DATA

Plant Name	Fibrominn Biomass Power Plant	**Date**	7/3/2007
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TG	**Run #**	OUT-HCl-3
# of Points Across	1	**# of Ports Used**	1

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.84	
Avg Stack Temp	(t_s)	299	oF
Avg Gas Meter Temp	(t_m)	80	
DH @ 0.75 SCFM	(ΔH@)	1.83	in H2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.26	in H2O
Stack Moisture Content	(B_{ws})	24.92	%
Stack Dry Molecular Weight	(M_d)	30.57	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.861	acfm
DP to DH Isokinetic Factor	(K)	1.83	

Leak Checks					
Train	**Pre**	0	ft3/min @	15	in Hg
OK? ☑	**Post**	0	ft3/min @	15	in Hg
Pitot	**Pre**	3/4	in. H_2O for	15	sec
OK? ☑	**Post**	3/4	in. H_2O for	15	sec
Orsat	OK? ☑				

Sampling Equipment			
Meter #	SAMP-CP-0016		
Meterbox Cal. Factor	(Y)	1.002	
Nozzle #	A-1		
Average Nozzle Diameter	(D_{na})	0.2473	in
Rec. Nozzle Diameter	(D_{ni})	0.2520	in
Probe # / Length	SAMP-HP-0011	/ 60	in
Liner Material	glass		
Sample Case / Oven #	SAMP-BH-0027		
Impinger Case #	SAMP-BC-0021		

Pressures			
Barometric Pressure	(P_b)	29.46	in Hg
Stack Static Pressure	(P_{static})	-0.23	in H2O
Absolute Stack Pressure	(P_s)	29.44	in Hg
Absolute Meter Pressure	(P_m)	29.59	in Hg

Nozzle Measurements				
Pre	0.247	0.247	0.248	**PASS**
Post	0.247	0.247	0.248	**PASS**

Run Time			
Start	21:39	**End**	22:39

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	689.40	776.50	750.20	640.90	908.70			
Post	936.30	870.50	772.00	647.20	923.50			

Wash Volume	**H_2O**	50.0	ml	
	MeCl		ml	

Filter #
M-1922

Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp**	**Filter Temp**	**Impinger Exit Temp**	**Aux Temp**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumulative Meter Volume (V_m)$_{std}$**	**Cumulative Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft3	in H2O	in H2O	in H2O	oF	oF	oF	oF	oF	oF	oF	in Hg	(in H2O)1/2	ft/sec	scf	%	scf
A-3	0.0	0:00:00	365.350	1.600	2.922	2.900	299	267	264	67		76	76	4.0	1.26	88.04	4.464	98.6	53.566
A-3	5.0	0:05:00	369.910	1.500	2.739	2.700	300	269	265	60		76	76	4.0	1.22	85.30	9.082	102.1	54.492
A-3	10.0	0:10:00	374.630	1.600	2.922	2.900	300	268	265	61		77	77	4.0	1.26	88.10	13.674	101.9	54.697
A-3	15.0	0:15:00	379.330	1.600	2.922	2.900	298	268	266	63		78	78	4.0	1.26	87.98	18.238	101.6	54.715
A-3	20.0	0:20:00	384.010	1.600	2.922	2.900	299	268	265	64		79	79	4.0	1.26	88.04	22.785	101.4	54.683
A-3	25.0	0:25:00	388.680	1.600	2.922	2.900	299	268	264	66		80	80	4.0	1.26	88.04	27.322	101.2	54.644
A-3	30.0	0:30:00	393.350	1.500	2.739	2.700	300	268	264	58		81	81	4.0	1.22	85.30	30.860	98.8	52.903
A-3	35.0	0:35:00	397.000	1.700	3.105	3.100	299	268	263	57		81	81	5.0	1.30	90.75	36.459	102.1	54.689
A-3	40.0	0:40:00	402.770	1.700	3.105	3.100	299	268	264	56		82	82	5.0	1.30	90.75	41.069	101.7	54.759
A-3	45.0	0:45:00	407.530	1.600	2.922	2.900	300	269	265	58		82	82	5.0	1.26	88.10	45.648	101.7	54.778
A-3	50.0	0:50:00	412.260	1.500	2.739	2.700	299	268	265	57		83	83	5.0	1.22	85.25	50.101	101.7	54.655
A-3	55.0	0:55:00	416.870	1.500	2.739	2.700	299	269	265	58		83	83	5.0	1.22	85.25	54.524	101.6	54.524
Last Pt	60.0	1:00:00	421.450																
Final Val	60.0	1:00:00	421.450										**Max Vac**	5.0	**Final Values**		54.524	101.6	
Average Values				1.583		2.867	299	268	265	60		80	80		1.26	87.58			
												80							

METHOD 26A (HYDROGEN CHLORIDE) - SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TG	**Acetone Lot Number**	

Run History Data				
Run Number	OUT-HCl-1	OUT-HCl-2	OUT-HCl-3	
Run Start Time	17:58	19:40	21:39	(hh:mm)
Run Stop Time	18:58	20:40	22:39	(hh:mm)
Train Prepared By	KV/SK	KV/SK	KV/SK	
Train Recovered By	KV/SK	KV/SK	KV/SK	
Recovery Date	7/3/2007	7/3/2007	7/3/2007	(mm/dd/yy)
Relinquished By	KV/SK	KV/SK	KV/SK	
Received By	TG	TG	TG	
Relinquished Date	7/3/2007	7/3/2007	7/3/2007	(mm/dd/yy)
Relinquished Time	18:58	20:40	22:39	(hh:mm)

Equipment Identification Numbers			
Filter	M-1922	M-1922	M-1922
Acetone Wash	ok	ok	ok
Silica Gel	ok	ok	ok
Impinger Case	SAMP-BC-0021	SAMP-BC-0003	SAMP-BC-0021
Sample Box	SAMP-BH-0027	SAMP-BH-0027	SAMP-BH-0027
Oven	ok	ok	ok

Sample Blank Taken ☑ YES

Moisture Content Data					
Impingers 1, 2, 3 and 4 - Liquid Volume					
Final Volume	(V_f)	3228.9	3179.7	3231.8	ml
Initial Volume	(V_i)	2867.0	2820.4	2862.2	ml
Net Volume	(V_n)	362.0	359.3	369.7	ml
Comments					
Impinger 5 - Silica Gel Weight					
Final Weight	(W_f)	908.7	901.7	923.5	g
Initial Weight	(W_i)	890.1	887.5	908.7	g
Net Weight	(W_n)	18.6	14.2	14.8	g
Comments					
Total Water Collected					
Total Volume	(V_{lc})	380.6	373.6	384.5	ml

HCl ANALYSIS

Air Hygiene International, Inc.
5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
(888) 461-8778
www.airhygiene.com

PARAMETER	UNITS	RUN			
		1	2	3	BLANK
Sample Number		IN-HCl-1	IN-HCl-2	IN-HCl-3	Blank
Lab Log Number		070307-IN-HCl1	070307-IN-HCl2	070307-IN-HCl3	070307-IN-HCl4
Concentration of Sample (S_x or B_x)	(mg Cl^-/L)	110	100	115	0.521
Sample Volume (V_{HCl})	(ml)	455	430	390	N/A
DGM Volume $(V_m)_{dscf}$	(dscf)	18.268	11.712	24.123	N/A
DGM Volume $(V_m)_{dstdL}$	(L_{dstd})	517.29	331.64	683.07	N/A
Sum of HCl Ion (N)	(mg/L)	112.544	102.264	117.684	N/A
Volume of HCl (V_a)	(L)	0.03146	0.02702	0.02820	N/A
HCl Concentration (C_{HCl})	(ppmvd)	60.816	81.460	41.280	N/A

Equations & Constants:

Example Using Data from the 1st run

DGM Volume (L_{dstd})

$$(V_m)_{dstdL}\,(L_{dstd}) = (V_m)_{dscf} \times 28.31685$$

$(V_m)_{dstdL}$ (L_{dstd}) = 18.268 dscf x 28.31685 L/ft^3 = 517.29 L_{dstd}

$(V_m)_{dscf}$ = Volume of gas sample measured by the DGM, corrected to standard conditions.

Sum of HCl Ion (mg/L) - modified 40 CFR 60, App A, Eq. 26-4

$$N(mg/L) = K_{HCl}\left(S_x - B_x\right)$$

$$\text{N (mg/L)} = \left(\frac{110.0\ \text{mg}}{\text{L}} - \frac{0.5\ \text{mg}}{\text{L}}\right) \times \frac{1.028\ \mu\text{g HCl/}\mu\text{g•mol}}{\mu\text{g } Cl^-/\mu\text{g•mol}} = \frac{112.5444\ \text{mg}}{\text{L}}$$

Total Sample Volume (ml)

$$S(ml) = \Sigma V_{NH\,3}$$

S (ml) = 455 ml

KHCl = Equation 26-4 conversion constant

MW = molecular weight (ref. ASTM D 3588)

Volume of HCl (L)

$$V_a(L) = \frac{\frac{N \times S}{1000} \times 22.4}{MW \times 1000}$$

$$V_a\text{ (L)} = \frac{112.5444\ \text{mg}}{\text{L}} \times 455\ \text{ml} \times \frac{\text{L}}{1000\ \text{ml}} \times \frac{22.4\ \text{L ideal gas}}{\text{g-mol substance}} \times \frac{\text{g-mol HCl}}{36.46094\ \text{g}} \times \frac{\text{g}}{1000\ \text{mg}} = 0.03146\ \text{L}$$

HCl Concentration (ppmvd)

$$C_{HCl}\,(ppmvd) = \frac{V_a}{(V_m)_{dstdL}} \times 10^6$$

$$C_{HCl}\text{ (ppmvd)} = \frac{0.03146\ \text{L}}{517.29\ L_{dstd}} \times \frac{10^6\ \text{parts}}{1\ \text{part}} = 60.816\ \text{ppmvd}$$

22.4 = liters of ideal gas per mol of substance at 0°C and 1 atm (ref. Civil Engineering Reference Manual, 7th ed. - Michael R. Lindeburg)

METHOD 26A (HYDROGEN CHLORIDE) - RESULTS

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	SDA Inlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TP	**Stack Type**	Circular

Historical Data						
Run Number		IN-HCl-1	IN-HCl-2	IN-HCl-3	**Average**	
Run Start Time		17:58	19:40	21:39		hh:mm
Run Stop Time		18:58	20:40	22:39		hh:mm
Meter Calibration Factor	(Y)	1.007	1.007	1.007		
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840		
Average Nozzle Diameter	(D_{na})	0.244	0.187	0.244		in
Stack Test Data						
Initial Meter Volume	(V_m)$_i$	49.646	69.964	82.719		ft3
Final Meter Volume	(V_m)$_f$	69.315	82.591	108.583		ft3
Total Meter Volume	(V_m)	19.669	12.627	25.864	19.387	ft3
Total Sampling Time	(Θ)	60.0	60.0	60.0	60.0	min
Average Meter Temperature	(t_m)$_{avg}$	104.5	104.2	102.0	103.5	oF
Average Stack Temperature	(t_s)$_{avg}$	350.0	344.2	347.8	347.3	oF
Barometric Pressure	(P_b)	29.44	29.44	29.44	29.44	in Hg
Stack Static Pressure	(P_{static})	-2.10	-2.10	-2.10	-2.10	in H2O
Absolute Stack Pressure	(P_s)	29.29	29.29	29.29	29.29	in Hg
Average Orifice Pressure Drop	(ΔH)$_{avg}$	0.65	0.24	0.79	0.56	in H2O
Absolute Meter Pressure	(P_m)	29.56	29.56	29.56	29.56	in Hg
Avg Square Root Pitot Pressure	($\Delta p^{1/2}$)$_{avg}$	0.66	0.72	0.75	0.71	(in H2O)1/2
Moisture Content Data						
Impingers 1-3 Water Volume Gain	(V_n)	85.8	73.5	52.2	70.5	ml
Impinger 4 Silica Gel Weight Gain	(W_n)	2.3	1.0	1.9	1.7	g
Total Water Volume Collected	(V_{lc})	88.1	74.5	54.1	72.2	ml
Standard Water Vapor Volume	(V_w)$_{std}$	4.145	3.508	2.546	3.400	scf
Standard Meter Volume	(V_m)$_{std}$	18.268	11.712	24.123	18.034	dscf
Calculated Stack Moisture	($B_{ws(calc)}$)	18.50	23.04	9.55	17.03	%
Saturated Stack Moisture	($B_{ws(svp)}$)	100.0	100.0	100.0	100.0	%
Reported Stack Moisture Content	(B_{ws})	18.50	23.04	9.55	17.03	%
Gas Analysis Data						
Carbon Dioxide Percentage	(%CO_2)	16.6	16.1	15.6	16.1	%
Oxygen Percentage	(%O_2)	5.2	5.5	4.9	5.2	%
Carbon Monoxide Percentage	(%CO)	0.0	0.0	0.0	0.0	%
Nitrogen Percentage	(%N_2)	78.1	78.4	79.5	78.7	%
Dry Gas Molecular Weight	(M_d)	30.87	30.80	30.69	30.78	lb/lb-mole
Wet Stack Gas Molecular Weight	(M_s)	28.49	27.85	29.48	28.60	lb/lb-mole
Calculated Fuel Factor	(F_o)	0.942	0.954	1.024	0.973	
Fuel F-Factor	(F_c)	1890	1890	1890	1890	dscf/MMBtu
Percent Excess Air	(%EA)	33.9	36.1	30.3	33.4	%
Volumetric Flow Rate Data						
Average Stack Gas Velocity	(v_s)	47.71	52.22	54.63	51.52	ft/sec
Stack Cross-Sectional Area	(A_s)	90.76	90.76	90.76	90.76	ft2
Actual Stack Flow Rate	(Q_{aw})	259,816	284,376	297,488	280,560	acfm
Wet Standard Stack Flow Rate	(Q_{sw})	9,946	10,965	11,420	10,777	wkscfh
Dry Standard Stack Flow Rate	(Q_{sd})	135,105	140,647	172,164	149,305	dscfm
Percent of Isokinetic Rate	(I)	91.6	104.0	93.4	96.3	%
HCl Rate Data						
Stack HCl Concentration	(c_{HCl})	60.816	81.460	41.280	61.185	ppm

METHOD 26A (HYDROGEN CHLORIDE) SOURCE SAMPLING TITLE PAGE

Source Information				
Plant Name	Fibrominn Biomass Power Plant			
Sampling Location	SDA Inlet			
Fuel or Source Type	Biomass			
Fuel F-Factor	1890	1890	1890	

Test Information			
Starting Test Date		07/03/07	
Project #		snc-07-benson.mn-comp#1	
Operator		TP	
Standard Temperature		68	oF
Standard Pressure		29.92	in Hg
Minimum Required Sample Vol.	indust. spec.	35	scf
Run Duration	chk Subpart	60	minutes
Unit Number		IN-HCl	
Load	% or w/DB	100%	
Base Run Number		IN-HCl	
Number of Ports Available		2	
Number of Ports Used		1	
Port Inside Diameter		5.00	in
Circular Stack			

Test Equipment Information					
Run		**1**	**2**	**3**	
Meter Box Number	from ACS	SAMP-CP-0002	SAMP-CP-0002	SAMP-CP-0002	
Meter Calibration Factor	(Y)	1.007	1.007	1.007	
Orifice Meter Coefficient	(ΔH@)	1.667	1.667	1.667	in H_2O
Pitot Identification	from ACS	SAMP-HP-0002	SAMP-HP-0002	SAMP-HP-0002	
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840	
Orsat Identification	from ACS	N/A	N/A	N/A	
Nozzle Number	from ACS	B-2	B-2	B-2	
Nozzle Diameter	(D_n)	0.244	0.187	0.244	in
Probe Number	from ACS	SAMP-HP-0002	SAMP-HP-0002	SAMP-HP-0002	
Probe Length		96.00	96.00	96.00	in
(SS, Glass ….) Liner Material	from list	glass	glass	glass	
Sample Case / Oven Number	from ACS	SAMP-BH-0004	SAMP-BH-0004	SAMP-BH-0004	
Impinger Case Number	from ACS	SAMP-BC-0015	SAMP-BC-0004	SAMP-BC-0015	

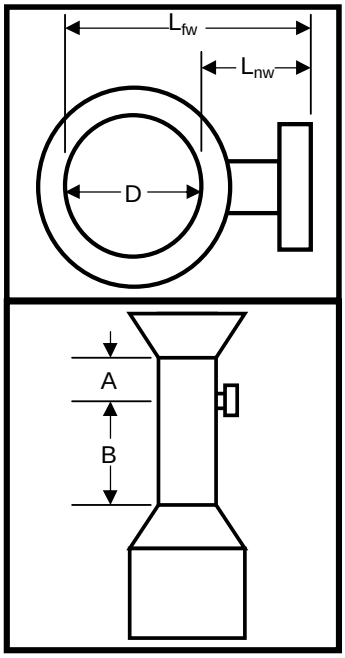
Testing Company Information	
Company Name	Air Hygiene International, Inc. (Tulsa, Oklahoma)
Address	5634 S. 122nd East Ave., Suite F
City, State Country Zip	Tulsa, Oklahoma 74146
Project Manager	Thomas K. Graham
Phone Number	(918) 307-8865
Fax Number	(918) 307-9131

METHOD 1 - SAMPLE AND VELOCITY TRAVERSES FOR CIRCULAR SOURCES

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	SDA Inlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TP	**# of Ports Available**	2
Stack Type	Circular	**# of Ports Used**	1
Stack Size	Large	**Port Inside Diameter**	5.00

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	136.00	in
Distance to Near Wall of Stack	(L_{nw})	7.00	in
Diameter of Stack	(D)	129.00	in
Area of Stack	(A_s)	90.76	ft2

Distance from Port to Disturbances			
Distance Upstream	(A)	350.00	in
Diameters Upstream	(A_D)	2.71	diameters
Distance Downstream	(B)	1222.00	in
Diameters Downstream	(B_D)	9.47	diameters



Number of Traverse Points Required			
Diameters to Flow Disturbance		**Minimum Number of[1] Traverse Points**	
Down Stream	**Up Stream**	**Particulate Points**	**Velocity Points**
2.00-4.99	0.50-1.24	24	16
5.00-5.99	1.25-1.49	20	16
6.00-6.99	1.50-1.74	16	12
7.00-7.99	1.75-1.99	12	12
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]
Upstream Spec		12	12
Downstream Spec		12	12
Traverse Pts Required		12	12

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

Number of Traverse Points Used			
1	**Ports by**	1	**Across**
1	**Pts Used**	1	**Required**
		Particulate Traverse	

Location of Traverse Points in Circular Stacks									
Traverse	(Fraction of Stack Dimension from Inside Wall to Traverse Point)								
Point	**Number of Traverse Points Across the Stack**								
Number	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**
1	.146	.067	.044	.032	.026	.021	.018	.016	.014
2	.854	.250	.146	.105	.082	.067	.057	.049	.044
3		.750	.296	.194	.146	.118	.099	.085	.075
4		.933	.704	.323	.226	.177	.146	.125	.109
5			.854	.677	.342	.250	.201	.169	.146
6			.956	.806	.658	.356	.269	.220	.188
7				.895	.774	.644	.366	.283	.236
8				.968	.854	.750	.634	.375	.296
9					.918	.823	.731	.625	.382
10					.974	.882	.799	.717	.618
11						.933	.854	.780	.704
12						.979	.901	.831	.764

Traverse Point Number	**Fraction of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
		in	in
1	0.50	64 4/8	71 4/8
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

METHOD 2 - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant Name	Fibrominn Biomass Power Plant				**Date**	06/30/07
Sampling Location	SDA Inlet				**Project #**	snc-07-benson.mn-comp#1
Operator	TP				**# of Ports Used**	1
Stack Type	Circular				**Pitot Identification**	samp-hp-0006
Pitot Leak Check	☑	**PreTest**	☑	**PostTest**	**Pitot Coefficient (C_p)**	0.84

Stack Dimensions			
Diameter or Length of Stack	(D)	129.00	in
Width of Stack	(W)		in
Area of Stack	(A_s)	90.76	ft2

Pressures			
Barometric Pressure	(P_b)	29.92	in Hg
Static Pressure	(P_{static})	-2.10	in H2O
Absolute Stack Pressure	(P_s)	29.77	in Hg

Stack Gas Composition			
Composition Data:		**Actual Composition**	
Carbon Dioxide Concentration	($\%CO_2$)	14.4	%
Oxygen Concentration	($\%O_2$)	4.8	%
Carbon Monoxide Concentration	(%CO)	0.0	%
Nitrogen Concentration	($\%N_2$)	80.8	%
Stack Moisture Content	(B_{ws})	30.000	%
Stack Dry Molecular Weight	(M_d)	30.50	lb/lb-mole
Stack Wet Molecular Weight	(M_s)	26.75	lb/lb-mole

Results			
Avg Stack Gas Velocity	(v_s)	95.0	ft/sec
Avg Stack Dry Std Flow Rate	(Q_{sd})	17,231,378	dscf/hr
Avg Stack Dry Std Flow Rate	(Q_{sd})	287,190	dscf/min
Avg Stack Wet Flow Rate	(Q_{aw})	517,452	acf/min
Avg Stack Wet Std Flow Rate	(Q_{sw})	24,616,255	ascf/hr

Stack Cross Section Schematic

Velocity Traverse Data

Run Number		IN-HCl-V1		
Run Time	**12:00**	**Start**	**12:10**	**End**
Traverse Point	**Velocity Head** (Δp)	**Null Angle** (N_a)	**Stack Temp** (t_s)	**Local Velocity** ($v_{s(l)}$)
	in H2O	deg	oF	ft/sec
A-1	2.10	-5	219	96.1
A-2	2.10	5	219	96.1
A-3	1.70	5	192	84.7
A-4	2.30	0	207	99.7
A-5	2.20	0	215	98.1
A-6	1.90	0	197	89.9
B-1	2.30	-5	196	98.9
B-2	2.40	5	202	101.4
B-3	2.10	0	200	94.8
B-4	1.90	0	183	89.0
B-5	2.10	10	198	94.6
B-6	2.20	-5	202	97.1
Average	2.11	3	203	
	1.45	**= Square roots of Δp**		

METHOD 3a - DETERMINATION OF DRY MOLECULAR WEIGHT BY ANALYZER

Plant Name	Fibrominn Biomass Power Plant				**Date**	07/03/07	
Sampling Location	SDA Inlet				**Project #**	snc-07-benson.mn-comp#1	
Operator	TP				**# of Ports Used**	1	
Fuel Type	Biomass		**Minimum Fuel Factor**	1.000	**Maximum Fuel Factor**	1.120	
Orsat Leak Check	☑	**PreTest**	☑	**PostTest**	**Orsat Identification**	N/A	

Gas Analysis Data

Run Number	IN-HCl-1			**Run Start Time**	17:58		**Run Stop Time**		18:58
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
1:00	16.6	5.2	229.3	16.6	5.2	0.0	78.1	30.87	0.00
Results			**Averages**	16.6	5.2	0.0	78.1	30.87	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.942		**Molecular Wt Deviation < 0.3?**			☑
Average Excess Air			$(\%EA)_{avg}$	33.9	percent	**Fuel Factor in Handbook Range?**			☑

Gas Analysis Data

Run Number	IN-HCl-2			**Run Start Time**	19:40		**Run Stop Time**		20:40
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
1:00	16.1	5.5	260.1	16.1	5.5	0.0	78.4	30.80	0.00
Results			**Averages**	16.1	5.5	0.0	78.4	30.80	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.954		**Molecular Wt Deviation < 0.3?**			☑
Average Excess Air			$(\%EA)_{avg}$	36.1	percent	**Fuel Factor in Handbook Range?**			☑

Gas Analysis Data

Run Number	IN-HCl-3			**Run Start Time**	21:39		**Run Stop Time**		22:39
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
1:00	15.6	4.9	260.1	15.6	4.9	0.0	79.5	30.69	0.00
Results			**Averages**	15.6	4.9	0.0	79.5	30.69	
Average Calculated Fuel Factor			$(F_o)_{avg}$	1.024		**Molecular Wt Deviation < 0.3?**			☑
Average Excess Air			$(\%EA)_{avg}$	30.3	percent	**Fuel Factor in Handbook Range?**			☑

Fuel Factor Fo		
Fuel Type	**Minimum**	**Maximum**
Coal, Anthracite	1.016	1.130
Coal, Lignite	1.016	1.130
Coal, Bituminous	1.083	1.230
Oil, Distillate	1.260	1.413
Oil, Residual	1.210	1.370
Gas, Natural	1.600	1.836
Gas, Propane	1.434	1.586
Gas, Butane	1.405	1.553
Biomass	1.000	1.120
Wood Bark	1.003	1.130

METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

Plant Name	Fibrominn Biomass Power Plant				**Date**	07/03/07	
Sampling Location	SDA Inlet				**Project #**	snc-07-benson.mn-comp#1	
Operator	TP				**# of Ports Used**	1	
Stack Type	Circular				**Meter Box Number**	SAMP-CP-0002	
Train Leak Check	☑	**PreTest**	☑	**PostTest**	**Meter Cal Factor (Y)**	1.007	

Moisture Content Data									
Run Number		IN-HCl-1			**Run Start Time**	17:58		**Run Stop Time**	18:58
Total Meter Volume	(V_m)	19.669	dcf		**Barometric Press.**	(P_b)	29.44		in Hg
Avg Stack Temp	(t_s)$_{avg}$	350	oF		**Stack Static Press.**	(P_{static})	-2.10		in H2O
Avg Meter Temp	(t_m)$_{avg}$	104	oF		**Avg Orifice Press.**	(ΔH)$_{avg}$	0.65		in H2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		g	g	g	g	g	g	g	g
Contents		H2SO4	H2SO4		Sil Gel				
Final Value	(V_f),(W_f)	878.80	673.30	681.00	641.30	939.60			
Initial Value	(V_i),(W_i)	691.60	720.40	750.20	639.00	924.90			
Net Value	(V_n),(W_n)	187.2	-47.1	-69.2	2.3	14.7			
Results									
Total Weight	(W_t)	87.90	g		**Water Vol Weighed**	($V_{wsg(std)}$)	4.144		scf
Std Meter Volume	($V_{m(std)}$)	18.260	dscf		**Sat. Moisture Content**	($B_{ws(svp)}$)	100.0		%
Calc Moisture Content	($B_{ws(calc)}$)	18.5	%		**Final Moisture Content**	(B_{ws})	18.5		%

Moisture Content Data									
Run Number		IN-HCl-2			**Run Start Time**	19:40		**Run Stop Time**	20:40
Total Meter Volume	(V_m)	12.627	dcf		**Barometric Press.**	(P_b)	29.44		in Hg
Avg Stack Temp	(t_s)$_{avg}$	344	oF		**Stack Static Press.**	(P_{static})	-2.10		in H2O
Avg Meter Temp	(t_m)$_{avg}$	104	oF		**Avg Orifice Press.**	(ΔH)$_{avg}$	0.24		in H2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		g	g	g	g	g	g	g	g
Contents		H2SO4	H2SO4		Sil Gel				
Final Value	(V_f),(W_f)	858.20	694.20	714.70	650.60	901.90			
Initial Value	(V_i),(W_i)	688.30	748.70	763.70	649.60	894.90			
Net Value	(V_n),(W_n)	169.9	-54.5	-49.0	1.0	7.0			
Results									
Total Weight	(W_t)	74.40	g		**Water Vol Weighed**	($V_{wsg(std)}$)	3.508		scf
Std Meter Volume	($V_{m(std)}$)	11.716	dscf		**Sat. Moisture Content**	($B_{ws(svp)}$)	100.0		%
Calc Moisture Content	(B_{ws})	23.0	%		**Final Moisture Content**	(B_{ws})	23.0		%

Moisture Content Data									
Run Number		IN-HCl-3			**Run Start Time**	21:39		**Run Stop Time**	22:39
Total Meter Volume	(V_m)	25.864	dcf		**Barometric Press.**	(P_b)	29.44		in Hg
Avg Stack Temp	(t_s)$_{avg}$	348	oF		**Stack Static Press.**	(P_{static})	-2.10		in H2O
Avg Meter Temp	(t_m)$_{avg}$	102	oF		**Avg Orifice Press.**	(ΔH)$_{avg}$	0.79		in H2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		g	g	g	g	g	g	g	g
Contents		H2SO4	H2SO4		Sil Gel				
Final Value	(V_f),(W_f)	824.90	698.50	663.90	639.50	951.40			
Initial Value	(V_i),(W_i)	697.70	732.10	720.20	637.60	936.60			
Net Value	(V_n),(W_n)	127.2	-33.6	-56.3	1.9	14.8			
Results									
Total Weight	(W_t)	54.00	g		**Water Vol Weighed**	($V_{wsg(std)}$)	2.546		scf
Std Meter Volume	($V_{m(std)}$)	24.124	dscf		**Sat. Moisture Content**	($B_{ws(svp)}$)	100.0		%
Calc Moisture Content	(B_{ws})	9.5	%		**Final Moisture Content**	(B_{ws})	9.5		%

METHOD 26A (HYDROGEN CHLORIDE) ISOKINETIC SAMPLING DATA

Plant Name	Fibrominn Biomass Power Plant	**Date**	7/3/2007
Sampling Location	SDA Inlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TP	**Run #**	IN-HCl-1
# of Points Across	1	**# of Ports Used**	1

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.84	
Avg Stack Temp	(t_s)	352	oF
Avg Gas Meter Temp	(t_m)	103	
DH @ 0.75 SCFM	(ΔH@)	1.67	in H2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.45	in H2O
Stack Moisture Content	(B_{ws})	30.00	%
Stack Dry Molecular Weight	(M_d)	30.87	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.750	acfm
DP to DH Isokinetic Factor	(K)	1.36	

Leak Checks					
Train	**Pre**	0.005	ft3/min @	15	in Hg
OK? ☑	**Post**	0	ft3/min @	15	in Hg
Pitot	**Pre**	6.0/5.3	in. H_2O for	30	sec
OK? ☑	**Post**	7.1/5.2	in. H_2O for	30	sec
Orsat	OK? ☑				

Sampling Equipment			
Meter #	SAMP-CP-0002		
Meterbox Cal. Factor	(Y)	1.007	
Nozzle #	B-2		
Average Nozzle Diameter	(D_{na})	0.2440	in
Rec. Nozzle Diameter	(D_{ni})	0.2332	in
Probe # / Length	SAMP-HP-0002	/ 96	in
Liner Material	glass		
Sample Case / Oven #	SAMP-BH-0004		
Impinger Case #	SAMP-BC-0015		

Pressures			
Barometric Pressure	(P_b)	29.44	in Hg
Stack Static Pressure	(P_{static})	-2.10	in H2O
Absolute Stack Pressure	(P_s)	29.29	in Hg
Absolute Meter Pressure	(P_m)	29.56	in Hg

Nozzle Measurements				
Pre	0.244	0.244	0.244	**PASS**
Post	0.244	0.244	0.244	**PASS**

Run Time			
Start	17:58	**End**	18:58

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	691.60	720.40	750.20	639.00	924.90			
Post	878.80	673.30	681.00	641.30	939.60			

Wash Volume			
	H_2O	50.0	ml
	MeCl		ml

Filter #
M-1945

Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp**	**Filter Temp**	**Impinger Exit Temp**	**Aux Temp**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumulative Meter Volume (V_m)$_{std}$**	**Cumulative Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft3	in H2O	in H2O	in H2O	oF	oF	oF	oF	oF	oF	oF	in Hg	(in H2O)1/2	ft/sec	scf	%	scf
A-3	0.0	0:00:00	49.646	0.730	0.995	0.990	352	223	225	53	223	103	103	2.5	0.85	62.17	3.082	114.3	36.990
A-3	5.0	0:05:00	52.955	0.720	0.981	0.980	355	225	226	52	226	104	104	2.5	0.85	61.86	5.812	108.6	34.870
A-3	10.0	0:10:00	55.890	0.700	0.954	0.950	354	228	231	48	224	104	104	3.0	0.84	60.95	8.452	105.9	33.809
A-3	15.0	0:15:00	58.730	0.650	0.886	0.890	353	228	233	49	228	105	105	4.0	0.81	58.70	10.837	103.3	32.512
A-3	20.0	0:20:00	61.300	0.650	0.886	0.890	353	226	229	50	223	105	105	8.0	0.81	58.70	13.227	101.6	31.745
A-3	25.0	0:25:00	63.875	0.410	0.559	0.560	352	230	225	51	223	106	106	12.0	0.64	46.59	15.152	100.8	30.304
A-3	30.0	0:30:00	65.955	0.400	0.545	0.550	351	238	236	52	225	106	105	13.0	0.63	45.99	16.584	98.3	28.429
A-3	35.0	0:35:00	67.500	0.540	0.736	0.740	348	245	229	60	224	105	105	16.0	0.73	53.34	17.395	95.3	26.093
A-3	40.0	0:40:00	68.375	0.430	0.586	0.590	346	245	230	64	225	104	104	21.0	0.66	47.54	17.836	93.5	23.782
A-3	45.0	0:45:00	68.850	0.290	0.395	0.400	345	243	236	68	225	104	104	21.5	0.54	39.02	17.978	92.8	21.573
A-3	50.0	0:50:00	69.002	0.120	0.164	0.160	346	228	235	68	223	104	104	21.5	0.35	25.11	18.217	91.9	19.873
A-3	55.0	0:55:00	69.260	0.030	0.041	0.040	345	226	231	68	223	104	104		0.17	12.55	18.268	91.6	18.268
Last Pt	60.0	1:00:00	69.315																
Final Val	60.0	1:00:00	69.315										**Max Vac**	21.5	**Final Values**		18.268	91.6	
Average Values				0.47		0.65	350	232	231	57	224	105	104		0.66	47.71			
												104							

METHOD 26A (HYDROGEN CHLORIDE) ISOKINETIC SAMPLING DATA

Plant Name	Fibrominn Biomass Power Plant	**Date**	7/3/2007
Sampling Location	SDA Inlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TP	**Run #**	IN-HCl-2
# of Points Across	1	**# of Ports Used**	1

Leak Checks					
Train	**Pre**	0	ft3/min @	15	in Hg
OK? ☑	**Post**	0	ft3/min @	15	in Hg
Pitot	**Pre**	5.5/6.8	in. H_2O for	60	sec
OK? ☑	**Post**	6.1/5.1	in. H_2O for	60	sec
Orsat	OK? ☑				

Nozzle Measurements				
Pre	0.187	0.186	0.187	**PASS**
Post	0.187	0.186	0.187	**PASS**

Sampling Equipment			
Meter #	SAMP-CP-0002		
Meterbox Cal. Factor	(Y)	1.007	
Nozzle #	B-2		
Average Nozzle Diameter	(D_{na})	0.1867	in
Rec. Nozzle Diameter	(D_{ni})	0.1877	in
Probe # / Length	SAMP-HP-0002	/ 96	in
Liner Material	glass		
Sample Case / Oven #	SAMP-BH-0004		
Impinger Case #	SAMP-BC-0004		

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.84	
Avg Stack Temp	(t_s)	350	oF
Avg Gas Meter Temp	(t_m)	104	
DH @ 0.75 SCFM	(ΔH@)	1.67	in H2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	0.66	in H2O
Stack Moisture Content	(B_{ws})	30.00	%
Stack Dry Molecular Weight	(M_d)	30.87	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.328	acfm
DP to DH Isokinetic Factor	(K)	0.47	

Pressures			
Barometric Pressure	(P_b)	29.44	in Hg
Stack Static Pressure	(P_{static})	-2.10	in H2O
Absolute Stack Pressure	(P_s)	29.29	in Hg
Absolute Meter Pressure	(P_m)	29.56	in Hg

Run Time			
Start	19:40	**End**	20:40

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	688.30	748.70	763.70	649.60	894.90			
Post	858.20	694.20	714.70	650.60	901.90			

Wash Volume			
	H_2O	50.0	ml
	MeCl		ml

Filter #
M-1945

Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp**	**Filter Temp**	**Impinger Exit Temp**	**Aux Temp**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumulative Meter Volume (V_m)$_{std}$**	**Cumulative Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft3	in H2O	in H2O	in H2O	oF	oF	oF	oF	oF	oF	oF	in Hg	(in H2O)1/2	ft/sec	scf	%	scf
A-3	0.0	0:00:00	69.964	0.570	0.267	0.270	341	223	224	68	225	105	105	2.0	0.75	54.56	1.970	140.3	23.639
A-3	5.0	0:05:00	72.090	0.540	0.253	0.250	342	224	226	68	223	105	105	10.0	0.73	53.14	2.975	117.8	17.851
A-3	10.0	0:10:00	73.175	0.570	0.267	0.270	342	226	227	68	224	105	105	10.0	0.75	54.60	3.925	105.6	15.700
A-3	15.0	0:15:00	74.200	0.570	0.267	0.270	344	228	231	68	223	105	105	13.0	0.75	54.66	5.014	99.6	15.041
A-3	20.0	0:20:00	75.375	0.560	0.263	0.260	344	225	233	68	224	104	104	15.0	0.75	54.18	6.374	99.2	15.296
A-3	25.0	0:25:00	76.840	0.570	0.267	0.270	344	230	242	68	223	104	104	17.0	0.75	54.66	8.007	102.8	16.014
A-3	30.0	0:30:00	78.600	0.560	0.263	0.260	344	232	237	68	223	104	104	18.0	0.75	54.18	9.752	106.8	16.718
A-3	35.0	0:35:00	80.480	0.560	0.263	0.260	345	234	233	68	225	104	104	18.0	0.75	54.22	11.298	107.5	16.946
A-3	40.0	0:40:00	82.145	0.520	0.244	0.240	345	236	241	68	226	104	104	21.0	0.72	52.24	11.480	106.0	15.306
A-3	45.0	0:45:00	82.341	0.350	0.164	0.160	345	232	242	68	225	104	104	20.5	0.59	42.86	11.567	105.2	13.880
A-3	50.0	0:50:00	82.435	0.450	0.211	0.210	347	231	245	67	224	103	103	20.5	0.67	48.66	11.641	104.6	12.699
A-3	55.0	0:55:00	82.515	0.450	0.211	0.210	347	229	231	68	223	103	103	20.5	0.67	48.66	11.712	104.0	11.712
Last Pt	60.0	1:00:00	82.591																
Final Val	60.0	1:00:00	82.591										**Max Vac**	21.0	**Final Values**		11.712	104.0	
Average Values				0.52		0.24	344	229	234	68	224	104	104		0.72	52.22			
												104							

METHOD 26A (HYDROGEN CHLORIDE) ISOKINETIC SAMPLING DATA

Plant Name	Fibrominn Biomass Power Plant	**Date**	7/3/2007
Sampling Location	SDA Inlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TP	**Run #**	IN-HCl-3
# of Points Across	1	**# of Ports Used**	1

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.84	
Avg Stack Temp	(t_s)	344	oF
Avg Gas Meter Temp	(t_m)	104	
DH @ 0.75 SCFM	(ΔH@)	1.67	in H2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	0.72	in H2O
Stack Moisture Content	(B_{ws})	30.00	%
Stack Dry Molecular Weight	(M_d)	30.80	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.210	acfm
DP to DH Isokinetic Factor	(K)	1.38	

Leak Checks					
Train	**Pre**	0	ft3/min @	15	in Hg
OK? ☑	**Post**	0	ft3/min @	15	in Hg
Pitot	**Pre**	6.3/5.4	in. H_2O for	60	sec
OK? ☑	**Post**	5.5/6.9	in. H_2O for	60	sec
Orsat	OK? ☑				

Sampling Equipment			
Meter #	SAMP-CP-0002		
Meterbox Cal. Factor	(Y)	1.007	
Nozzle #	B-2		
Average Nozzle Diameter	(D_{na})	0.2440	in
Rec. Nozzle Diameter	(D_{ni})	0.1466	in
Probe # / Length	SAMP-HP-0002	/ 96	in
Liner Material	glass		
Sample Case / Oven #	SAMP-BH-0004		
Impinger Case #	SAMP-BC-0015		

Pressures			
Barometric Pressure	(P_b)	29.44	in Hg
Stack Static Pressure	(P_{static})	-2.10	in H2O
Absolute Stack Pressure	(P_s)	29.29	in Hg
Absolute Meter Pressure	(P_m)	29.56	in Hg

Nozzle Measurements				
Pre	0.244	0.244	0.244	**PASS**
Post	0.244	0.244	0.244	**PASS**

Run Time			
Start	21:39	**End**	22:39

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	697.70	732.10	720.20	637.60	936.60			
Post	824.90	698.50	663.90	639.50	951.40			

Wash Volume	**H_2O**	50.0	ml	**Filter #**
	MeCl		ml	M-1945

Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp**	**Filter Temp**	**Impinger Exit Temp**	**Aux Temp**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumulative Meter Volume (V_m)$_{std}$**	**Cumulative Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft3	in H2O	in H2O	in H2O	oF	oF	oF	oF	oF	oF	oF	in Hg	(in H2O)1/2	ft/sec	scf	%	scf
A-3	0.0	0:00:00	82.719	0.810	1.117	1.100	344	234	239	67	223	102	102	6.5	0.90	65.22	0.841	29.4	10.093
A-3	5.0	0:05:00	83.620	0.700	0.965	0.970	348	225	233	66	223	102	102	5.0	0.84	60.78	1.718	31.3	10.309
A-3	10.0	0:10:00	84.560	0.430	0.593	0.590	348	224	233	66	224	102	102	5.0	0.66	47.64	4.156	81.8	16.624
A-3	15.0	0:15:00	87.175	0.610	0.841	0.840	347	225	232	66	226	102	102	5.0	0.78	56.71	6.306	83.5	18.919
A-3	20.0	0:20:00	89.480	0.550	0.758	0.760	349	226	230	66	224	102	102	6.0	0.74	53.91	8.545	86.6	20.507
A-3	25.0	0:25:00	91.880	0.350	0.483	0.480	348	226	225	65	226	102	102	6.5	0.59	42.98	10.632	91.5	21.265
A-3	30.0	0:30:00	94.120	0.530	0.731	0.730	349	227	229	65	228	102	102	6.5	0.73	52.92	12.642	90.8	21.672
A-3	35.0	0:35:00	96.275	0.600	0.827	0.830	347	223	227	66	229	102	102	7.0	0.77	56.24	14.704	89.9	22.056
A-3	40.0	0:40:00	98.485	0.530	0.731	0.730	348	226	227	63	226	102	102	8.5	0.73	52.89	16.835	90.2	22.446
A-3	45.0	0:45:00	100.770	0.510	0.703	0.700	349	225	226	63	225	102	102	9.0	0.71	51.91	19.059	91.1	22.871
A-3	50.0	0:50:00	103.155	0.670	0.924	0.920	348	225	228	57	224	102	102	13.5	0.82	59.47	21.564	91.8	23.524
A-3	55.0	0:55:00	105.840	0.570	0.786	0.790	348	225	225	57	225	102	102	15.0	0.75	54.85	24.123	93.4	24.123
Last Pt	60.0	1:00:00	108.583																
Final Val	60.0	1:00:00	108.583										**Max Vac**	15.0	**Final Values**		24.123	93.4	
Average Values				0.572		0.787	348	226	230	64	225	102	102		0.75	54.63			
												102							

METHOD 26A (HYDROGEN CHLORIDE) - SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	SDA Inlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TP	**Acetone Lot Number**	

Run History Data				
Run Number	IN-HCl-1	IN-HCl-2	IN-HCl-3	
Run Start Time	17:58	19:40	21:39	(hh:mm)
Run Stop Time	18:58	20:40	22:39	(hh:mm)
Train Prepared By	KV/SK	KV/SK	KV/SK	
Train Recovered By	KV/SK	KV/SK	KV/SK	
Recovery Date	7/3/2007	7/3/2007	7/3/2007	(mm/dd/yy)
Relinquished By	KV/SK	KV/SK	KV/SK	
Received By	TG	TG	TG	
Relinquished Date	7/3/2007	7/3/2007	7/3/2007	(mm/dd/yy)
Relinquished Time	18:58	20:40	22:39	(hh:mm)

Equipment Identification Numbers			
Filter	M-1945	M-1945	M-1945
Acetone Wash	ok	ok	ok
Silica Gel	ok	ok	ok
Impinger Case	SAMP-BC-0015	SAMP-BC-0004	SAMP-BC-0015
Sample Box	SAMP-BH-0004	SAMP-BH-0004	SAMP-BH-0004
Oven	ok	ok	ok

Sample Blank Taken ☑ YES

Moisture Content Data					
Impingers 1, 2, and 3 - Liquid Volume					
Final Volume	(V_f)	3178.4	3174.7	3144.4	ml
Initial Volume	(V_i)	3092.7	3101.2	3092.2	ml
Net Volume	(V_n)	85.8	73.5	52.2	ml
Comments					
Impinger 4 - Silica Gel Weight					
Final Weight	(W_f)	641.3	650.6	639.5	g
Initial Weight	(W_i)	639.0	649.6	637.6	g
Net Weight	(W_n)	2.3	1.0	1.9	g
Comments					
Total Water Collected					
Total Volume	(V_{lc})	88.1	74.5	54.1	ml

TEST RESULTS AND CALCULATIONS

PM Emissions Data

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - RESULTS

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Stack Type**	Circular

Historical Data						
Run Number		OUT-PM-1	OUT-PM-2	OUT-PM-3	**Average**	
Run Start Time		23:42	2:44	5:27		hh:mm
Run Stop Time		2:38	5:22	7:58		hh:mm
Meter Calibration Factor	(Y)	1.002	1.002	1.002		
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840		
Average Nozzle Diameter	(D_{na})	0.226	0.230	0.226		in
Stack Test Data						
Initial Meter Volume	(V_m)$_i$	421.770	532.680	647.580		ft3
Final Meter Volume	(V_m)$_f$	532.680	647.580	770.250		ft3
Total Meter Volume	(V_m)	110.910	114.900	122.670	116.160	ft3
Total Sampling Time	(Θ)	150.0	150.0	150.0	150.0	min
Average Meter Temperature	(t_m)$_{avg}$	78.4	80.3	80.8	79.8	oF
Average Stack Temperature	(t_s)$_{avg}$	293.0	297.1	296.2	295.4	oF
Barometric Pressure	(P_b)	29.49	29.49	29.49	29.49	in Hg
Stack Static Pressure	(P_{static})	-0.23	-0.23	-0.23	-0.23	in H2O
Absolute Stack Pressure	(P_s)	29.47	29.47	29.47	29.47	in Hg
Average Orifice Pressure Drop	(ΔH)$_{avg}$	1.87	1.98	2.25	2.03	in H2O
Absolute Meter Pressure	(P_m)	29.62	29.62	29.62	29.62	in Hg
Avg Square Root Pitot Pressure	(Δp$^{1/2}$)$_{avg}$	1.21	1.20	1.33	1.25	(in H2O)1/2
Moisture Content Data						
Impingers 1-3 Water Volume Gain	(V_n)	549.6	707.4	642.4	633.1	ml
Impinger 4 Silica Gel Weight Gain	(W_n)	36.6	36.0	87.8	53.5	g
Total Water Volume Collected	(V_{lc})	586.3	743.4	730.3	686.7	ml
Standard Water Vapor Volume	(V_w)$_{std}$	27.595	34.994	34.374	32.321	scf
Standard Meter Volume	(V_m)$_{std}$	107.920	111.451	118.961	112.777	dscf
Calculated Stack Moisture	($B_{ws(calc)}$)	20.36	23.89	22.42	22.22	%
Saturated Stack Moisture	($B_{ws(svp)}$)	100.0	100.0	100.0	100.0	%
Reported Stack Moisture Content	(B_{ws})	20.36	23.89	22.42	22.22	%
Gas Analysis Data						
Carbon Dioxide Percentage	(%CO_2)	14.0	14.0	14.0	14.0	%
Oxygen Percentage	(%O_2)	5.0	5.0	5.0	5.0	%
Carbon Monoxide Percentage	(%CO)	0.0	0.0	0.0	0.0	%
Nitrogen Percentage	(%N_2)	81.0	81.0	81.0	81.0	%
Dry Gas Molecular Weight	(M_d)	30.44	30.44	30.44	30.44	lb/lb-mole
Wet Stack Gas Molecular Weight	(M_s)	27.91	27.47	27.65	27.68	lb/lb-mole
Calculated Fuel Factor	(F_o)	1.135	1.135	1.135	1.135	
Fuel F-Factor	(F_c)	1890	1890	1890	1890	dscf/MMBtu
Percent Excess Air	(%EA)	30.5	30.5	30.5	30.5	%
Volumetric Flow Rate Data						
Average Stack Gas Velocity	(v_s)	84.03	83.50	92.29	86.61	ft/sec
Stack Cross-Sectional Area	(A_s)	63.62	63.62	63.62	63.62	ft2
Actual Stack Flow Rate	(Q_{aw})	320,746	318,717	352,260	330,574	acfm
Wet Standard Stack Flow Rate	(Q_{sw})	13,293	13,137	14,538	13,656	wkscfh
Dry Standard Stack Flow Rate	(Q_{sd})	176,434	166,641	187,981	177,019	dscfm
Percent of Isokinetic Rate	(I)	99.3	100.1	100.2	99.9	%
Emission Rate Data						
Mass of Particulate on Filter	(M_f)	11.6	14.9	13.9	13.5	mg
Mass of Particulate in Acetone	(M_a')	9.7	4.4	2.0	5.4	mg
Mass of Particulate in Imp Content	(M_{ino}')	220.4	272.4	256.3	249.7	mg
Mass of Particulate in Org Rinse	(M_{org}')	0.2	1.1	4.1	1.8	mg
Total Mass of Particulates	(M_n)	241.8	292.7	276.3	270.3	mg
Stack Particulate Concentration	(c_s)	0.002	0.003	0.002	0.002	g/dscf
	(c_s)	0.035	0.041	0.036	0.037	gr/dscf
Particulate Emission Rate	(E)	23.72	26.25	26.20	25.39	kg/hr
	($\dot{E}$)	52.3	57.9	57.8	56.0	lbs/hr
	($\ddot{E}$)	229.1	253.5	253.0	245.2	tons/yr
	($\ddot{E}$)	0.0605	0.0732	0.0691	0.0676	lbs/MMBtu
(Pt 75 App F Sect. 5.2.1) **Heat Input**	(HI)	784.0	740.5	835.3	786.6	MMBtu/hr

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) SOURCE SAMPLING TITLE PAGE

Source Information				
Plant Name	Fibrominn Biomass Power Plant			
Sampling Location	Stack Outlet			
Fuel or Source Type	Biomass			
Fuel F-Factor	1890	1890	1890	

Test Information			
Starting Test Date		07/03/07	
Project #		snc-07-benson.mn-comp#1	
Operator		TKG	
Standard Temperature		68	oF
Standard Pressure		29.92	in Hg
Minimum Required Sample Vol.	indust. spec.	100	scf
Run Duration	chk Subpart	150	minutes
Unit Number		OUT-PM	
Load	% or w/DB	100%	
Base Run Number		OUT-PM	
Number of Ports Available		4	
Number of Ports Used		4	
Port Inside Diameter		5.00	in
Circular Stack			

Test Equipment Information					
Run		**1**	**2**	**3**	
Meter Box Number	from ACS	SAMP-CP-0016	SAMP-CP-0016	SAMP-CP-0016	
Meter Calibration Factor	(Y)	1.002	1.002	1.002	
Orifice Meter Coefficient	(ΔH@)	1.832	1.832	1.832	in H_2O
Pitot Identification	from ACS	SAMP-HP-0004	SAMP-HP-0011	SAMP-HP-0004	
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840	
Orsat Identification	from ACS	N/A	N/A	N/A	
Nozzle Number	from ACS	R#8	R#1	R#8	
Nozzle Diameter	(D_n)	0.226	0.230	0.226	in
Probe Number	from ACS	SAMP-HP-0004	SAMP-HP-0011	SAMP-HP-0004	
Probe Length		60.00	60.00	60.00	in
(SS, Glass ….) Liner Material	from list	inconel	inconel	inconel	
Sample Case / Oven Number	from ACS	SAMP-BH-0027	SAMP-BH-0004	SAMP-BH-0028	
Impinger Case Number	from ACS	SAMP-BC-0004	SAMP-BC-0003	SAMP-BC-0026	
Acetone Lot Number	from bottle	C38B11	C38B11	C38B11	

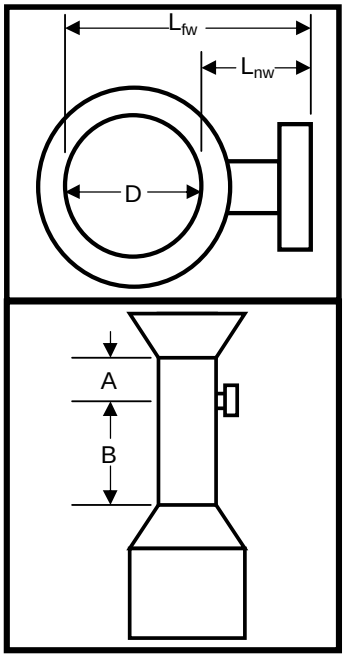
Testing Company Information	
Company Name	Air Hygiene International, Inc. (Tulsa, Oklahoma)
Address	5634 S. 122nd East Ave., Suite F
City, State Country Zip	Tulsa, Oklahoma 74146
Project Manager	Thomas K. Graham
Phone Number	(918) 307-8865
Fax Number	(918) 307-9131

METHOD 1 - SAMPLE AND VELOCITY TRAVERSES FOR CIRCULAR SOURCES

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**# of Ports Available**	4
Stack Type	Circular	**# of Ports Used**	4
Stack Size	Large	**Port Inside Diameter**	5.00

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	129.00	in
Distance to Near Wall of Stack	(L_{nw})	21.00	in
Diameter of Stack	(D)	108.00	in
Area of Stack	(A_s)	63.62	ft2

Distance from Port to Disturbances			
Distance Upstream	(A)	2358.00	in
Diameters Upstream	(A_D)	21.83	diameters
Distance Downstream	(B)	910.00	in
Diameters Downstream	(B_D)	8.43	diameters



Number of Traverse Points Required			
Diameters to Flow Disturbance		**Minimum Number of[1] Traverse Points**	
Down Stream	**Up Stream**	**Particulate Points**	**Velocity Points**
2.00-4.99	0.50-1.24	24	16
5.00-5.99	1.25-1.49	20	16
6.00-6.99	1.50-1.74	16	12
7.00-7.99	1.75-1.99	12	12
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]
Upstream Spec		12	12
Downstream Spec		12	12
Traverse Pts Required		12	12

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

Number of Traverse Points Used			
4	**Ports by**	3	**Across**
12	**Pts Used**	12	**Required**
		Particulate Traverse	

Location of Traverse Points in Circular Stacks									
Traverse	(Fraction of Stack Dimension from Inside Wall to Traverse Point)								
Point	**Number of Traverse Points Across the Stack**								
Number	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**
1	.146	.067	.044	.032	.026	.021	.018	.016	.014
2	.854	.250	.146	.105	.082	.067	.057	.049	.044
3		.750	.296	.194	.146	.118	.099	.085	.075
4		.933	.704	.323	.226	.177	.146	.125	.109
5			.854	.677	.342	.250	.201	.169	.146
6			.956	.806	.658	.356	.269	.220	.188
7				.895	.774	.644	.366	.283	.236
8				.968	.854	.750	.634	.375	.296
9					.918	.823	.731	.625	.382
10					.974	.882	.799	.717	.618
11						.933	.854	.780	.704
12						.979	.901	.831	.764

Traverse Point Number	**Fraction of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
		in	in
1	0.04	4 6/8	25 6/8
2	0.15	15 6/8	36 6/8
3	0.30	32	53
4			
5			
6			
7			
8			
9			
10			
11			
12			

METHOD 2 - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant Name	Fibrominn Biomass Power Plant				**Date**	06/30/07
Sampling Location	Stack Outlet				**Project #**	snc-07-benson.mn-comp#1
Operator	TKG				**# of Ports Used**	4
Stack Type	Circular				**Pitot Identification**	SAMP-HP-0004
Pitot Leak Check	☑	**PreTest**	☑	**PostTest**	**Pitot Coefficient (C_p)**	0.84

Stack Dimensions			
Diameter or Length of Stack	(D)	108.00	in
Width of Stack	(W)		in
Area of Stack	(A_s)	63.62	ft2

Pressures			
Barometric Pressure	(P_b)	29.92	in Hg
Static Pressure	(P_{static})	-0.23	in H2O
Absolute Stack Pressure	(P_s)	29.90	in Hg

Stack Gas Composition			
Composition Data:		**Estimated Composition**	
Carbon Dioxide Concentration	($\%CO_2$)	14.4	%
Oxygen Concentration	($\%O_2$)	4.8	%
Carbon Monoxide Concentration	(%CO)	0.0	%
Nitrogen Concentration	($\%N_2$)	80.8	%
Stack Moisture Content	(B_{ws})	30.000	%
Stack Dry Molecular Weight	(M_d)	30.50	lb/lb-mole
Stack Wet Molecular Weight	(M_s)	26.75	lb/lb-mole

Results			
Avg Stack Gas Velocity	(v_s)	72.7	ft/sec
Avg Stack Dry Std Flow Rate	(Q_{sd})	8,192,279	dscf/hr
Avg Stack Dry Std Flow Rate	(Q_{sd})	136,538	dscf/min
Avg Stack Wet Flow Rate	(Q_{aw})	277,654	acf/min
Avg Stack Wet Std Flow Rate	(Q_{sw})	11,703,256	ascf/hr

Stack Cross Section Schematic

Velocity Traverse Data				
Run Number		OUT-PM-V1		
Run Time	**12:00**	**Start**	**12:10**	**End**
Traverse Point	**Velocity Head** (Δp)	**Null Angle** (N_a)	**Stack Temp** (t_s)	**Local Velocity** ($v_{s(l)}$)
	in H2O	deg	oF	ft/sec
A-1	1.00	0	291	69.6
A-2	1.30	-10	291	79.3
A-3	1.30	0	290	79.3
B-1	1.10	-5	290	72.9
B-2	1.30	0	290	79.3
B-3	0.14	0	290	26.0
C-1	1.30	0	293	79.4
C-2	1.00	0	293	69.7
C-3	1.20	0	293	76.3
D-1	1.30	0	292	79.4
D-2	1.30	-10	291	79.3
D-3	1.40	-15	290	82.3
Average	1.14	3	291	
	1.05	**= Square roots of Δp**		

METHOD 3a - DETERMINATION OF DRY MOLECULAR WEIGHT BY ANALYZER

Plant Name	Fibrominn Biomass Power Plant				**Date**	07/03/07	
Sampling Location	Stack Outlet				**Project #**	snc-07-benson.mn-comp#1	
Operator	TKG				**# of Ports Used**	4	
Fuel Type	Biomass		**Minimum Fuel Factor**	1.000	**Maximum Fuel Factor**	1.120	
Orsat Leak Check	☑	**PreTest**	☑	**PostTest**	**Orsat Identification**	N/A	

Gas Analysis Data									
Run Number		OUT-PM-1		**Run Start Time**		23:42	**Run Stop Time**		2:38
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
2:56	14.0	5.0	100.0	14.0	5.0	0.0	81.0	30.44	0.00
Results			**Averages**	14.0	5.0	0.0	81.0	30.44	
Average Calculated Fuel Factor			$(F_o)_{avg}$	1.135		**Molecular Wt Deviation < 0.3?**			☑
Average Excess Air			$(\%EA)_{avg}$	30.5	percent	**Fuel Factor in Handbook Range?**			☑

Gas Analysis Data									
Run Number		OUT-PM-2		**Run Start Time**		2:44	**Run Stop Time**		5:22
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
2:38	14.0	5.0	100.0	14.0	5.0	0.0	81.0	30.44	0.00
Results			**Averages**	14.0	5.0	0.0	81.0	30.44	
Average Calculated Fuel Factor			$(F_o)_{avg}$	1.135		**Molecular Wt Deviation < 0.3?**			☑
Average Excess Air			$(\%EA)_{avg}$	30.5	percent	**Fuel Factor in Handbook Range?**			☑

Gas Analysis Data									
Run Number		OUT-PM-3		**Run Start Time**		5:27	**Run Stop Time**		7:58
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
2:31	14.0	5.0	100.0	14.0	5.0	0.0	81.0	30.44	0.00
Results			**Averages**	14.0	5.0	0.0	81.0	30.44	
Average Calculated Fuel Factor			$(F_o)_{avg}$	1.135		**Molecular Wt Deviation < 0.3?**			☑
Average Excess Air			$(\%EA)_{avg}$	30.5	percent	**Fuel Factor in Handbook Range?**			☑

Fuel Factor Fo		
Fuel Type	**Minimum**	**Maximum**
Coal, Anthracite	1.016	1.130
Coal, Lignite	1.016	1.130
Coal, Bituminous	1.083	1.230
Oil, Distillate	1.260	1.413
Oil, Residual	1.210	1.370
Gas, Natural	1.600	1.836
Gas, Propane	1.434	1.586
Gas, Butane	1.405	1.553
Biomass	1.000	1.120
Wood Bark	1.003	1.130

METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

Plant Name	Fibrominn Biomass Power Plant				**Date**	07/03/07	
Sampling Location	Stack Outlet				**Project #**	snc-07-benson.mn-comp#1	
Operator	TKG				**# of Ports Used**	4	
Stack Type	Circular				**Meter Box Number**	SAMP-CP-0016	
Train Leak Check	☑	**PreTest**	☑	**PostTest**	**Meter Cal Factor (Y)**	1.002	

Moisture Content Data									
Run Number		OUT-PM-1			**Run Start Time**	23:42		**Run Stop Time**	2:38
Total Meter Volume	(V_m)	110.910	dcf		**Barometric Press.**	(P_b)	29.49		in Hg
Avg Stack Temp	(t_s)$_{avg}$	293	oF		**Stack Static Press.**	(P_{static})	-0.23		in H2O
Avg Meter Temp	(t_m)$_{avg}$	78	oF		**Avg Orifice Press.**	(ΔH)$_{avg}$	1.87		in H2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		g	g	g	g	g	g	g	g
Contents		DI	DI	DI	Sil Gel				
Final Value	(V_f),(W_f)	977.50	993.40	830.80	937.30				
Initial Value	(V_i),(W_i)	757.50	759.00	736.60	900.70				
Net Value	(V_n),(W_n)	220.0	234.4	94.2	36.6				
Results									
Total Weight	(W_t)	585.20	g		**Water Vol Weighed**	($V_{wsg(std)}$)	27.592		scf
Std Meter Volume	($V_{m(std)}$)	107.915	dscf		**Sat. Moisture Content**	($B_{ws(svp)}$)	100.0		%
Calc Moisture Content	($B_{ws(calc)}$)	20.4	%		**Final Moisture Content**	(B_{ws})	20.4		%

Moisture Content Data									
Run Number		OUT-PM-2			**Run Start Time**	2:44		**Run Stop Time**	5:22
Total Meter Volume	(V_m)	114.900	dcf		**Barometric Press.**	(P_b)	29.49		in Hg
Avg Stack Temp	(t_s)$_{avg}$	297	oF		**Stack Static Press.**	(P_{static})	-0.23		in H2O
Avg Meter Temp	(t_m)$_{avg}$	80	oF		**Avg Orifice Press.**	(ΔH)$_{avg}$	1.98		in H2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		g	g	g	g	g	g	g	g
Contents		DI	DI	DI	Sil Gel				
Final Value	(V_f),(W_f)	1005.60	1002.90	931.20	961.50				
Initial Value	(V_i),(W_i)	753.40	748.60	731.60	925.50				
Net Value	(V_n),(W_n)	252.2	254.3	199.6	36.0				
Results									
Total Weight	(W_t)	742.10	g		**Water Vol Weighed**	($V_{wsg(std)}$)	34.990		scf
Std Meter Volume	($V_{m(std)}$)	111.451	dscf		**Sat. Moisture Content**	($B_{ws(svp)}$)	100.0		%
Calc Moisture Content	(B_{ws})	23.9	%		**Final Moisture Content**	(B_{ws})	23.9		%

Moisture Content Data									
Run Number		OUT-PM-3			**Run Start Time**	5:27		**Run Stop Time**	7:58
Total Meter Volume	(V_m)	122.670	dcf		**Barometric Press.**	(P_b)	29.49		in Hg
Avg Stack Temp	(t_s)$_{avg}$	296	oF		**Stack Static Press.**	(P_{static})	-0.23		in H2O
Avg Meter Temp	(t_m)$_{avg}$	81	oF		**Avg Orifice Press.**	(ΔH)$_{avg}$	2.25		in H2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		g	g	g	g	g	g	g	g
Contents		DI	DI	DI	Sil Gel				
Final Value	(V_f),(W_f)	970.50	941.30	951.10	1003.45				
Initial Value	(V_i),(W_i)	773.40	733.30	715.00	915.70				
Net Value	(V_n),(W_n)	197.1	208.0	236.1	87.8				
Results									
Total Weight	(W_t)	728.95	g		**Water Vol Weighed**	($V_{wsg(std)}$)	34.370		scf
Std Meter Volume	($V_{m(std)}$)	118.956	dscf		**Sat. Moisture Content**	($B_{ws(svp)}$)	100.0		%
Calc Moisture Content	(B_{ws})	22.4	%		**Final Moisture Content**	(B_{ws})	22.4		%

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) ISOKINETIC SAMPLING DATA

Plant Name	Fibrominn Biomass Power Plant	**Date**	7/3/2007
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Run #**	OUT-PM-1
# of Points Across	3	**# of Ports Used**	4

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.84	
Avg Stack Temp	(t_s)	291	oF
Avg Gas Meter Temp	(t_m)	81	
DH @ 0.75 SCFM	($\Delta H@$)	1.83	in H2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.05	in H2O
Stack Moisture Content	(B_{ws})	25.00	%
Stack Dry Molecular Weight	(M_d)	30.44	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.750	acfm
DP to DH Isokinetic Factor	(K)	1.28	

Leak Checks					
Train	**Pre**	0	ft3/min @	15	in Hg
OK? ☑	**Post**	0	ft3/min @	15	in Hg
Pitot	**Pre**	4/5	in. H_2O for	15	sec
OK? ☑	**Post**	4/5	in. H_2O for	15	sec
Orsat	OK? ☑				

Sampling Equipment			
Meter #	SAMP-CP-0016		
Meterbox Cal. Factor	(Y)	1.002	
Nozzle #	R#8		
Average Nozzle Diameter	(D_{na})	0.2257	in
Rec. Nozzle Diameter	(D_{ni})	0.2453	in
Probe # / Length	SAMP-HP-0004	/ 60	in
Liner Material	inconel		
Sample Case / Oven #	SAMP-BH-0027		
Impinger Case #	SAMP-BC-0004		

Pressures			
Barometric Pressure	(P_b)	29.49	in Hg
Stack Static Pressure	(P_{static})	-0.23	in H2O
Absolute Stack Pressure	(P_s)	29.47	in Hg
Absolute Meter Pressure	(P_m)	29.62	in Hg

Nozzle Measurements				
Pre	0.225	0.226	0.226	**PASS**
Post	0.225	0.226	0.226	**PASS**

Run Time			
Start	23:42	**End**	2:38

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	757.50	759.00	736.60	900.70				
Post	977.50	993.40	830.80	937.30				

Wash	**H_2O**	50.0	ml	**Filter #**
Volume	**MeCl**	50.0	ml	M-1916

Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp**	**Filter Temp**	**Impinger Exit Temp**	**Aux Temp**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumulative Meter Volume (V_m)$_{std}$**	**Cumulative Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft3	in H2O	in H2O	in H2O	oF	oF	oF	oF	oF	oF	oF	in Hg	(in H2O)1/2	ft/sec	scf	%	scf
A-1	0.0	0:00:00	421.770	1.500	1.918	1.900	306	267	259	62		75	75	2.0	1.22	85.77	9.088	99.9	109.054
A-2	12.5	0:12:30	431.050	1.500	1.918	1.900	307	268	262	56		75	75	2.0	1.22	85.82	17.960	98.8	107.762
A-3	25.0	0:25:00	440.110	1.600	2.046	2.000	309	268	265	55		78	78	4.0	1.26	88.75	27.516	99.9	110.064
B-1	37.5	0:37:30	449.920	1.500	1.918	1.900	301	273	266	68		78	78	3.0	1.22	85.49	36.787	100.3	110.361
B-2	50.0	0:50:00	459.440	1.700	2.174	2.200	306	273	257	51		79	79	3.0	1.30	91.31	46.495	100.3	111.588
B-3	62.5	1:02:30	469.420	1.600	2.046	2.000	307	264	256	51		80	80	4.0	1.26	88.64	56.083	100.6	112.166
C-1	75.0	1:15:00	479.300	1.500	1.918	1.900	302	266	253	60		80	80	4.0	1.22	85.54	65.252	100.6	111.860
C-2	87.5	1:27:30	488.750	1.200	1.535	1.500	191	268	255	63		80	80	2.0	1.10	70.72	73.568	99.9	110.352
C-3	100.0	1:40:00	497.330	1.300	1.663	1.700	300	268	251	66		80	80	3.0	1.14	79.53	81.840	99.6	109.120
D-1	112.5	1:52:30	505.860	1.500	1.918	1.900	296	266	252	61		79	79	3.0	1.22	85.21	90.559	99.2	108.671
D-2	125.0	2:05:00	514.830	1.400	1.790	1.800	295	257	247	57		78	78	3.0	1.18	82.26	99.302	99.2	108.329
D-3	137.5	2:17:30	523.810	1.300	1.663	1.700	296	256	257	59		79	79	3.0	1.14	79.32	107.920	99.3	107.920
Last Pt	150.0	2:30:00	532.680																
Final Val	150.0	2:30:00	532.680										**Max Vac**	4.0	**Final Values**		107.920	99.3	
Average Values				1.47		1.87	293	266	257	59		78	78		1.21	84.03			

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) ISOKINETIC SAMPLING DATA

Plant Name	Fibrominn Biomass Power Plant	**Date**	7/4/2007
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Run #**	OUT-PM-2
# of Points Across	3	**# of Ports Used**	4

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.84	
Avg Stack Temp	(t_s)	293	oF
Avg Gas Meter Temp	(t_m)	78	
DH @ 0.75 SCFM	(ΔH@)	1.83	in H2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.21	in H2O
Stack Moisture Content	(B_{ws})	25.00	%
Stack Dry Molecular Weight	(M_d)	30.44	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.739	acfm
DP to DH Isokinetic Factor	(K)	1.37	

Leak Checks					
Train	**Pre**	0	ft3/min @	15	in Hg
OK? ☑	**Post**	0	ft3/min @	15	in Hg
Pitot	**Pre**	4/5	in. H_2O for	15	sec
OK? ☑	**Post**	4/5	in. H_2O for	15	sec
Orsat	OK? ☑				

Sampling Equipment			
Meter #	SAMP-CP-0016		
Meterbox Cal. Factor	(Y)	1.002	
Nozzle #	R#1		
Average Nozzle Diameter	(D_{na})	0.2300	in
Rec. Nozzle Diameter	(D_{ni})	0.2355	in
Probe # / Length	SAMP-HP-0011	/ 60	in
Liner Material	inconel		
Sample Case / Oven #	SAMP-BH-0004		
Impinger Case #	SAMP-BC-0003		

Pressures			
Barometric Pressure	(P_b)	29.49	in Hg
Stack Static Pressure	(P_{static})	-0.23	in H2O
Absolute Stack Pressure	(P_s)	29.47	in Hg
Absolute Meter Pressure	(P_m)	29.62	in Hg

Nozzle Measurements				
Pre	0.229	0.231	0.230	**PASS**
Post	0.229	0.231	0.230	**PASS**

Run Time			
Start	2:44	**End**	5:22

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	753.40	748.60	731.60	925.50				
Post	1005.60	1002.90	931.20	961.50				

Wash	**H_2O**	50.0	ml	**Filter #**
Volume	**MeCl**	50.0	ml	M-2149

Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp**	**Filter Temp**	**Impinger Exit Temp**	**Aux Temp**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumulative Meter Volume (V_m)$_{std}$**	**Cumulative Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft3	in H2O	in H2O	in H2O	oF	oF	oF	oF	oF	oF	oF	in Hg	(in H2O)1/2	ft/sec	scf	%	scf
A-1	0.0	0:00:00	532.680	1.500	2.055	2.100	299	271	225	64		78	78	2.0	1.22	85.37	8.925	94.1	107.097
A-2	12.5	0:12:30	541.840	1.600	2.192	2.200	299	266	245	59		79	79	2.0	1.26	88.17	17.757	92.1	106.544
A-3	25.0	0:25:00	550.920	1.600	2.192	2.200	299	252	254	63		80	80	3.0	1.26	88.17	27.816	95.9	111.265
B-1	37.5	0:37:30	561.280	1.400	1.918	1.900	301	266	231	68		80	80	4.0	1.18	82.59	37.334	98.0	112.003
B-2	50.0	0:50:00	571.090	1.600	2.192	2.200	301	267	256	58		81	81	4.0	1.26	88.29	46.939	98.0	112.653
B-3	62.5	1:02:30	581.000	1.300	1.781	1.800	301	258	253	58		81	81	3.0	1.14	79.58	55.798	98.4	111.595
C-1	75.0	1:15:00	590.150	1.500	2.055	2.100	296	257	237	64		80	80	3.0	1.22	85.21	65.048	98.2	111.512
C-2	87.5	1:27:30	599.680	1.400	1.918	1.900	296	225	252	68		81	81	3.0	1.18	82.32	74.123	98.3	111.184
C-3	100.0	1:40:00	609.050	1.600	2.192	2.200	295	257	253	65		81	81	5.0	1.26	87.94	83.969	98.5	111.959
D-1	112.5	1:52:30	619.210	1.300	1.781	1.800	292	255	247	66		80	80	5.0	1.14	79.11	93.747	99.7	112.496
D-2	125.0	2:05:00	629.290	1.200	1.644	1.600	294	261	253	65		81	81	4.0	1.10	76.11	102.659	100.2	111.992
D-3	137.5	2:17:30	638.500	1.300	1.781	1.800	292	257	253	65		81	81	4.0	1.14	79.11	111.451	100.1	111.451
Last Pt	150.0	2:30:00	647.580																
Final Val	150.0	2:30:00	647.580										**Max Vac**	5.0	**Final Values**		111.451	100.1	
Average Values				1.44		1.98	297	258	247	64		80	80		1.20	83.50			
												80							

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) ISOKINETIC SAMPLING DATA

Plant Name	Fibrominn Biomass Power Plant	**Date**	7/4/2007
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Run #**	OUT-PM-3
# of Points Across	3	**# of Ports Used**	4

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.84	
Avg Stack Temp	(t_s)	297	oF
Avg Gas Meter Temp	(t_m)	80	
DH @ 0.75 SCFM	($\Delta H@$)	1.83	in H2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.20	in H2O
Stack Moisture Content	(B_{ws})	25.00	%
Stack Dry Molecular Weight	(M_d)	30.44	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.766	acfm
DP to DH Isokinetic Factor	(K)	1.27	

Leak Checks					
Train	**Pre**	0	ft3/min @	15	in Hg
OK? ☑	**Post**	0	ft3/min @	15	in Hg
Pitot	**Pre**	4/5	in. H_2O for	15	sec
OK? ☑	**Post**	4/5	in. H_2O for	15	sec
Orsat	OK? ☑				

Sampling Equipment			
Meter #	SAMP-CP-0016		
Meterbox Cal. Factor	(Y)	1.002	
Nozzle #	R#8		
Average Nozzle Diameter	(D_{na})	0.2257	in
Rec. Nozzle Diameter	(D_{ni})	0.2401	in
Probe # / Length	SAMP-HP-0004	/ 60	in
Liner Material	inconel		
Sample Case / Oven #	SAMP-BH-0028		
Impinger Case #	SAMP-BC-0026		

Pressures			
Barometric Pressure	(P_b)	29.49	in Hg
Stack Static Pressure	(P_{static})	-0.23	in H2O
Absolute Stack Pressure	(P_s)	29.47	in Hg
Absolute Meter Pressure	(P_m)	29.62	in Hg

Nozzle Measurements				
Pre	0.225	0.226	0.226	**PASS**
Post	0.225	0.226	0.226	**PASS**

Run Time			
Start	5:27	**End**	7:58

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	773.40	733.30	715.00	915.70				
Post	970.50	941.30	951.10	1003.45				

Wash	**H_2O**	50.0	ml	
Volume	**MeCl**	50.0	ml	

Filter #
M-1973

Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp**	**Filter Temp**	**Impinger Exit Temp**	**Aux Temp**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumulative Meter Volume (V_m)$_{std}$**	**Cumulative Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft3	in H2O	in H2O	in H2O	oF	oF	oF	oF	oF	oF	oF	in Hg	(in H2O)1/2	ft/sec	scf	%	scf
A-1	0.0	0:00:00	647.580	1.600	2.027	2.000	295	253	235	66		80	80	5.0	1.26	87.94	9.443	99.8	113.312
A-2	12.5	0:12:30	657.310	1.400	1.774	1.800	294	254	245	65		81	81	5.0	1.18	82.21	18.708	102.2	112.250
A-3	25.0	0:25:00	666.880	1.600	2.027	2.000	295	255	246	67		81	81	6.0	1.26	87.94	28.153	101.4	112.611
B-1	37.5	0:37:30	676.630	1.700	2.154	2.200	290	262	234	66		81	81	5.0	1.30	90.35	37.621	100.2	112.864
B-2	50.0	0:50:00	686.400	1.500	1.901	1.900	295	268	254	64		81	81	5.0	1.22	85.15	46.996	100.7	112.790
B-3	62.5	1:02:30	696.080	1.800	2.281	2.300	299	259	246	66		81	81	5.0	1.34	93.52	56.302	99.4	112.604
C-1	75.0	1:15:00	705.680	1.900	2.408	2.400	297	263	236	67		80	80	6.0	1.38	95.96	66.356	99.1	113.754
C-2	87.5	1:27:30	716.030	1.700	2.154	2.200	298	267	254	64		81	81	6.0	1.30	90.83	76.222	99.4	114.334
C-3	100.0	1:40:00	726.210	1.700	2.154	2.200	301	266	251	59		81	81	6.0	1.30	91.01	86.040	99.6	114.720
D-1	112.5	1:52:30	736.340	2.000	2.534	2.500	293	263	244	55		80	80	7.0	1.41	98.19	96.243	99.3	115.491
D-2	125.0	2:05:00	746.840	2.200	2.788	2.800	296	266	256	53		81	81	8.0	1.48	103.19	107.094	99.1	116.830
D-3	137.5	2:17:30	758.020	2.100	2.661	2.700	301	267	269	54		81	81	7.0	1.45	101.15	118.961	100.2	118.961
Last Pt	150.0	2:30:00	770.250																
Final Val	150.0	2:30:00	770.250										**Max Vac**	8.0	**Final Values**		118.961	100.2	
Average Values				1.767		2.250	296	262	248	62		81	81		1.33	92.29			

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Acetone Lot Number**	C38B11

Run History Data				
Run Number	OUT-PM-1	OUT-PM-2	OUT-PM-3	
Run Start Time	23:42	2:44	5:27	(hh:mm)
Run Stop Time	2:38	5:22	7:58	(hh:mm)
Train Prepared By	KV/SK	KV/SK	KV/SK	
Train Recovered By	KV/SK	KV/SK	KV/SK	
Recovery Date	7/3/2007	7/4/2007	7/4/2007	(mm/dd/yy)
Relinquished By	TG	TG	TG	
Received By	PS	PS	PS	
Relinquished Date	7/5/2007	7/5/2007	7/5/2007	(mm/dd/yy)
Relinquished Time	19:00	19:00	19:00	(hh:mm)

Equipment Identification Numbers			
Filter	M-1916	M-2149	M-1973
Acetone Wash	ok	ok	ok
Silica Gel	ok	ok	ok
Impinger Case	SAMP-BC-0004	SAMP-BC-0003	SAMP-BC-0026
Sample Box	SAMP-BH-0027	SAMP-BH-0004	SAMP-BH-0028
Oven	ok	ok	ok

Sample Blank Taken ☑ YES

Moisture Content Data					
Impingers 1, 2, and 3 - Liquid Volume					
Final Volume	(V_f)	2806.8	2945.0	2868.1	ml
Initial Volume	(V_i)	2257.2	2237.6	2225.7	ml
Net Volume	(V_n)	549.6	707.4	642.4	ml
Comments					
Impinger 4 - Silica Gel Weight					
Final Weight	(W_f)	937.3	961.5	1003.5	g
Initial Weight	(W_i)	900.7	925.5	915.7	g
Net Weight	(W_n)	36.6	36.0	87.8	g
Comments					
Total Water Collected					
Total Volume	(V_{lc})	586.3	743.4	730.3	ml

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - SAMPLE ANALYTICAL DATA SHEET

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Acetone Lot Number**	C38B11

Analytical Data							
Placed in Desiccator				**Run**	OUT-PM-1	**Start Time**	23:42
	Number	**Date**	**Time**	**Leakage Evident?**		☐	
Filter	M-1916	07/06/07	10:30	**Estimated Volume**		0.00	
Probe Wash Beaker #	100-94	07/06/07	10:30				
Water Beaker #	400-54	07/06/07	10:30				
MeCl (org) Beaker #	250-22	07/06/07	10:30				

Weight Data							
Filter and Beaker Weight		**Filter**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1f})	49.0370	07/06/07	16:37	38%	76	
Measurement 2	(m_{2f})	49.0365	76/7	11:45	38%	75	
Measurement 3	(m_{3f})						
Measurement 4	(m_{4f})						
Probe Wash and Beaker Weight		**Acetone**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1a})	55.2304	07/06/07	16:37	38%	76	
Measurement 2	(m_{2a})	55.2307	76/7	11:45	38%	75	
Measurement 3	(m_{3a})						
Measurement 4	(m_{4a})						
Imp Content and Beaker Weight		**Imp Water**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1ino})	121.8997	07/06/07	16:37	38%	76	
Measurement 2	(m_{2ino})	121.8997	76/7	11:45	38%	75	
Measurement 3	(m_{3ino})						
Measurement 4	(m_{4ino})						
Organics and Beaker Weight		**MeCl Org**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1org})	99.8518	07/06/07	16:37	38%	76	
Measurement 2	(m_{2org})	99.8515	76/7	11:45	38%	75	
Measurement 3	(m_{3org})						
Measurement 4	(m_{4org})						

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - SAMPLE ANALYTICAL DATA SHEET

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Acetone Lot Number**	C38B11

Tare (Pre-Particulate) Weights						
Tare	**Filter**	**Filter Beaker**	**Acetone Beaker**	**Imp Content Beaker**		
	0.3707	48.6544	55.2202	121.6793		g
Tare		**Organics Beaker**	**PM_{10} Beaker**			
		99.8509		g	**Run**	OUT-PM-1

Sample Volume and Blank Concentrations			
Probe Wash Volume	(v_a)	90.0000	ml
Impinger Content Volume	(v_{ino})	925.0000	ml
Organics Wash Volume	(v_{org})	180.0000	ml
Net Wash Volume	(v_n)	1195.0000	ml
Acetone Blank Weight of Solids	(w_{ab})	0.0011	g
Imp Cont Blank Weight of Solids	(w_{inob})	0.0000	g
MeCl Blank Weight of Solids	(w_{orgb})	0.0004	g
Acetone Blank Volume	(v_{ab})	150.0000	ml
Imp Content Blank Volume	(v_{inob})	200.0000	ml
MeCl Blank Volume	(v_{orgb})	150.0000	ml
Acetone Blank Concentration	(C_a)	0.0072	mg/ml
Imp Content Blank Concentration	(C_{ino})	0.0000	mg/ml
MeCl Blank Concentration	(C_{org})	0.0030	mg/ml

Results							
		$Filter_f$	**$PM10_{a1'}$**	**$Probe_{a'}$**	**$Imp\ Cont_{ino'}$**	**$Organics_{org'}$**	
Final Weight	(m_{fx})	49.0367		55.2305	121.8997	99.8516	g
Tare Weight	(m_{tx})	49.0251		55.2202	121.6793	99.8509	g
Weight Gain	(m_x)	11.6		10.3	220.4	0.7	mg
Blank Adjustment	(W_x)			0.6	0.0	0.5	mg
Total Particulates	(M_n)	241.8					mg

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - SAMPLE ANALYTICAL DATA SHEET

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Acetone Lot Number**	C38B11

Analytical Data							
Placed in Desiccator				**Run**	OUT-PM-2	**Start Time**	2:44
	Number	**Date**	**Time**	**Leakage Evident?**		☐	
Filter	M-2149	07/06/07	10:30	**Estimated Volume**		0.00	
Probe Wash Beaker #	100-98	07/06/07	10:30				
Water Beaker #	400-33	07/06/07	10:30				
MeCl (org) Beaker #	250-30	07/06/07	10:30				

Weight Data							
Filter and Beaker Weight		**Filter**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1f})	54.8877	07/06/07	16:37	38%	76	
Measurement 2	(m_{2f})	54.8882	76/7	11:45	38%	75	
Measurement 3	(m_{3f})						
Measurement 4	(m_{4f})						
Probe Wash and Beaker Weight		**Acetone**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1a})	54.9307	07/06/07	16:37	38%	76	
Measurement 2	(m_{2a})	54.9309	76/7	11:45	38%	75	
Measurement 3	(m_{3a})						
Measurement 4	(m_{4a})						
Imp Content and Beaker Weight		**Imp Water**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1ino})	158.5654	07/06/07	16:37	38%	76	
Measurement 2	(m_{2ino})	158.5654	76/7	11:45	38%	75	
Measurement 3	(m_{3ino})						
Measurement 4	(m_{4ino})						
Organics and Beaker Weight		**MeCl Org**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1org})	91.4065	07/06/07	16:37	38%	76	
Measurement 2	(m_{2org})	91.4063	76/7	11:45	38%	75	
Measurement 3	(m_{3org})						
Measurement 4	(m_{4org})						

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - SAMPLE ANALYTICAL DATA SHEET

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Acetone Lot Number**	C38B11

Tare (Pre-Particulate) Weights						
Tare	**Filter**	**Filter Beaker**	**Acetone Beaker**	**Imp Water Beaker**		
	0.3587	54.5144	54.9258	158.2930		g
Tare		**Organics Beaker**	**PM_{10} Beaker**			
		91.4049		g	**Run**	OUT-PM-2

Sample Volume and Blank Concentrations			
Probe Wash Volume	(v_a)	90.0000	ml
Impinger Content Volume	(v_{ino})	1040.0000	ml
Organics Wash Volume	(v_{org})	150.0000	ml
Net Wash Volume	(v_n)	1280.0000	ml
Acetone Blank Weight of Solids	(w_{ab})	0.0011	g
Imp Cont Blank Weight of Solids	(w_{inob})	0.0000	g
MeCl Blank Weight of Solids	(w_{orgb})	0.0004	g
Acetone Blank Volume	(v_{ab})	150.0000	ml
Imp Content Blank Volume	(v_{inob})	200.0000	ml
MeCl Blank Volume	(v_{orgb})	150.0000	ml
Acetone Blank Concentration	(C_a)	0.0072	mg/ml
Imp Content Blank Concentration	(C_{ino})	0.0000	mg/ml
MeCl Blank Concentration	(C_{org})	0.0030	mg/ml

Results							
		$Filter_f$	**$PM10_{a1'}$**	**$Probe_{a'}$**	**$Imp\ Cont_{ino'}$**	**$Organics_{org'}$**	
Final Weight	(m_{fx})	54.8880		54.9308	158.5654	91.4064	g
Tare Weight	(m_{tx})	54.8731		54.9258	158.2930	91.4049	g
Weight Gain	(m_x)	14.9		5.0	272.4	1.5	mg
Blank Adjustment	(W_x)			0.6	0.0	0.4	mg
Total Particulates	(M_n)	292.7					mg

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - SAMPLE ANALYTICAL DATA SHEET

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Acetone Lot Number**	C38B11

Analytical Data							
Placed in Desiccator				**Run**	OUT-PM-3	**Start Time**	5:27
	Number	**Date**	**Time**	**Leakage Evident?**		☐	
Filter	M-1973	07/06/07	10:30	**Estimated Volume**		0.00	
Probe Wash Beaker #	250-52	07/06/07	10:30				
Water Beaker #	400-139	07/06/07	10:30				
MeCl (org) Beaker #	250-56	07/06/07	10:30				

Weight Data							
Filter and Beaker Weight		**Filter**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1f})	54.5513	07/06/07	16:37	38%	76	
Measurement 2	(m_{2f})	54.5518	76/7	11:45	38%	75	
Measurement 3	(m_{3f})						
Measurement 4	(m_{4f})						
Probe Wash and Beaker Weight		**Acetone**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1a})	102.9624	07/06/07	16:37	38%	76	
Measurement 2	(m_{2a})	102.9620	76/7	11:45	38%	75	
Measurement 3	(m_{3a})						
Measurement 4	(m_{4a})						
Imp Content and Beaker Weight		**Imp Water**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1ino})	160.8034	07/06/07	16:37	38%	76	
Measurement 2	(m_{2ino})	160.8034	76/7	11:45	38%	75	
Measurement 3	(m_{3ino})						
Measurement 4	(m_{4ino})						
Organics and Beaker Weight		**MeCl Org**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1org})	103.0957	07/06/07	16:37	38%	76	
Measurement 2	(m_{2org})	103.0953	76/7	11:45	38%	75	
Measurement 3	(m_{3org})						
Measurement 4	(m_{4org})						

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - SAMPLE ANALYTICAL DATA SHEET

Plant Name	Fibrominn Biomass Power Plant	**Date**	07/03/07
Sampling Location	Stack Outlet	**Project #**	snc-07-benson.mn-comp#1
Operator	TKG	**Acetone Lot Number**	C38B11

Tare (Pre-Particulate) Weights						
Tare	**Filter**	**Filter Beaker**	**Acetone Beaker**	**Imp Water Beaker**		
	0.3809	54.1568	102.9592	160.5470		g
Tare		**Organics Beaker**	**PM_{10} Beaker**			
		103.0908		g	**Run**	OUT-PM-3

Sample Volume and Blank Concentrations			
Probe Wash Volume	(v_a)	130.0000	ml
Impinger Content Volume	(v_{ino})	1020.0000	ml
Organics Wash Volume	(v_{org})	200.0000	ml
Net Wash Volume	(v_n)	1350.0000	ml
Acetone Blank Weight of Solids	(w_{ab})	0.0011	g
Imp Cont Blank Weight of Solids	(w_{inob})	0.0000	g
MeCl Blank Weight of Solids	(w_{orgb})	0.0004	g
Acetone Blank Volume	(v_{ab})	150.0000	ml
Imp Content Blank Volume	(v_{inob})	200.0000	ml
MeCl Blank Volume	(v_{orgb})	150.0000	ml
Acetone Blank Concentration	(C_a)	0.0072	mg/ml
Imp Content Blank Concentration	(C_{ino})	0.0000	mg/ml
MeCl Blank Concentration	(C_{org})	0.0030	mg/ml

Results							
		$Filter_f$	**$PM10_{a1'}$**	**$Probe_{a'}$**	**$Imp\ Cont_{ino'}$**	**$Organics_{org'}$**	
Final Weight	(m_{fx})	54.5516		102.9622	160.8034	103.0955	g
Tare Weight	(m_{tx})	54.5377		102.9592	160.5470	103.0908	g
Weight Gain	(m_x)	13.9		3.0	256.3	4.7	mg
Blank Adjustment	(W_x)			0.9	0.0	0.6	mg
Total Particulates	(M_n)	276.3					mg

EXAMPLE CALCULATIONS (Reference Method 1 - Circular Stack)

L_{fw} = distance to far wall of stack (in.)
L_{nw} = distance to near wall of stack (in.) [reference]
D = diameter of stack (in.)
A_s = area of stack (ft^2)
B = distance downstream (in.)
B_D = stack diameters downstream (dia.)
A = distance upstream (in.)
A_D = stack diameters upstream (dia.)

Diameter of Stack (in.)

$$D(in.) = L_{fw} - L_{nw}$$

D (in.) = 129 in. - 21 in. = 108 in.

Area of Stack (ft^2)

$$A_s(ft^2) = \pi \times \left(\frac{D}{2 \times 12}\right)^2$$

A_s (ft^2) = 3.14 x $\left(\frac{108.0 \text{ in.}}{2 \times 12 \text{in./ft}}\right)^2$ = 63.62 ft^2

Stack Diameters Downstream

$$B_D(dia.) = \frac{B}{D}$$

B_D (dia.) = $\frac{910 \text{ in.}}{108 \text{ in.}}$ = 8.43 diameters

Stack Diameters Upstream

$$A_D(dia.) = \frac{A}{D}$$

A_D (dia.) = $\frac{2358 \text{ in.}}{108 \text{ in.}}$ = 21.83 diameters

Number of Traverse Points

Based on 40 CFR Part 60, Appendix A, Method 1, Section 2.2

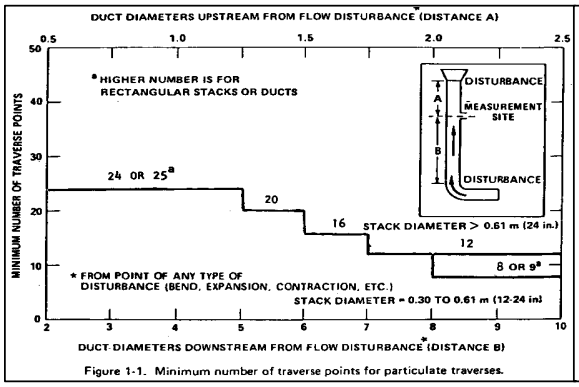


Figure 1-1. Minimum number of traverse points for particulate traverses.

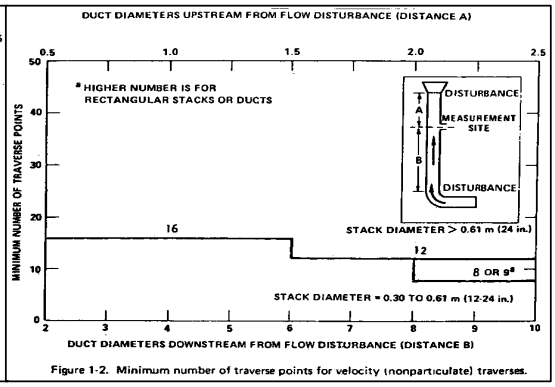


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.

Traverse Point Locations

Based on 40 CFR Part 60, Appendix A, Method 1, Section 2.3

Location of Traverse Points in Circular Stacks												
Traverse Point Number	(Fraction of Stack Dimension from Inside Wall to Traverse Point) Number of Traverse Points Across the Stack											
	2	4	6	8	10	12	14	16	18	20	22	24
1	.146	.067	.044	.032	.026	.021	.018	.016	.014	.013	.011	.011
2	.854	.250	.146	.105	.082	.067	.057	.049	.044	.039	.035	.032
3		.750	.296	.194	.146	.118	.099	.085	.075	.067	.060	.055
4		.933	.704	.323	.226	.177	.146	.125	.109	.097	.087	.079
5			.854	.677	.342	.250	.201	.169	.146	.129	.116	.105
6			.956	.806	.658	.356	.269	.220	.188	.165	.146	.132
7				.895	.774	.644	.366	.283	.236	.204	.180	.161
8				.968	.854	.750	.634	.375	.296	.250	.218	.194
9					.918	.823	.731	.625	.382	.306	.262	.230
10					.974	.882	.799	.717	.618	.388	.315	.272
11						.933	.854	.780	.704	.612	.393	.323
12						.979	.901	.831	.764	.694	.607	.398
13							.943	.875	.812	.750	.685	.602
14							.982	.915	.854	.796	.738	.677
15								.951	.891	.835	.782	.728
16								.984	.925	.871	.820	.770
17									.956	.903	.854	.806
18									.986	.933	.884	.839
19										.961	.913	.868
20										.987	.940	.895
21											.965	.921
22											.989	.945
23												.968
24												.989

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 2)

P_b = barometric pressure (in. Hg)
P_{static} = static pressure (in. H_20)
P_s = absolute stack pressure (in. Hg)
$\%N_2$ = nitrogen concentration (%)
$\%CO_2$ = carbon dioxide concentration (%)
$\%O_2$ = oxygen concentration (%)
%CO = carbon monoxide concentration (%)
MW = molecular weight (lb/lb-mole)
B_{ws} = stack moisture content (%)
M_d = stack dry molecular weight (lb/lb-mole)
M_s = stack wet molecular weight (lb/lb-mole)
T_{std} = standard temperature, 68°F, 528°R
P_{std} = standard pressure, 29.92 in. Hg
v_{sl} = local velocity (ft/sec)
v_s = average stack gas velocity (ft/sec)
Q_{sd} = average stack dry standard flow rate (dscf/hr)
Q_{aw} = average stack wet flow rate (ascf/min)

C_p = pitot tube coefficient
Δp = velocity head (in. H_2O)
A_s = area of stack (ft^2)
N_a = null angle (deg.)
t_s = stack temperature (°F)
T_u = temperature offset, 460°R
K_p = pitot tube constant,
85.49 (ft/sec)(((lb/lb-mole)(in. Hg))/((°R)(in. Hg)))$^{1/2}$

Absolute Stack Pressure (in. Hg)

$$P_S\,(in.Hg) = P_b + \frac{P_{static}}{13.6}$$

P_s (in. Hg) = 29.92 in. Hg + $\frac{\text{-0.23 in. } H_2O}{\text{13.6 in. } H_2O/\text{in. Hg}}$ = 29.90 in. Hg

Nitrogen Concentration (%)

$$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$$

$\%N_2$ (%) = 100 - 14.39 % - 4.83 % - 0 % = 80.78 %

Stack Dry Molecular Weight (lb/lb-mole)

$$M_d\,(lb/lb-mol) = \sum\left(\frac{MW_{comp}}{100} \times \%component\right)$$

M_d (lb/lb-mol) = $\left(\frac{\text{44 lb/lb-mol}}{100} \text{ x } 14.39\ \%\right) + \left(\frac{\text{32 lb/lb-mol}}{100} \text{ x } 4.83\ \%\right)$ + etc. = $\frac{30.5 \text{ lb}}{\text{lb-mol}}$

Stack Wet Molecular Weight (lb/lb-mole)

$$M_S\,(lb/lb-mol) = \left[M_d \times \left(1 - \frac{B_{WS}}{100}\right)\right] + \left[MW_{H_2O} \times \frac{B_{WS}}{100}\right]$$

M_S (lb/lb-mol) = $\left\{\frac{30.5 \text{ lb}}{\text{lb-mol}} \text{ x} \left(1 - \frac{30\ \%}{100}\right)\right\} + \left\{\frac{18 \text{ lb}}{\text{lb-mol}} \text{ x } \frac{30\ \%}{100}\right\} = \frac{26.75 \text{ lb}}{\text{lb-mol}}$

Local Velocity (ft/sec)

$$v_{s(l)}(ft/\sec) = K_p \times C_p \times \sqrt{\Delta p} \times \sqrt{\frac{t_s + T_u}{P_s \times M_s}}$$

v_{sl} (ft/sec) = $\frac{85.49 \text{ ft}}{\text{sec}} \left(\frac{\text{(lb/lb-mol)(in. Hg)}}{(^oR)(\text{in. } H_2O)}\right)^{1/2}$ x 0.84 x $\sqrt{1.00 \text{ in.} H_2O}$ x $\sqrt{\frac{291 + 460\ ^oR}{29.9 \text{ in. Hg x } 26.75 \text{ lb/lb-mol}}}$ = $\frac{69.59 \text{ ft}}{\text{sec}}$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 2)

P_b = barometric pressure (in. Hg)
P_{static} = static pressure (in. H_20)
P_s = absolute stack pressure (in. Hg)
$\%N_2$ = nitrogen concentration (%)
$\%CO_2$ = carbon dioxide concentration (%)
$\%O_2$ = oxygen concentration (%)
%CO = carbon monoxide concentration (%)
MW = molecular weight (lb/lb-mole)
B_{ws} = stack moisture content (%)
M_d = stack dry molecular weight (lb/lb-mole)
M_s = stack wet molecular weight (lb/lb-mole)
K_p = pitot tube constant,
85.49 (ft/sec)(((lb/lb-mole)(in. Hg))/((^oR)(in. Hg)))$^{1/2}$
T_{STD} = standard temperature, 68^oF
P_{STD} = standard pressure, 29.92 in. Hg
v_{sl} = local velocity (ft/sec)
v_s = average stack gas velocity (ft/sec)
Q_{SD} = average stack dry standard flow rate (dscf/hr)
Q_{AW} = average stack wet flow rate (ascf/min)

C_p = pitot tube coefficient
Δp = velocity head (in. H_2O)
A_s = area of stack (ft^2)
N_A = null angle (deg.)
t_s = stack temperature (^oF)
T_u = temperature offset, 460^oR

Average Stack Gas Velocity (ft/sec)

$$v_s(ft/\sec) = K_p \times C_p \times \left(\sqrt{\Delta p}\right)_{avg} \times \sqrt{\frac{(t_s)_{avg} + T_u}{P_s \times M_s}}$$

$$v_{sl}\ (ft/sec) = \frac{85.49\ ft}{sec}\left(\frac{(lb/lb\text{-}mol)(in.\ Hg)}{(^oR)(in.\ H_2O)}\right)^{1/2} \times 0.84 \times 1.05 \times in.H_2O^{1/2} \times \sqrt{\frac{291}{29.9}\ \frac{+\ 460\ ^oR}{in.\ Hg \times 26.75\ lb/lb\text{-}mol}} = \frac{72.74\ ft}{sec}$$

Average Stack Dry Standard Flow Rate (dscfh)

$$Q_{sd}(dscfh) = \frac{60 \times 60 \times \left(1 - \frac{B_{ws}}{100}\right) \times v_s \times A_s \times T_{std} \times P_s}{(t_s + T_u) \times P_{std}}$$

$$Q_{sd}\ (dscf/hr) = \frac{3600\ sec}{hr} \times \left(1 - \frac{30.0\ \%}{100}\right) \times \frac{72.74\ ft}{sec} \times 63.62\ ft^2 \times \frac{68}{291}\ \frac{+\ 460\ ^oR}{+\ 460\ ^oR} \times \frac{29.90\ in.\ Hg}{29.92\ in.\ Hg} = \frac{8,192,279\ dscf}{hr}$$

Average Stack Wet Flow Rate (acfm)

$$Q_{aw}(acfm) = 60 \times v_s \times A_s$$

$$Q_{aw}\ (acf/min) = \frac{60\ sec}{min} \times \frac{72.74\ ft}{sec} \times 63.62\ ft^2 = \frac{277,654\ acf}{min}$$

Average Stack Wet Standard Flow Rate (ascfh)

$$Q_{sw}(ascfh) = \frac{60 \times Q_{aw} \times T_{std} \times P_s}{(t_s + T_u) \times P_{std}}$$

$$Q_{sw}\ (ascf/hr) = \frac{60\ min}{hr} \times \frac{277,654\ acf}{min} \times \frac{68}{291}\ \frac{+\ 460\ ^oR}{+\ 460\ ^oR} \times \frac{29.90\ in.\ Hg}{29.92\ in.\ Hg} = \frac{11,703,256\ ascf}{hr}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 3a)

$\%N_2$ = nitrogen concentration (%)
$\%CO_2$ = carbon dioxide concentration (%)
$\%O_2$ = oxygen concentration (%)
ppmCO = carbon monoxide concentration (ppm)
%CO = carbon monoxide concentration (%)
M_d = stack dry molecular weight (lb/lb-mole)
$(F_o)_{avg}$ = average calculated fuel factor
$(\%EA)_{avg}$ = average excess air (%)

Carbon Monoxide Concentration (%)

$$\%CO = \frac{ppmCO}{10{,}000}$$

%CO (%) = 100.00 ppm / 10,000 ppm/% = 1.0E-02 %

Nitrogen Concentration (%)

$$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$$

%N$_2$ (%) = 100 - 14 % - 5 % - 0.01 % = 80.99 %

Stack Dry Molecular Weight (lb/lb-mole)

$$M_d\,(lb/lb-mol) = \sum\left(\frac{MW_{comp}}{100} \times \%component\right)$$

M_d (lb/lb-mol) = (44 lb/lb-mol / 100 x 14 %) + (32 lb/lb-mol / 100 x 5 %) + etc. = 30.44 lb / lb-mol

Average Calculated Fuel Factor

$$F_{o(avg)} = \frac{\left[20.9 - (\%O_2)_{avg} - (0.5 \times (\%CO)_{avg})\right]}{(\%CO_2)_{avg} + (\%CO)_{avg}}$$

$F_{o(avg)}$ = (20.9% - 5 % - [0.5 x 0.01 %]) / (14 % + 0.01 %) = 1.135

Average Excess Air (%)

$$\%EA_{avg}(\%) = \frac{100 \times \left[(\%O_2)_{avg} - (0.5 \times (\%CO)_{avg})\right]}{(0.264 \times (N_2)_{avg}) - \left[(\%O_2)_{avg} - (0.5 \times (\%CO)_{avg})\right]}$$

$(\%EA)_{AVG}$ = 100 x {5 % - [0.5 x 0.01 %]} / [0.264 x 80.99 %] - {5 % - [0.5 x 0.01 %]} = 30.5 %

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 4)

V_{mf} = final dry gas meter reading (dcf)
V_{mi} = initial dry gas meter reading (dcf)
V_m = total meter volume (dcf)
$t_{m(avg)}$ = average meter temp. (^oF)
$t_{s(avg)}$ = average stack temp. (^oF)
P_b = barometric pressure (in. Hg)
P_{static} = static pressure (in. H_2O)
ΔH_{avg} = average orifice pressure (in. H_2O)
V_i = initial impinger volume (ml)
V_f = final impinger volume (ml)
W_i = initial impinger weight (g)
W_f = final impinger weight (g)
V_t = total impinger volume (ml) = $\Sigma(V_f-V_i)$
W_t = total impinger weight (g) = $\Sigma(W_f-W_i)$
K_5 = water mass to std water vapor, 0.04715 ft^3/g
K_1 = standard volume correction, 17.65^oR/in. Hg
Y = meter calibration factor
T_u = absolute temperature offset, 460^oR
B_{ws} = final moisture content (%) = min of $B_{ws(calc)}$ and $B_{ws(svp)}$

Water Volume Weighed (dscf)

$$V_{wsg(std)}(dscf) = W_t \times K_5$$

$V_{wsg(std)}$ = 585.20 g x 0.04715 ft^3/g = 27.592 dscf

Standard Meter Volume (dscf)

$$V_{m(std)}(dscf) = \frac{K_1 \times Y \times V_m \times \left(P_b + \frac{\Delta H_{avg}}{13.6}\right)}{(t_m)_{avg} + T_u}$$

$$V_{m(std)} = \frac{\frac{17.65\ ^oR}{in.\ Hg} \times 1.00 \times 110.91\ dcf \times \left(29.49\ in.\ Hg + \frac{1.87\ in.\ H_2O}{13.6\ in.\ H_2O / in.\ Hg}\right)}{78\ ^oF + 460\ ^oR} = 107.92\ dscf$$

Calculated Moisture Content (%)

$$B_{ws(calc)}(\%) = 100 \times \frac{V_{wsg(std)}}{V_{wsg(std)} + V_{m(std)}}$$

$$B_{ws(calc)} = 100 \times \frac{27.59218\ dscf}{27.59218\ dscf + 107.9155\ dscf} = 20.36208\ \%$$

Saturated Moisture Content (%)

$$B_{ws(svp)}(\%) = 100 \times \frac{10^{6.691 - \frac{3144}{t_{s(avg)} + 390.86}}}{P_b + \frac{P_{static}}{13.6}} \leq 100$$

$$B_{ws(svp)} = 100 \times \frac{10^{\left(6.691 - \frac{3144}{293\ ^oF + 390.86}\right)}}{29.49\ in.\ Hg + \frac{-0.23\ in.\ H_2O}{13.6\ in.\ H_2O / in.\ Hg}} \leq 100 = 100\ \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Isokinetic Sampling)

C_n = nozzle diameter constant, 0.03575
Q_m = estimated orifice flow rate, 0.750 acfm
else Vm/Θ from previous run
V_m = total meter volume (acf)
Θ = total sampling time (min)
t_m = average gas meter temperature (°F)
T_u = absolute temperature offset, 460°R
C_p = pitot tube coefficient
B_{wm} = meter moisture content (%)
B_{ws} = stack moisture content (%)
t_s = average stack temperature (°F)
M_d = stack dry molecular weight (lb/lb-mole)
P_s = absolute stack pressure (in. Hg)
C_k = K Factor Constant, 849.8

Δp_{avg} = average pitot tube differential pressure (in. H_2O)
ΔH@ = DH @ 0.75 SCFM (in. H_2O)
D_{na} = actual nozzle diameter (in.)
Δp = velocity head (in. H_2O)

Desired Orifice (in. H_2O)

$$\Delta H_d\,(in.H_2O) = K \times \Delta p$$

ΔH_d (in. H_2O) = 1.28 x 1.5 in. H_2O = 1.918 in. H_2O

Absolute Meter Pressure (in. Hg)

$$P_m\,(in.Hg) = P_b + \frac{\Delta H\,@}{13.6}$$

P_m (in. Hg) = 29.49 in. Hg + $\dfrac{1.83 \text{ in. } H_2O}{13.6 \text{ in. } H_2O/\text{in. Hg}}$ = 29.62 in. Hg

Recommended Nozzle Diameter (in.)

$$D_{ni}\,(in.) = \sqrt{\frac{C_n \times Q_m \times P_m}{(t_m + T_u) \times C_p} \times \left(\frac{1 - \frac{B_{wm}}{100}}{1 - \frac{B_{ws}}{100}}\right)} \times \sqrt{(t_s + T_u) \times \left[\frac{M_d \times \left(1 - \frac{B_{ws}}{100}\right) + (18 \times B_{ws})}{P_s \times \Delta p_{avg}}\right]}$$

$$D_{ni}\text{ (in.)} = \sqrt{\frac{0.03575 \text{ (lb-mole•°R•in. } H_2O)^{1/2}\text{•min•in.}^2}{\text{acf•in. Hg}^{3/4}\text{•lb}^{1/2}} \text{ x } 0.75 \text{ acf x } 29.62 \text{ in. Hg} \times \left(\frac{1 - \frac{0.0\ \%}{100}}{1 - \frac{25.0\ \%}{100}}\right) \text{x}}$$

$$\sqrt{\left(81\ ^\circ\text{F} + 460^\circ\text{R}\right) \text{x } 0.84 \times \frac{\frac{30.44 \text{ lb}}{\text{lb-mole}} \text{ x } \left(1 - \frac{25.0\ \%}{100}\right) + \left(\frac{18 \text{ lb}}{\text{lb-mol}} \text{ x } 25.0\ \%\right)}{29.47 \text{ in. Hg x } 1.05 \text{ in. } H_2O}} = 0.245 \text{ in.}$$

DP to DH Isokinetic Factor

$$K = C_k \times C_p^2 \times \Delta H\,@ \times D_{na}^4 \times \left[\frac{M_d \times \left(1 - \frac{B_{wm}}{100}\right) + \left(18 \times \frac{B_{wm}}{100}\right)}{M_d \times \left(1 - \frac{B_{ws}}{100}\right) + \left(18 \times \frac{B_{ws}}{100}\right)}\right] \times \left(\frac{1 - \frac{B_{ws}}{100}}{1 - \frac{B_{wm}}{100}}\right)^2 \times \left(\frac{t_m + T_u}{ts + T_u}\right) \times \frac{P_s}{P_m}$$

$$K = \frac{849.8}{\text{in. } H_2O\text{•in.}^4} \text{ x } 0.84^2 \text{ x } 1.83 \text{ in. } H_2O \text{ x } 0.225667^4 \text{ x } \left(\frac{1 - \frac{25.0\ \%}{100}}{1 - \frac{0.0\ \%}{100}}\right)^2 \text{x } \left(\frac{81\ ^\circ\text{F} + 460^\circ\text{R}}{291\ ^\circ\text{F} + 460^\circ\text{R}}\right) \text{x}$$

$$\left(\frac{\frac{30.44 \text{ lb}}{\text{lb/mole}} \text{ x } \left(1 - \frac{0.0\ \%}{100}\right) + \left(\frac{18 \text{ lb}}{\text{lb-mol}} \text{ x } \frac{0.0\ \%}{100}\right)}{\frac{30.44 \text{ lb}}{\text{lb/mole}} \text{ x } \left(1 - \frac{25.0\ \%}{100}\right) + \left(\frac{18 \text{ lb}}{\text{lb-mol}} \text{ x } \frac{25.0\ \%}{100}\right)}\right) \text{x } \frac{29.47 \text{ in. Hg}}{29.62 \text{ in. Hg}} = 1.28$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 5)

K_4 = isokinetic conversion constant, 0.0945min•in.Hg/sec•°R
$m_{\#x}$ = weight measurements (g)
v_a = acetone volume (ml)
v_{ino} = impinger content volume (ml)
v_{org} = organics wash volume (ml)
w_x = blank weight of solids (g)
v_x = blank volume (ml)
m_{fx} = final weight, avg of last two measurements (g)
m_{tx} = tare weight (g)

Total Particulates (mg)

$$M_n(mg) = \Sigma(m_x - W_x)$$

M_n (mg) = Σ(10.3 mg - 0.645 mg)+ etc… = 241.84 mg

Local Stack Velocity (ft/sec)

$$v_{s(l)}(ft/\sec) = K_p \times C_p \times \sqrt{\Delta p} \times \sqrt{\frac{t_s + T_u}{P_s \times \left[M_d \times \left(1 - \frac{B_{ws}}{100}\right) + \left(18 \times \frac{B_{ws}}{100}\right)\right]}}$$

$$v_{s(l)}\text{ (ft/sec)} = \frac{85.49\text{ ft}}{\sec}\left(\frac{\text{(lb/lb-mol)(in. Hg)}}{(^{o}\text{R})(\text{in. H}_2\text{O})}\right)^{1/2} \text{x } 0.84 \text{ x } \sqrt{1.50\text{ in.H}_2\text{O}} \text{ x } \sqrt{\frac{306\ ^{o}\text{F} + 460\ ^{o}\text{R}}{29.47\text{ in. Hg x}\left(\frac{30.44\text{ lb}}{\text{lb/mole}} \text{ x}\left(1 - \frac{25.0\ \%}{100}\right) + \left(\frac{18\text{ lb}}{\text{lb-mol}} \text{ x } \frac{25.0\ \%}{100}\right)\right)}} = \frac{85.77\text{ ft}}{\sec}$$

Cumulative Percent Isokinetic (%)

$$I(\%) = \frac{K_4 \times \left((t_s)_{avg} + T_u\right) \times V_m}{\left(\Theta \times \left(v_{s(l)}\right)_{avg} \times P_s \times \pi \times \left(\frac{D_{na}}{2} \times \frac{1}{12}\right)^2\right) \times \left(1 - \frac{B_{ws}}{100}\right)}$$

I (%) =

$$\frac{\frac{0.0945\text{ min•in. Hg}}{\sec\text{•}^{o}\text{R}} \text{ x } \left(307\ ^{o}\text{F} + 460\ ^{o}\text{R}\right) \text{x } 107.92\text{ scf}}{12.5\text{ min x } \frac{85.80\text{ ft}}{\sec} \text{ x } 29.47\text{ in. Hg x } 3.14 \text{ x } \left(\frac{0.225667\text{ in.}}{2} \text{ x } \frac{\text{ft.}}{12\text{ in.}}\right)^2 \text{x}\left(1 - \frac{25\ \%}{100}\right)} = 98.80142\ \%$$

Net Wash Volume (ml)

$$v_n(ml) = v_a + v_{ino} + v_{org}$$

v_n (ml) = 90 ml + 925 ml + 180 ml = 1195 ml

Blank Concentration (mg/ml)

$$C_x(mg/ml) = \frac{1000 \times w_x}{v_x}$$

C_x (mg/ml) = $\frac{1000 \text{ x } 0.001075\text{ g}}{150\text{ ml}} = \frac{0.007167\text{ mg}}{\text{ml}}$

Blank Adjustment (lesser of)

$$W_x(mg) = m_x \cdots or \cdots v_x \times C_x$$

W_x (mg) = 10.3 mg or

90 ml x $\frac{0.007167\text{ mg}}{\text{ml}}$ = 0.645 mg

Weight Gain (mg)

$$m_x(mg) = \left(m_{fx} - m_{tx}\right) \times 1000$$

m_x (mg) = (55.2305 mg - 55.2202 mg) x 1000 = 10.3 mg

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 5)

M_n = total particulates (mg)
$V_{m(std)}$ = standard meter volume (dscf)
Q_{sd} = dry standard stack flow rate (dscfm)
F_d = fuel f-factor (dscf/MMBtu)
$\%O_2$ = oxygen percentage (%)
Q_{sw} = wet standard stack flow rate (ascfm)

Stack Particulate Concentration (g/dscf)

$$c_s\,(g/dscf) = 0.001 \times \frac{M_n}{V_{m(std)}}$$

$$c_s\ (g/dscf) = \frac{g}{1000\ mg} \times \frac{241.84\ mg}{107.92\ dscf} = \frac{0.00\ g}{dscf}$$

Stack Particulate Concentration (gr/dscf)

$$c'_s\,(gr/dscf) = 0.001 \times \frac{M_n}{V_{m(std)}} \times \frac{7000}{453.592}$$

$$c'_s\ (gr/dscf) = \frac{g}{1000\ mg} \times \frac{241.84\ mg}{107.92\ dscf} \times \frac{7000\ gr}{lb} \times \frac{lb}{453.592\ g} = \frac{0.034583\ gr}{dscf}$$

Particulate Emissions Rate (kg/hr)

$$E\,(kg/hr) = c_s \times Q_{sd} \times \frac{60}{1000}$$

$$E\ (kg/hr) = \frac{kg}{1000\ g} \times \frac{60\ min}{hr} \times \frac{0.00\ g}{dscf} \times \frac{176{,}434\ \ dscf}{min} = \frac{23.72\ kg}{hr}$$

Particulate Emissions Rate (lb/hr)

$$E'\,(lb/hr) = \frac{M_n \times Q_{sd}}{V_{m(std)}} \times \frac{60}{453.592 \times 1000}$$

$$E'\ (lb/hr) = \frac{g}{1000\ mg} \times \frac{60\ min}{hr} \times \frac{lb}{453.592\ g} \times \frac{241.84\ mg}{107.92\ dscf} \times \frac{176{,}434\ \ dscf}{min} = \frac{52.29946\ lb}{hr}$$

Particulate Emissions Rate (ton/yr)

$$E''\,(ton/yr) = E' \times \frac{8760}{2000}$$

$$E''\ (ton/yr) = \frac{ton}{2000\ lb} \times \frac{8760\ hr}{yr} \times \frac{52.29946\ lb}{hr} = \frac{229.07\ ton}{yr}$$

Particulate Emissions Rate (lb/MMBtu)

$$E'''\,(lb/MMBtu) = \frac{M_n \times F_d}{V_{m(std)} \times 1000 \times 453.592} \times \left(\frac{20.9}{20.9 - \%O_2}\right)$$

$$E'''\ (lb/MMBtu) = \frac{g}{1000\ mg} \times \frac{lb}{453.592\ g} \times \frac{241.84\ mg}{107.92\ dscf} \times \frac{1{,}890\ \ dscf}{MMBtu} \times \left(\frac{20.9}{20.9 - \ \ 5.0\ \%}\right) = \frac{0.06052\ lb}{MMBtu}$$

Heat Input (MMBtu/hr)

$$HI\,(MMBtu/hr) = Q_{sw} \times 1000 \times \left(\frac{100 - B_{ws}}{100 \times F_d}\right) \times \left(\frac{20.9 - \%O_2}{20.9}\right)$$

$$HI\ (MMBtu/hr) = \frac{13{,}292.7\ \ wkscf}{hr} \times \frac{10^3\ scf}{kscf} \times \left(\frac{100 - \ \ 20.4\ \%}{100 \times \ \ 1{,}890\ \ dscf/MMBtu}\right) \times \left(\frac{20.9 - \ \ 5.0\ \%}{20.9}\right) = \frac{784\ MMBtu}{hr}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

TEST RESULTS AND CALCULATIONS

Opacity Emissions Data

Company: Fibrominn, LLC
Equipment: Biomass Boiler Stack Exhaust
Location: Benson, Minnesota
Date: July 2, 2007
Project #: snc-07-benson.mn-comp#1

Run 1

Average Opacity: 2.69 %
Maximum Opacity: 15 %
6 Minute Average: 3.07 %
6 Minute Maximum: 14.58 %
Readings at 20 %: 0 readings

TIME (min)	OPACITY (%)	6 MIN AVG.	TIME (min)	OPACITY (%)	6 MIN AVG.	TIME (min)	OPACITY (%)	6 MIN AVG.	TIME (min)	OPACITY (%)	6 MIN AVG.
0.00	0	N/A	15.00	15	13.75	30.00	0	1.67	45.00	5	0.21
0.25	0	N/A	15.25	15	13.96	30.25	0	1.67	45.25	5	0.42
0.50	0	N/A	15.50	15	14.17	30.50	0	1.67	45.50	5	0.63
0.75	0	N/A	15.75	15	14.38	30.75	0	1.67	45.75	5	0.83
1.00	0	N/A	16.00	15	14.58	31.00	0	1.67	46.00	0	0.83
1.25	0	N/A	16.25	15	14.58	31.25	0	1.67	46.25	0	0.83
1.50	0	N/A	16.50	15	14.58	31.50	0	1.67	46.50	0	0.83
1.75	0	N/A	16.75	15	14.58	31.75	0	1.67	46.75	0	0.83
2.00	0	N/A	17.00	10	14.38	32.00	0	1.46	47.00	0	0.83
2.25	0	N/A	17.25	10	14.17	32.25	0	1.25	47.25	0	0.83
2.50	0	N/A	17.50	10	13.96	32.50	0	1.04	47.50	0	0.83
2.75	0	N/A	17.75	10	13.75	32.75	0	0.83	47.75	0	0.83
3.00	0	N/A	18.00	10	13.54	33.00	0	0.63	48.00	0	0.83
3.25	0	N/A	18.25	10	13.33	33.25	0	0.42	48.25	0	0.83
3.50	0	N/A	18.50	5	12.92	33.50	0	0.21	48.50	0	0.83
3.75	0	N/A	18.75	5	12.50	33.75	0	0.00	48.75	0	0.83
4.00	0	N/A	19.00	`0	12.61	34.00	0	0.00	49.00	0	0.83
4.25	0	N/A	19.25	`0	12.73	34.25	0	0.00	49.25	0	0.83
4.50	0	N/A	19.50	`0	12.62	34.50	0	0.00	49.50	0	0.83
4.75	0	N/A	19.75	`0	12.50	34.75	0	0.00	49.75	0	0.83
5.00	0	N/A	20.00	5	12.00	35.00	0	0.00	50.00	0	0.83
5.25	0	N/A	20.25	5	11.50	35.25	0	0.00	50.25	0	0.83
5.50	0	N/A	20.50	5	11.00	35.50	0	0.00	50.50	0	0.83
5.75	0	0.00	20.75	5	10.50	35.75	0	0.00	50.75	0	0.83
6.00	0	0.00	21.00	5	10.00	36.00	0	0.00	51.00	0	0.63
6.25	0	0.00	21.25	5	9.50	36.25	0	0.00	51.25	0	0.42
6.50	0	0.00	21.50	5	9.00	36.50	0	0.00	51.50	0	0.21
6.75	0	0.00	21.75	5	8.50	36.75	0	0.00	51.75	0	0.00
7.00	0	0.00	22.00	5	8.00	37.00	0	0.00	52.00	0	0.00
7.25	0	0.00	22.25	5	7.50	37.25	0	0.00	52.25	0	0.00
7.50	0	0.00	22.50	5	7.00	37.50	0	0.00	52.50	0	0.00
7.75	0	0.00	22.75	5	6.50	37.75	0	0.00	52.75	0	0.00
8.00	0	0.00	23.00	0	6.00	38.00	0	0.00	53.00	0	0.00
8.25	0	0.00	23.25	0	5.50	38.25	0	0.00	53.25	0	0.00
8.50	0	0.00	23.50	0	5.00	38.50	0	0.00	53.50	0	0.00
8.75	0	0.00	23.75	0	4.50	38.75	0	0.00	53.75	0	0.00
9.00	10	0.42	24.00	0	4.00	39.00	0	0.00	54.00	0	0.00
9.25	10	0.83	24.25	0	3.50	39.25	0	0.00	54.25	0	0.00
9.50	10	1.25	24.50	0	3.25	39.50	0	0.00	54.50	0	0.00
9.75	10	1.67	24.75	0	3.00	39.75	0	0.00	54.75	0	0.00
10.00	10	2.08	25.00	0	2.86	40.00	0	0.00	55.00	0	0.00
10.25	15	2.71	25.25	0	2.73	40.25	0	0.00	55.25	0	0.00
10.50	15	3.33	25.50	0	2.61	40.50	0	0.00	55.50	0	0.00
10.75	15	3.96	25.75	0	2.50	40.75	0	0.00	55.75	0	0.00
11.00	15	4.58	26.00	5	2.50	41.00	0	0.00	56.00	0	0.00
11.25	15	5.21	26.25	5	2.50	41.25	0	0.00	56.25	0	0.00
11.50	15	5.83	26.50	5	2.50	41.50	0	0.00	56.50	0	0.00
11.75	15	6.46	26.75	5	2.50	41.75	0	0.00	56.75	0	0.00
12.00	15	7.08	27.00	5	2.50	42.00	0	0.00	57.00	0	0.00
12.25	15	7.71	27.25	5	2.50	42.25	0	0.00	57.25	0	0.00
12.50	15	8.33	27.50	5	2.50	42.50	0	0.00	57.50	0	0.00
12.75	15	8.96	27.75	5	2.50	42.75	0	0.00	57.75	0	0.00
13.00	10	9.38	28.00	0	2.29	43.00	0	0.00	58.00	0	0.00
13.25	10	9.79	28.25	0	2.08	43.25	0	0.00	58.25	0	0.00
13.50	15	10.42	28.50	0	1.88	43.50	0	0.00	58.50	0	0.00
13.75	15	11.04	28.75	0	1.67	43.75	0	0.00	58.75	0	0.00
14.00	15	11.67	29.00	0	1.67	44.00	0	0.00	59.00	0	0.00
14.25	15	12.29	29.25	0	1.67	44.25	0	0.00	59.25	0	0.00
14.50	15	12.92	29.50	0	1.67	44.50	0	0.00	59.50	0	0.00
14.75	15	13.54	29.75	0	1.67	44.75	0	0.00	59.75	0	0.00

Company: Fibrominn, LLC
Equipment: Biomass Boiler Stack Exhaust
Location: Benson, Minnesota
Date: July 2, 2007
Project #: snc-07-benson.mn-comp#1

Run 2

Average Opacity: 2.94 %
Maximum Opacity: 15 %
6 Minute Average: 2.78 %
6 Minute Maximum: 10.83 %
Readings at 20 %: 0 readings

TIME (min)	OPACITY (%)	6 MIN AVG.	TIME (min)	OPACITY (%)	6 MIN AVG.	TIME (min)	OPACITY (%)	6 MIN AVG.	TIME (min)	OPACITY (%)	6 MIN AVG.
0.00	5	N/A	15.00	5	6.67	30.00	0	0.00	45.00	0	2.50
0.25	5	N/A	15.25	5	6.46	30.25	0	0.00	45.25	0	2.50
0.50	5	N/A	15.50	5	6.46	30.50	0	0.00	45.50	0	2.50
0.75	5	N/A	15.75	5	6.25	30.75	0	0.00	45.75	0	2.50
1.00	5	N/A	16.00	0	5.83	31.00	0	0.00	46.00	0	2.50
1.25	5	N/A	16.25	0	5.42	31.25	0	0.00	46.25	0	2.50
1.50	5	N/A	16.50	0	5.00	31.50	0	0.00	46.50	0	2.50
1.75	5	N/A	16.75	0	4.58	31.75	0	0.00	46.75	5	2.71
2.00	10	N/A	17.00	0	4.38	32.00	0	0.00	47.00	5	2.92
2.25	10	N/A	17.25	0	3.96	32.25	0	0.00	47.25	5	3.13
2.50	10	N/A	17.50	0	3.75	32.50	0	0.00	47.50	5	3.33
2.75	10	N/A	17.75	0	3.54	32.75	0	0.00	47.75	5	3.54
3.00	15	N/A	18.00	0	3.33	33.00	0	0.00	48.00	5	3.54
3.25	15	N/A	18.25	0	3.13	33.25	0	0.00	48.25	5	3.54
3.50	15	N/A	18.50	0	2.92	33.50	0	0.00	48.50	5	3.54
3.75	15	N/A	18.75	0	2.50	33.75	0	0.00	48.75	0	3.33
4.00	10	N/A	19.00	0	2.29	34.00	0	0.00	49.00	0	3.13
4.25	10	N/A	19.25	0	2.08	34.25	0	0.00	49.25	0	2.92
4.50	10	N/A	19.50	0	1.88	34.50	0	0.00	49.50	0	2.71
4.75	10	N/A	19.75	0	1.67	34.75	0	0.00	49.75	0	2.50
5.00	15	N/A	20.00	0	1.46	35.00	0	0.00	50.00	0	2.29
5.25	10	N/A	20.25	0	1.25	35.25	0	0.00	50.25	0	2.08
5.50	10	N/A	20.50	0	1.04	35.50	0	0.00	50.50	0	1.88
5.75	5	9.17	20.75	0	0.83	35.75	0	0.00	50.75	5	1.88
6.00	10	9.38	21.00	0	0.63	36.00	0	0.00	51.00	5	2.08
6.25	10	9.58	21.25	0	0.42	36.25	0	0.00	51.25	0	2.08
6.50	10	9.79	21.50	0	0.21	36.50	0	0.00	51.50	0	2.08
6.75	10	10.00	21.75	0	0.00	36.75	0	0.00	51.75	5	2.29
7.00	10	10.21	22.00	0	0.00	37.00	0	0.00	52.00	5	2.50
7.25	10	10.42	22.25	0	0.00	37.25	0	0.00	52.25	5	2.71
7.50	10	10.63	22.50	0	0.00	37.50	0	0.00	52.50	5	2.92
7.75	10	10.83	22.75	0	0.00	37.75	0	0.00	52.75	0	2.71
8.00	10	10.83	23.00	0	0.00	38.00	0	0.00	53.00	0	2.50
8.25	10	10.83	23.25	0	0.00	38.25	0	0.00	53.25	0	2.29
8.50	10	10.83	23.50	0	0.00	38.50	0	0.00	53.50	0	2.08
8.75	5	10.63	23.75	0	0.00	38.75	0	0.00	53.75	5	2.08
9.00	5	10.21	24.00	0	0.00	39.00	0	0.00	54.00	5	2.08
9.25	10	10.00	24.25	0	0.00	39.25	0	0.00	54.25	5	2.08
9.50	5	9.58	24.50	0	0.00	39.50	0	0.00	54.50	5	2.08
9.75	10	9.38	24.75	0	0.00	39.75	0	0.00	54.75	5	2.29
10.00	10	9.38	25.00	0	0.00	40.00	0	0.00	55.00	5	2.50
10.25	10	9.38	25.25	0	0.00	40.25	0	0.00	55.25	5	2.71
10.50	10	9.38	25.50	0	0.00	40.50	0	0.00	55.50	5	2.92
10.75	10	9.38	25.75	0	0.00	40.75	0	0.00	55.75	5	3.13
11.00	5	8.96	26.00	0	0.00	41.00	0	0.00	56.00	5	3.33
11.25	10	8.96	26.25	0	0.00	41.25	0	0.00	56.25	5	3.54
11.50	5	8.75	26.50	0	0.00	41.50	0	0.00	56.50	5	3.75
11.75	5	8.75	26.75	0	0.00	41.75	0	0.00	56.75	0	3.54
12.00	5	8.54	27.00	0	0.00	42.00	5	0.21	57.00	0	3.33
12.25	5	8.33	27.25	0	0.00	42.25	5	0.42	57.25	0	3.33
12.50	5	8.13	27.50	0	0.00	42.50	5	0.63	57.50	0	3.33
12.75	10	8.13	27.75	0	0.00	42.75	5	0.83	57.75	0	3.13
13.00	5	7.92	28.00	0	0.00	43.00	5	1.04	58.00	0	2.92
13.25	5	7.71	28.25	0	0.00	43.25	5	1.25	58.25	0	2.71
13.50	5	7.50	28.50	0	0.00	43.50	5	1.46	58.50	0	2.50
13.75	5	7.29	28.75	0	0.00	43.75	5	1.67	58.75	0	2.50
14.00	5	7.08	29.00	0	0.00	44.00	5	1.88	59.00	0	2.50
14.25	5	6.88	29.25	0	0.00	44.25	5	2.08	59.25	0	2.50
14.50	5	6.67	29.50	0	0.00	44.50	5	2.29	59.50	0	2.50
14.75	5	6.67	29.75	0	0.00	44.75	5	2.50	59.75	0	2.29

Company: Fibrominn, LLC
Equipment: Biomass Boiler Stack Exhaust
Location: Benson, Minnesota
Date: July 2, 2007
Project #: snc-07-benson.mn-comp#1

Run 3

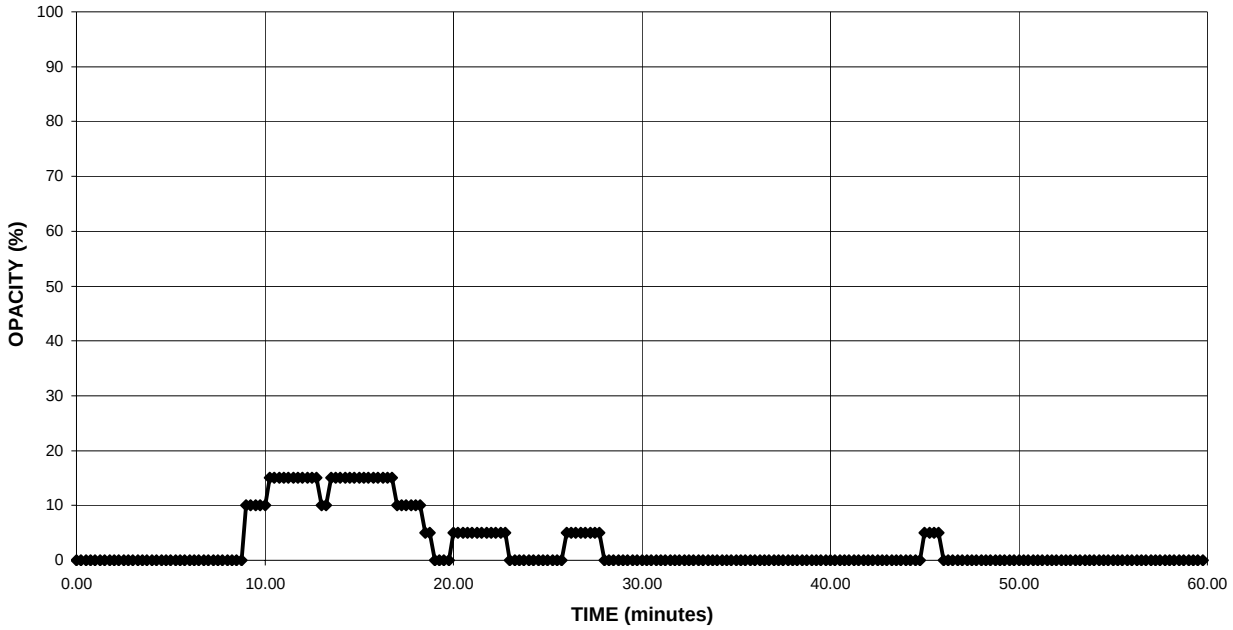
Average Opacity: 0.83 %
Maximum Opacity: 5 %
6 Minute Average: 0.92 %
6 Minute Maximum: 5.00 %
Readings at 20 %: 0 readings

TIME (min)	OPACITY (%)	6 MIN AVG.	TIME (min)	OPACITY (%)	6 MIN AVG.	TIME (min)	OPACITY (%)	6 MIN AVG.	TIME (min)	OPACITY (%)	6 MIN AVG.
0.00	0	N/A	15.00	5	4.38	30.00	0	0.00	45.00	0	0.00
0.25	0	N/A	15.25	5	4.58	30.25	0	0.00	45.25	0	0.00
0.50	0	N/A	15.50	5	4.79	30.50	0	0.00	45.50	0	0.00
0.75	0	N/A	15.75	5	5.00	30.75	0	0.00	45.75	0	0.00
1.00	0	N/A	16.00	5	5.00	31.00	0	0.00	46.00	0	0.00
1.25	0	N/A	16.25	5	5.00	31.25	0	0.00	46.25	0	0.00
1.50	0	N/A	16.50	5	5.00	31.50	0	0.00	46.50	0	0.00
1.75	0	N/A	16.75	5	5.00	31.75	0	0.00	46.75	0	0.00
2.00	0	N/A	17.00	5	5.00	32.00	0	0.00	47.00	0	0.00
2.25	0	N/A	17.25	5	5.00	32.25	0	0.00	47.25	0	0.00
2.50	0	N/A	17.50	5	5.00	32.50	0	0.00	47.50	0	0.00
2.75	0	N/A	17.75	5	5.00	32.75	0	0.00	47.75	0	0.00
3.00	0	N/A	18.00	5	5.00	33.00	0	0.00	48.00	0	0.00
3.25	0	N/A	18.25	5	5.00	33.25	0	0.00	48.25	0	0.00
3.50	0	N/A	18.50	5	5.00	33.50	0	0.00	48.50	0	0.00
3.75	0	N/A	18.75	5	5.00	33.75	0	0.00	48.75	0	0.00
4.00	0	N/A	19.00	5	5.00	34.00	0	0.00	49.00	0	0.00
4.25	0	N/A	19.25	5	5.00	34.25	0	0.00	49.25	0	0.00
4.50	0	N/A	19.50	5	5.00	34.50	0	0.00	49.50	0	0.00
4.75	0	N/A	19.75	5	5.00	34.75	0	0.00	49.75	0	0.00
5.00	0	N/A	20.00	0	4.79	35.00	0	0.00	50.00	0	0.00
5.25	0	N/A	20.25	0	4.58	35.25	0	0.00	50.25	0	0.00
5.50	0	N/A	20.50	0	4.38	35.50	0	0.00	50.50	0	0.00
5.75	0	0.00	20.75	0	4.17	35.75	0	0.00	50.75	0	0.00
6.00	0	0.00	21.00	0	3.96	36.00	0	0.00	51.00	0	0.00
6.25	0	0.00	21.25	0	3.75	36.25	0	0.00	51.25	0	0.00
6.50	0	0.00	21.50	0	3.54	36.50	0	0.00	51.50	0	0.00
6.75	0	0.00	21.75	0	3.33	36.75	0	0.00	51.75	0	0.00
7.00	0	0.00	22.00	0	3.13	37.00	0	0.00	52.00	0	0.00
7.25	0	0.00	22.25	0	2.92	37.25	0	0.00	52.25	0	0.00
7.50	0	0.00	22.50	0	2.71	37.50	0	0.00	52.50	0	0.00
7.75	0	0.00	22.75	0	2.50	37.75	0	0.00	52.75	0	0.00
8.00	0	0.00	23.00	0	2.29	38.00	0	0.00	53.00	0	0.00
8.25	0	0.00	23.25	0	2.08	38.25	0	0.00	53.25	0	0.00
8.50	0	0.00	23.50	0	1.88	38.50	0	0.00	53.50	0	0.00
8.75	0	0.00	23.75	0	1.67	38.75	0	0.00	53.75	0	0.00
9.00	0	0.00	24.00	0	1.46	39.00	0	0.00	54.00	0	0.00
9.25	0	0.00	24.25	0	1.25	39.25	0	0.00	54.25	0	0.00
9.50	0	0.00	24.50	0	1.04	39.50	0	0.00	54.50	0	0.00
9.75	0	0.00	24.75	0	0.83	39.75	0	0.00	54.75	0	0.00
10.00	5	0.21	25.00	0	0.63	40.00	0	0.00	55.00	0	0.00
10.25	5	0.42	25.25	0	0.42	40.25	0	0.00	55.25	0	0.00
10.50	5	0.63	25.50	0	0.21	40.50	0	0.00	55.50	0	0.00
10.75	5	0.83	25.75	0	0.00	40.75	0	0.00	55.75	0	0.00
11.00	5	1.04	26.00	0	0.00	41.00	0	0.00	56.00	0	0.00
11.25	5	1.25	26.25	0	0.00	41.25	0	0.00	56.25	0	0.00
11.50	5	1.46	26.50	0	0.00	41.50	0	0.00	56.50	0	0.00
11.75	5	1.67	26.75	0	0.00	41.75	0	0.00	56.75	0	0.00
12.00	5	1.88	27.00	0	0.00	42.00	0	0.00	57.00	0	0.00
12.25	5	2.08	27.25	0	0.00	42.25	0	0.00	57.25	0	0.00
12.50	5	2.29	27.50	0	0.00	42.50	0	0.00	57.50	0	0.00
12.75	5	2.50	27.75	0	0.00	42.75	0	0.00	57.75	0	0.00
13.00	5	2.71	28.00	0	0.00	43.00	0	0.00	58.00	0	0.00
13.25	5	2.92	28.25	0	0.00	43.25	0	0.00	58.25	0	0.00
13.50	5	3.13	28.50	0	0.00	43.50	0	0.00	58.50	0	0.00
13.75	5	3.33	28.75	0	0.00	43.75	0	0.00	58.75	0	0.00
14.00	5	3.54	29.00	0	0.00	44.00	0	0.00	59.00	0	0.00
14.25	5	3.75	29.25	0	0.00	44.25	0	0.00	59.25	0	0.00
14.50	5	3.96	29.50	0	0.00	44.50	0	0.00	59.50	0	0.00
14.75	5	4.17	29.75	0	0.00	44.75	0	0.00	59.75	0	0.00

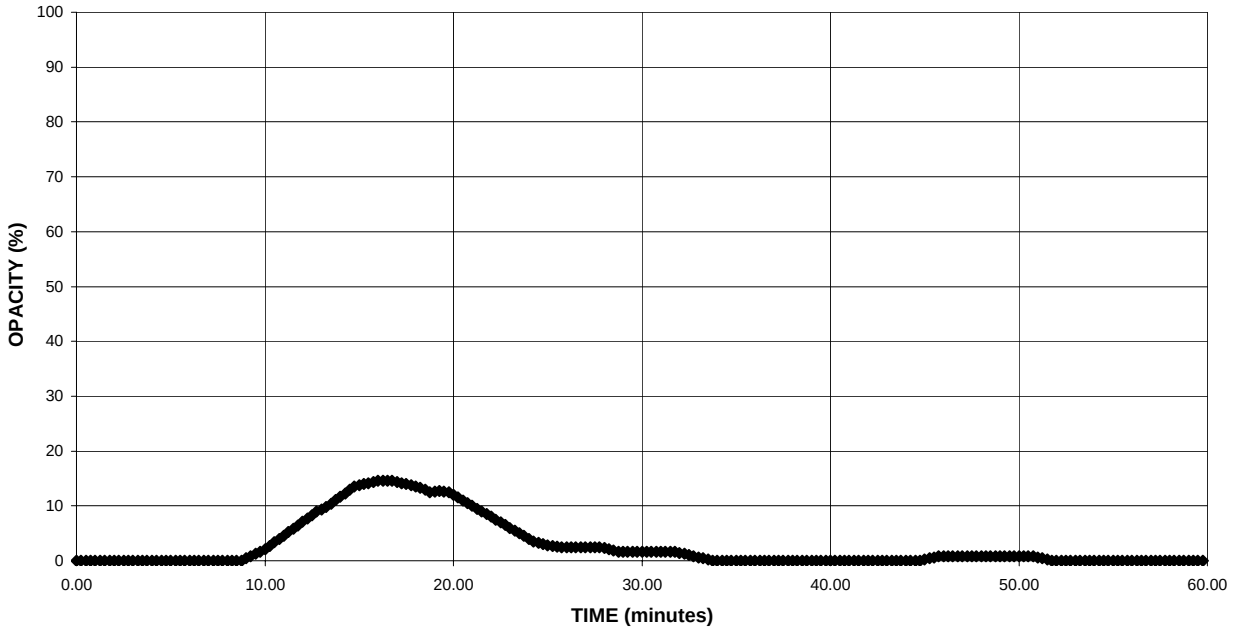
Company:	Fibrominn, LLC
Equipment:	Biomass Boiler Stack Exhaust
Location:	Benson, Minnesota
Date:	July 2, 2007
Project #:	snc-07-benson.mn-comp#1

Run 1	**Average Opacity:**	2.69 %
	Maximum Opacity:	15 %
	6 Minute Average:	3.07 %
	6 Minute Maximum:	14.58 %
	Readings at 20 %:	0 readings

OPACITY READINGS
(15 second intervals)



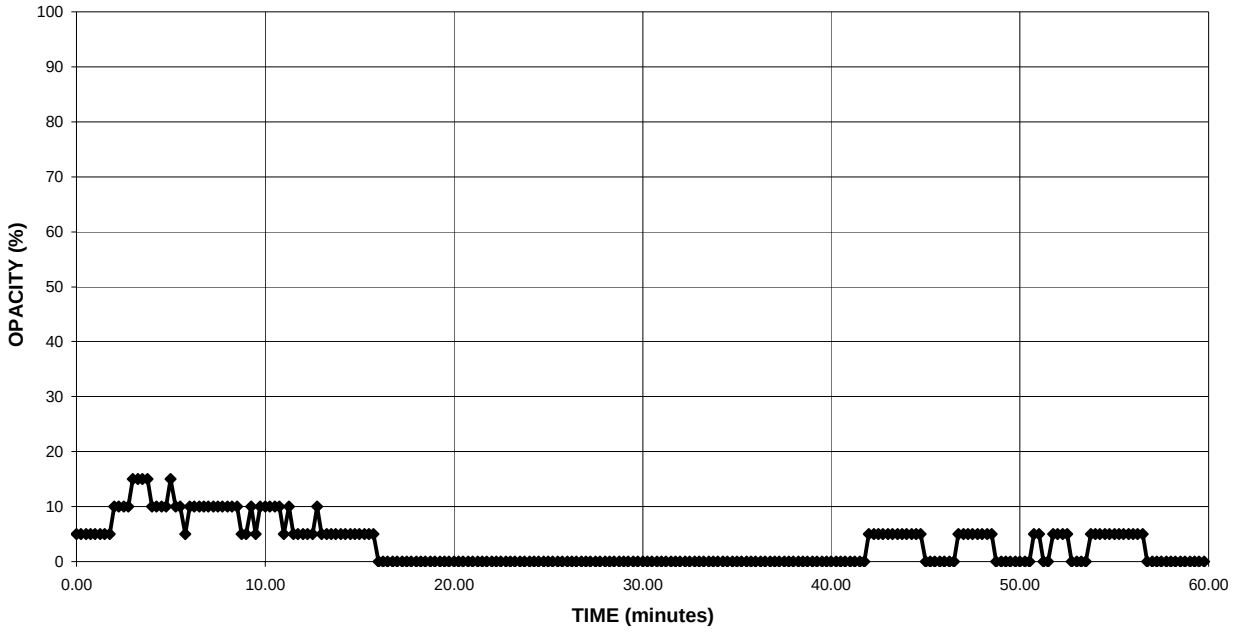
OPACITY RESULTS
(6 minute averages)



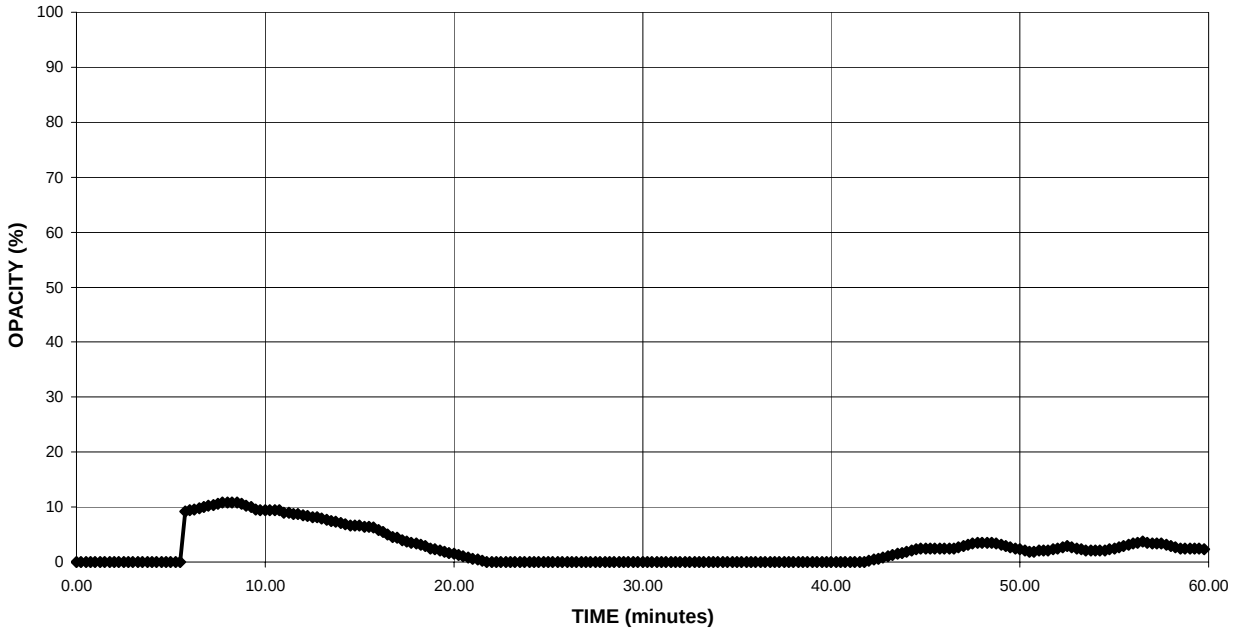
Company:	Fibrominn, LLC
Equipment:	Biomass Boiler Stack Exhaust
Location:	Benson, Minnesota
Date:	July 2, 2007
Project #:	snc-07-benson.mn-comp#1

Run 2	**Average Opacity:**	2.94 %
	Maximum Opacity:	15 %
	6 Minute Average:	2.78 %
	6 Minute Maximum:	10.83 %
	Readings at 20 %:	0 readings

OPACITY READINGS
(15 second intervals)



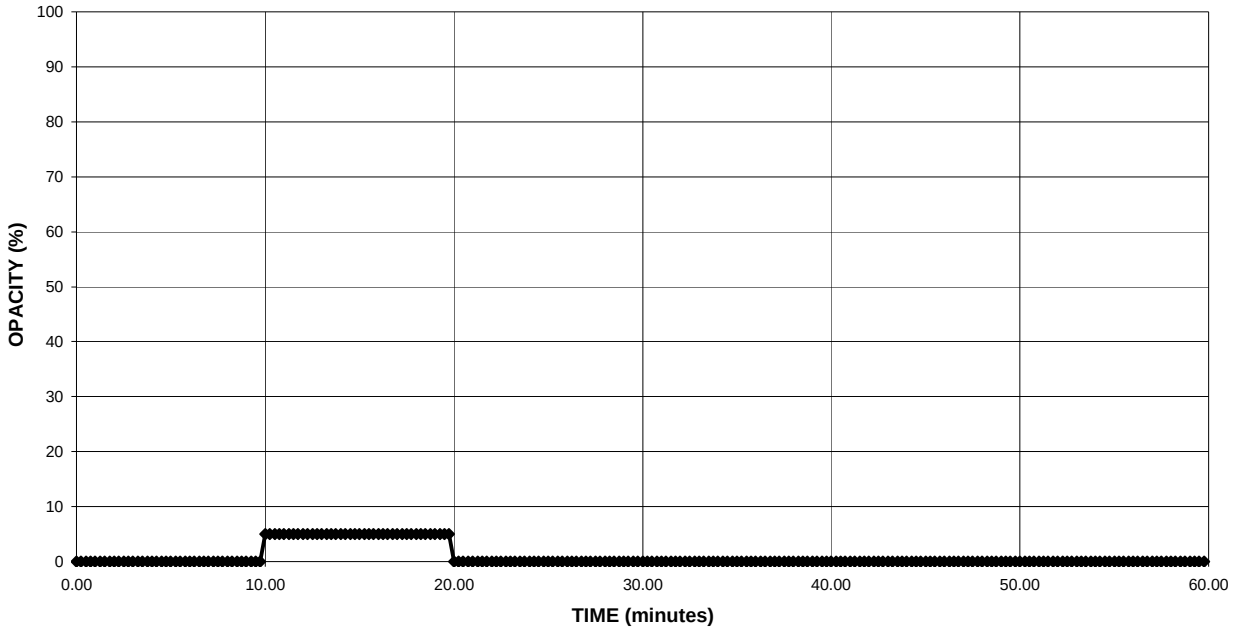
OPACITY RESULTS
(6 minute averages)



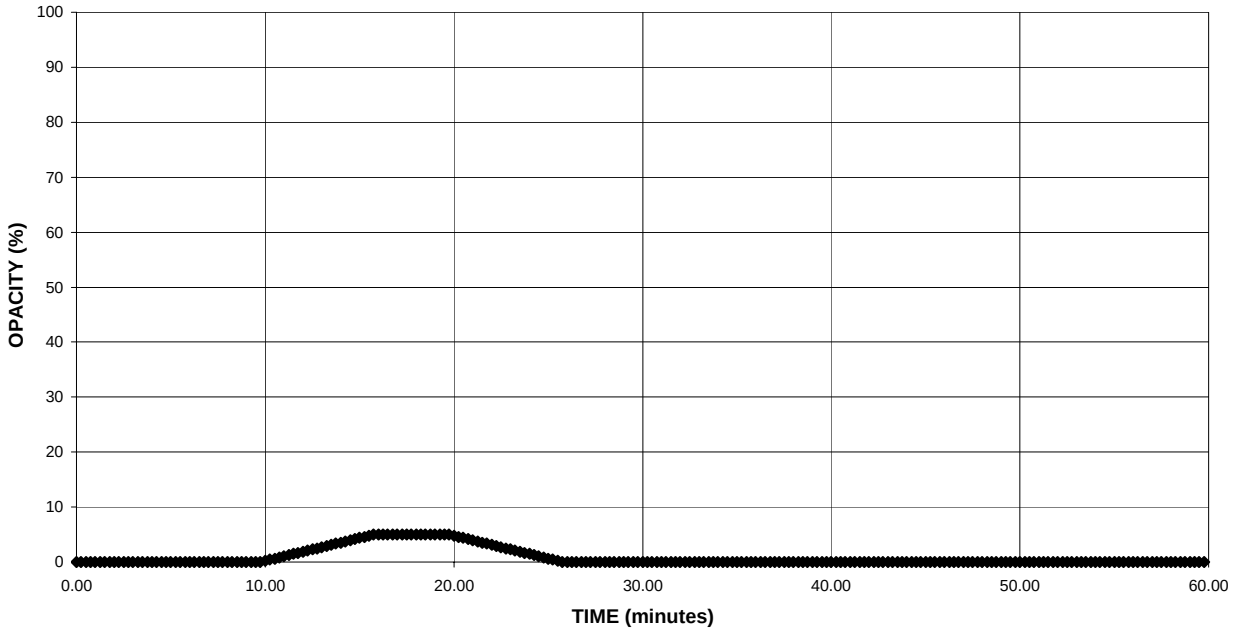
Company:	Fibrominn, LLC
Equipment:	Biomass Boiler Stack Exhaust
Location:	Benson, Minnesota
Date:	July 2, 2007
Project #:	snc-07-benson.mn-comp#1

Run 3	**Average Opacity:**	0.83 %
	Maximum Opacity:	5 %
	6 Minute Average:	0.92 %
	6 Minute Maximum:	5.00 %
	Readings at 20 %:	0 readings

OPACITY READINGS
(15 second intervals)



OPACITY RESULTS
(6 minute averages)



Method Used (Circle One)
Method 9 203A 203B Other: _____

Company Name: Fibrominn, LCC
Facility Name: Fibrominn Biomass Power Plant
Street Address: 900 Industry DR
City: Benson State: MN Zip: 56215

Process: Boiler Unit #: 1 Operating Mode: Full
Control Equipment: Bag house / SDA Operating Mode: Full

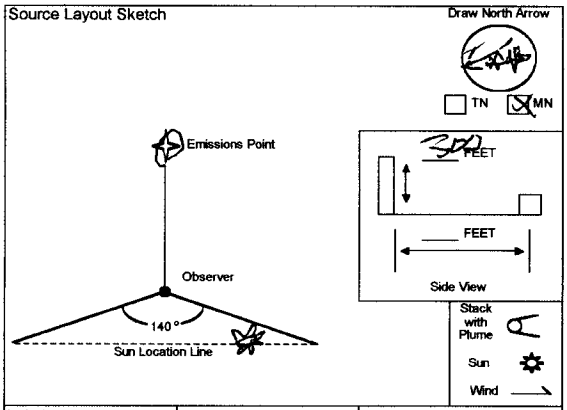
Describe Emissions Pont: Barely visible greyish
Height of Emiss. Pt. Start 300 ft End 300 ft
Height of Emiss. Pt. Rel. to Observer Start 300 ft End
Distance to Emiss. Pt. Start 3,000 ft End 900 ft
Direction to Emiss. Pt. (Degrees) Start 90° End 90°

Vetical Angle to Obs. Pt. Start 50° End 50°
Direction to Obs. Pt. (Degrees) Start 90° End 90°
Distance and Direction to Observation Point from Emission Point Start 0 0 End 0 0

Describe Emissions Start Barely visible End None visible
Emission Color Start Dark Grey End Clear
Water Droplet Plume Start None End None

Describe Plume Background Start Sky End Sky
Background Color Start Blue End Blue
Sky Conditions Start Overcast End Clear
Wind Speed Start Calm End Calm
Wind Direction Start — End —
Ambient Temp. Start 84° End 81°
Wet Bulb Temp.
RH Percent

Source Layout Sketch



Latitude | Longitude | Declination

Additional Information

VISUAL EMISSIONS OBSERVATION FORM

Form Number | Page 1 of 6
Continued on Form Number

Observation Date: 2-July-07 Time Zone: Central Start Time: 17:53 End Time: 1858

Min. \ Sec.	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	10	10	10	10	
11	10	15	15	15	
12	15	15	15	15	
13	15	15	15	15	
14	10	10	15	15	
15	15	15	15	15	
16	15	15	15	15	
17	15	15	15	15	
18	10	10	10	10	
19	10	10	5	5	
20	10	10	10	10	
21	5	5	5	5	
22	5	5	5	5	
23	5	5	5	5	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	5	5	5	5	
28	5	5	5	5	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print): Rob White
Observer's Signature: [signature] Date: 4-July-07
Organization: Air Hygiene
Certified By: ETA Date: 28-Mar-07

Method Used (Circle One)
Method 9 203A 203B Other: _____

VISUAL EMISSIONS OBSERVATION FORM

Company Name: Fibrominn, LLC
Facility Name: Fibrominn Biomass Power Plant
Street Address: 900 Industry Dr.
City: Benson State: MN Zip: 56215

Process: Boiler Unit #: 1 Operating Mode: Full
Control Equipment: Bag House / SDA Operating Mode: Full

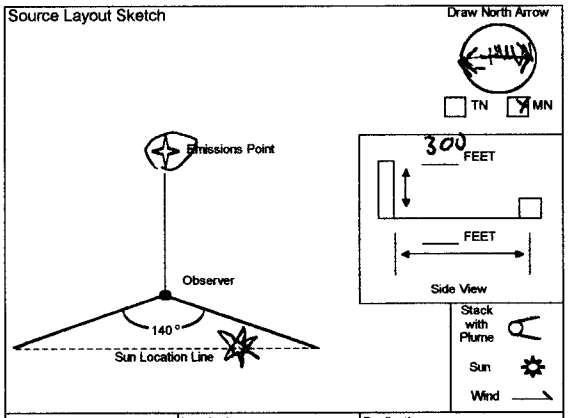
Describe Emissions Pont: Barely Visible
Height of Emiss. Pt. Start 300 ft End 300 ft Height of Emiss. Pt. Rel. to Observer Start 300 ft End 300 ft
Distance to Emiss. Pt. Start 900 ft End 900 ft Direction to Emiss. Pt. (Degrees) Start 90° End 90°

Vetical Angle to Obs. Pt. Start 0° End 30° Direction to Obs. Pt. (Degrees) Start 90° End 90°
Distance and Direction to Observation Point from Emission Point Start 0' 0" End 0' 0"

Describe Emissions Start Barely Visible End NONE Visible
Emission Color Start ~~Plume~~ Grey End Clear Water Droplet Plume Start N/A End N/A

Describe Plume Background Start Sky End Sky
Background Color Start Blue End Blue Sky Conditions Start Overcast End Clear
Wind Speed Start Calm End Calm Wind Direction Start ~ End ~
Ambient Temp. Start 74 End 81 Wet Bulb Temp. RH Percent

Source Layout Sketch



Latitude | Longitude | Declination

Additional Information

Form Number | Page 2 of 6
Continued on Form Number

Observation Date: 3-July-07 Time Zone: ~~PDST~~ Central Start Time: 1758 End Time: 1858

Min. \ Sec.	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	5	5	5	5	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print): Rob White
Observer's Signature: [signature] Date: 4 July 07
Organization: Air Hygiene
Certified By: ETA Date: 28-Mar-07

Method Used (Circle One)
Method 9 | 203A | 203B | Other: _____

Company Name: Fibrominn, LLC
Facility Name: Fibrominn Biomass Power Plant
Street Address: 400 Industry Dr.
City: Benson | State: MN | Zip: 56215

Process: Boiler | Unit #: 1 | Operating Mode: Full
Control Equipment: Baghouse/SNCR | Operating Mode: Full

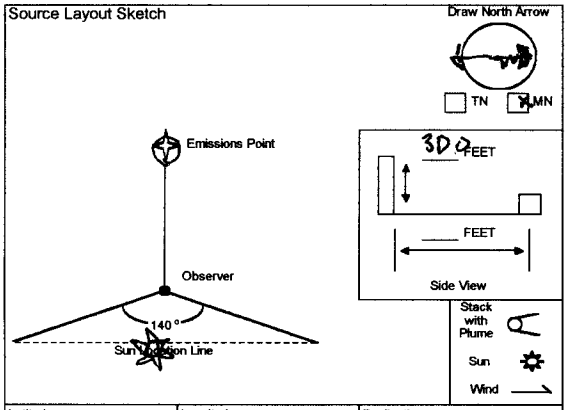
Describe Emissions Pont: Barely visible
Height of Emiss. Pt. Start: 300 ft End: 300 ft
Height of Emiss. Pt. Rel. to Observer Start: 300 ft End: 300 ft
Distance to Emiss. Pt. Start: 900 ft End: 900 ft
Direction to Emiss. Pt. (Degrees) Start: 40° End: 90°

Vetical Angle to Obs. Pt. Start: 50° End: 50°
Direction to Obs. Pt. (Degrees) Start: 90° End: 90°
Distance and Direction to Observation Point from Emission Point Start: 0 0 End: 0 0

Describe Emissions Start: Barely visible End: NONE visible
Emission Color Start: Wet End: Clear
Water Droplet Plume Start: N/A End: N/A

Describe Plume Background Start: Sky End: Sky
Background Color Start: Blue End: Blue
Sky Conditions Start: Clear End: Clear
Wind Speed Start: Calm End: Calm
Wind Direction Start: – End: –
Ambient Temp. Start: 71° End: 76°
Wet Bulb Temp.
RH Percent

Source Layout Sketch



Latitude | Longitude | Declination

Additional Information

VISUAL EMISSIONS OBSERVATION FORM

Form Number | Page 3 of 6
Continued on Form Number

Observation Date: 3 July | Time Zone: Central | Start Time: 1410 | End Time: 1450

Min. \ Sec.	0	15	30	45	Comments
1	5	5	5	5	
2	5	5	5	5	
3	10	10	10	10	
4	15	15	15	15	
5	10	10	10	10	
6	15	10	10	5	
7	10	10	10	10	
8	10	10	10	10	
9	10	10	10	5	
10	5	10	5	10	
11	10	10	10	10	
12	5	10	5	5	
13	5	5	5	10	
14	5	5	5	5	
15	5	5	5	5	
16	5	5	5	5	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print): Rob White
Observer's Signature: RdW | Date: 4 July 07
Organization: Air Hygiene
Certified By: ETA | Date: 28 Mar 07

VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One): ~~Method 9~~ 203A 203B Other: _____

Company Name: Fibrominn LLC

Facility Name: Fibrominn Biomass Power Plant

Street Address: 900 Industry Dr

City: Benson State: MN Zip: 56215

Process: Boiler Unit #: 1 Operating Mode: Full

Control Equipment: Bag House / SDA Operating Mode: Full

Describe Emissions Pont: Barely Visible

Height of Emiss. Pt. Start: 300 ft End: 300 ft

Height of Emiss. Pt. Rel. to Observer Start: 300 ft End: 300 ft

Distance to Emiss. Pt. Start: 400 ft End: 500 ft

Direction to Emiss. Pt. (Degrees) Start: 90° End: 90°

Vetical Angle to Obs. Pt. Start: 50° End: 50°

Direction to Obs. Pt. (Degrees) Start: 90° End: 90°

Distance and Direction to Observation Point from Emission Point Start: 0 0° End: 0 0°

Describe Emissions Start: Barely Visible End: Barely Visible

Emission Color Start: Grey End: Clear

Water Droplet Plume Start: — End: —

Describe Plume Background Start: Sky End: Sky

Background Color Start: Blue End: Blue

Sky Conditions Start: Clear End: Clear

Wind Speed Start: Calm End: Calm

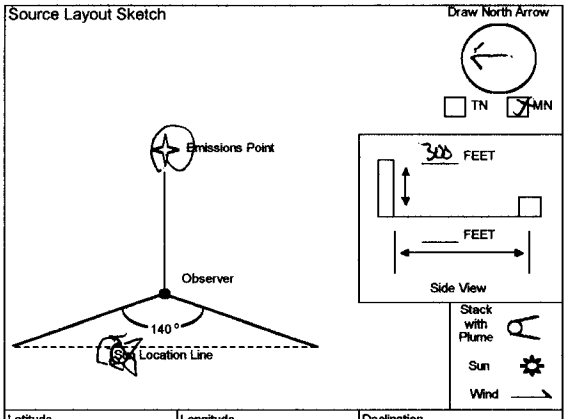
Wind Direction Start: — End: —

Ambient Temp. Start: 80° End: 70°

Wet Bulb Temp.

RH Percent

Source Layout Sketch



Latitude | Longitude | Declination

Additional Information

Form Number: B4.6 Page

Continued on Form Number

Observation Date: 4 July 07 Time Zone: Central Start Time: 1940 End Time: 2040

Min. \ Sec.	0	15	30	45	Comments
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25	5	5	5	5	
26	5	5	5	5	
27	5	5	5	5	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print): Rob White

Observer's Signature: [signature] Date: 4 July 07

Organization: Air Hygiene

Certified By: EJA Date: 10-Nov-07

Method Used (Circle One)
Method 9 | 203A | 203B | Other: _____

Company Name: Fibrominn LLC
Facility Name: Fibrominn Biomass Power Plant
Street Address: 900 Industry Dr.
City: Benson | State: MN | Zip: 56215

Process: Boiler | Unit #: 1 | Operating Mode: Full
Control Equipment: Bag House / SDA | Operating Mode: Full

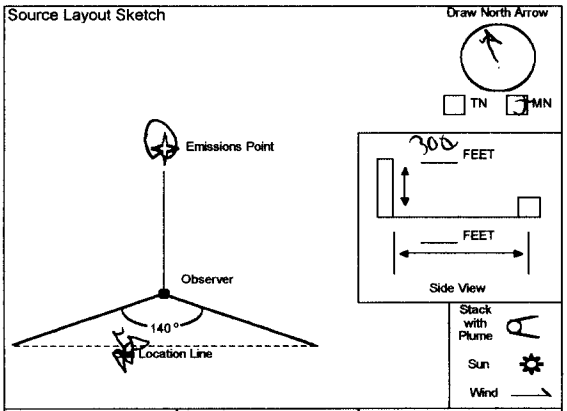
Describe Emissions Point: Light Grey very Faint
Height of Emiss. Pt. Start: 300 ft | End: 300 ft
Height of Emiss. Pt. Rel. to Observer Start: 300 ft | End: 300 ft
Distance to Emiss. Pt. Start: 900 ft | End: 900 ft
Direction to Emiss. Pt. (Degrees) Start: 30° | End: 30°

Vetical Angle to Obs. Pt. Start: 18 | End: 18
Direction to Obs. Pt. (Degrees) Start: 300 | End: 300
Distance and Direction to Observation Point from Emission Point Start: 0 0 | End: 0 0

Describe Emissions Start: Barely Visible | End: Long Visible
Emission Color Start: Grey | End: Clear
Water Droplet Plume Start: - | End: -

Describe Plume Background Start: Sky | End: Sky
Background Color Start: Blue | End: Blue
Sky Conditions Start: Part Cloudy | End: Clear
Wind Speed Start: 5-7 | End: Calm
Wind Direction Start: NW | End: =
Ambient Temp. Start: 79° | End: 79°
Wet Bulb Temp. | RH Percent

Source Layout Sketch



Latitude | Longitude | Declination

Additional Information

VISUAL EMISSIONS OBSERVATION FORM

Form Number | Page 6 of 6
Continued on Form Number

Observation Date: 4 July 07 | Time Zone: Central | Start Time: 1462 | End Time: 1552

Min. \ Sec.	0	15	30	45	Comments
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27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print): Rob White
Observer's Signature: [signature] | Date: 4 July 07
Organization: Air Hygiene
Certified By: EJA | Date: 13 Mar 07

VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name: Fibrominn, LLC

Facility Name: Fibrominn Biomass Power Plant

Street Address: 900 Industrial Dr

City: Benson State: MN Zip: 56215

Process: Boiler Unit #: 1 Operating Mode: Full

Control Equipment: Baghouse Operating Mode: Full

Describe Emissions Point: Light Grey very faint

Height of Emiss. Pt. Start: 300 ft End: 300 ft Height of Emiss. Pt. Rel. to Observer Start: 300 ft End: 300 ft

Distance to Emiss. Pt. Start: 800 ft End: 800 ft Direction to Emiss. Pt. (Degrees) Start: 300° End: 300°

Vetical Angle to Obs. Pt. Start: 18° End: Direction to Obs. Pt. (Degrees) Start: 30° End: 30°

Distance and Direction to Observation Point from Emission Point Start: 0° 0° End: 0° 0°

Describe Emissions Start: Barely visible End: None Visible

Emission Color Start: Grey End: Clear Water Droplet Plume Start: None End: None

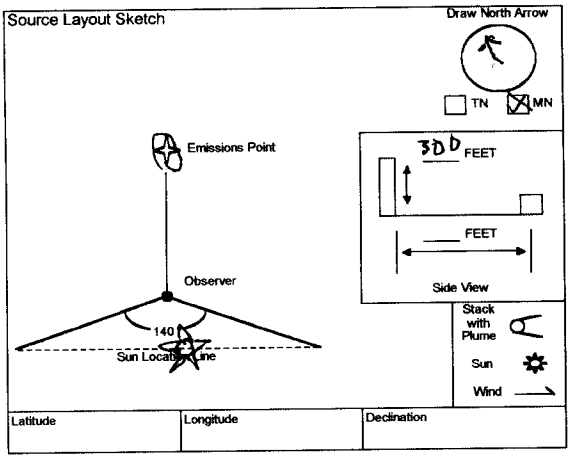
Describe Plume Background Start: Sky End: Sky

Background Color Start: Blue End: Blue Sky Conditions Start: Fully Cloudy End: Clear

Wind Speed Start: 5-7 End: Calm Wind Direction Start: NW End: —

Ambient Temp. Start: 79° End: 79° Wet Bulb Temp. RH Percent

Source Layout Sketch



Latitude | Longitude | Declination

Additional Information

Form Number | Page 5 of 6

Continued on Form Number

Observation Date: 4-July-07 Time Zone: Central Start Time: 1452 End Time: 1552

Min. \ Sec.	0	15	30	45	Comments
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26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print): Rob White

Observer's Signature: [signature] Date: 4-July-07

Organization: Air Hygiene

Certified By: ETA Date: 28-Mar-07

APPENDIX B

UNIT OPERATION PARAMETERS

Fibrominn, LLC

Air Permit # :	15100038-004
Plant Name or Location:	Fibrominn Biomass Power Plant
Date:	July 3, 2007
Project Number:	snc-07-benson.mn-comp#1
Manufacturer & Equipment:	Biomass Boiler
Unit Number:	1

		RUN					
	UNITS	**Out-1**	**Out-2**	**Out-3**	**In-1**	**In-2**	**In-3**
Start Time	hh:mm:ss	17:58:14	19:40:14	21:39:14	17:58:14	19:40:14	21:39:14
End Time	hh:mm:ss	18:57:44	20:39:44	22:38:44	18:57:44	20:39:44	22:38:44
Bar. Pressure	in. Hg	29.43	29.44	29.46	29.43	29.44	29.46
Amb. Temp.	°F	81	78	77	81	78	77
Rel. Humidity	%	71	72	71	71	72	71
Spec. Humidity	lb water / lb air	0.016438	0.014868	0.014450	0.016438	0.014868	0.014450
Unit Number		Outlet	Outlet	Outlet	Inlet	Inlet	Inlet
Stack Flow (M2)	SCFH	10,257,198	9,847,715	10,305,362	8,106,276	8,438,795	10,329,857
Stack Moisture	% Method 4	25.7	26.0	24.9	18.5	23.0	9.5
Heat Input	MMBtu/hr	784.4	774.1	777.9	784.4	774.1	777.9
Gross Power Output	gross MW	61.3	61.8	62.8	61.3	61.8	62.8
Steam Rate	lb/hr	487,155	487,320	490,767	487,155	487,320	490,767
Biomass Flow	TPH	83.9	83.3	88.5	83.9	83.3	88.5
Urea Injection	gal/hr	89.3	89.0	94.1	89.3	89.0	94.1
Feedwater Flow	lb/hr	496,079	486,901	492,715	496,079	486,901	492,715
Secondary Air Flow	lb/hr	354,766	339,054	354,522	354,766	339,054	354,522
Primary Air Flow	lb/hr	249,174	244,227	258,475	249,174	244,227	258,475
Dist. Air Flow	lb/hr	70,974	71,209	72,455	70,974	71,209	72,455
SDA Slurry Flow	GPM	27.1	22.3	30.9	27.1	22.3	30.9
SDA Quench Flow	GPM	14.4	14.5	8.6	14.4	14.5	8.6
Sootblower Flow	lb/hr	4,414	2,176	2,649	4,414	2,176	2,649
SH Steam Temp	°F	968	971	969	968	971	969
SH Steam Pres.	psi	1,500	1,504	1,499	1,500	1,504	1,499

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/3/07 17:58	61.27	488,136.59	376.44	501,145.31	83.70	0.00	272.39	542.42	968.81	1,497.90	862.92	798.83
7/3/07 17:59	61.16	488,086.69	376.25	500,904.50	84.48	0.00	272.27	542.05	969.56	1,497.29	862.24	798.57
7/3/07 18:00	60.74	484,075.91	376.09	500,663.69	83.76	0.00	272.18	541.91	967.59	1,490.67	861.05	798.34
7/3/07 18:01	60.80	485,474.81	375.93	500,422.91	85.20	0.00	272.19	541.86	968.04	1,492.36	861.16	799.15
7/3/07 18:02	60.63	485,193.50	375.89	500,453.09	87.56	0.00	272.08	542.01	968.16	1,490.60	861.32	799.55
7/3/07 18:03	60.83	486,385.41	375.88	501,128.50	90.16	0.00	272.02	542.20	965.21	1,494.05	861.06	799.79
7/3/07 18:04	61.01	489,298.00	375.90	501,803.91	89.60	0.00	271.90	542.56	964.02	1,499.60	860.86	801.23
7/3/07 18:05	60.53	484,985.59	375.96	502,479.31	92.86	0.00	271.84	542.80	963.40	1,490.59	860.68	801.23
7/3/07 18:06	60.36	483,758.00	375.99	503,154.69	89.56	0.00	271.79	542.77	963.95	1,489.91	860.56	801.77
7/3/07 18:07	60.47	484,567.81	376.01	503,830.09	90.29	0.00	271.76	542.83	965.78	1,493.58	860.80	805.17
7/3/07 18:08	60.53	484,910.41	376.01	504,505.50	88.82	0.00	271.71	543.07	967.53	1,496.25	861.33	809.32
7/3/07 18:09	60.83	485,765.09	376.04	505,180.91	84.80	0.00	271.67	543.31	968.85	1,501.01	861.65	812.58
7/3/07 18:10	61.04	487,715.59	376.08	505,856.31	85.80	0.00	271.69	543.40	970.59	1,504.36	862.19	815.70
7/3/07 18:11	61.15	487,510.31	376.11	506,531.69	86.34	0.00	271.71	543.65	973.55	1,505.10	863.42	817.88
7/3/07 18:12	61.37	488,347.31	376.10	507,207.09	88.38	0.00	271.76	543.60	973.57	1,507.88	864.33	817.36
7/3/07 18:13	62.13	493,857.91	375.99	507,882.50	91.67	0.00	271.86	543.65	974.59	1,519.40	865.30	816.98
7/3/07 18:14	62.34	496,012.69	375.95	508,557.91	90.22	0.00	271.98	543.87	974.99	1,522.49	866.52	816.42
7/3/07 18:15	61.81	492,298.59	375.90	509,233.31	91.50	0.00	272.12	543.78	972.14	1,510.94	867.30	815.49
7/3/07 18:16	61.98	493,674.09	375.69	509,908.69	90.31	0.00	272.32	543.53	969.66	1,515.19	867.25	814.02
7/3/07 18:17	62.83	503,093.41	375.55	510,584.09	89.77	0.00	272.50	543.40	969.35	1,520.27	867.34	813.04
7/3/07 18:18	62.86	504,764.69	375.31	511,259.50	90.54	0.00	272.59	543.35	969.57	1,517.38	867.59	812.19
7/3/07 18:19	63.14	506,108.09	375.13	511,934.91	87.10	0.00	272.81	543.02	968.45	1,515.36	867.34	811.34
7/3/07 18:20	63.55	508,853.19	374.99	512,943.09	84.73	0.00	273.05	542.87	969.83	1,514.36	867.68	811.56
7/3/07 18:21	63.59	509,087.91	374.94	509,906.31	88.10	0.00	273.23	542.74	969.02	1,511.55	868.17	811.32
7/3/07 18:22	63.57	507,268.50	374.99	506,869.50	86.28	0.00	273.58	543.06	969.90	1,507.37	866.85	811.08
7/3/07 18:23	62.81	500,432.31	375.07	503,832.69	82.66	0.00	273.81	543.51	968.94	1,498.19	865.40	809.62
7/3/07 18:24	63.01	502,944.09	375.15	500,795.91	80.91	0.00	274.00	543.64	967.26	1,501.56	865.27	809.38
7/3/07 18:25	62.07	495,316.50	375.14	497,759.19	79.22	0.00	273.99	543.58	965.85	1,491.81	865.62	809.28
7/3/07 18:26	61.61	489,745.19	375.10	494,722.41	79.81	0.00	274.01	543.56	964.33	1,488.29	866.01	809.06
7/3/07 18:27	61.21	486,545.09	375.03	491,685.59	78.41	0.00	273.84	543.60	962.88	1,487.62	866.47	809.16
7/3/07 18:28	61.50	489,173.19	374.92	490,544.09	80.41	0.00	273.64	543.91	962.88	1,494.39	867.17	809.40
7/3/07 18:29	61.48	487,661.81	374.75	490,979.69	83.87	0.00	273.34	544.61	965.99	1,492.10	868.38	810.33
7/3/07 18:30	61.49	487,025.69	374.50	491,415.19	85.72	0.00	273.07	544.90	967.40	1,492.60	868.69	809.93
7/3/07 18:31	61.58	486,501.50	374.10	491,850.69	85.41	0.00	272.84	544.81	969.42	1,490.95	868.44	809.11
7/3/07 18:32	61.99	487,999.31	373.53	492,286.19	84.37	0.00	272.66	544.56	971.56	1,498.85	868.06	808.91
7/3/07 18:33	61.76	485,925.31	373.04	492,721.69	85.52	0.00	272.59	544.48	973.51	1,494.36	868.19	809.34
7/3/07 18:34	62.07	488,774.69	372.56	493,157.19	79.70	0.00	272.55	544.58	973.73	1,501.14	868.59	809.48
7/3/07 18:35	61.65	484,684.41	372.09	493,592.81	78.13	0.00	272.48	544.64	972.78	1,493.76	869.28	809.61
7/3/07 18:36	61.18	481,761.59	371.52	494,028.31	75.25	0.00	272.41	544.59	970.11	1,486.49	869.47	809.39
7/3/07 18:37	61.17	481,675.81	370.89	492,172.00	74.76	0.00	272.38	544.54	966.79	1,488.88	869.02	808.68
7/3/07 18:38	61.45	486,131.09	370.27	489,898.09	75.10	0.00	272.30	544.75	964.85	1,497.29	868.87	808.57
7/3/07 18:39	60.45	478,490.31	369.73	487,624.19	76.29	0.00	272.15	544.88	963.15	1,485.02	868.61	807.78
7/3/07 18:40	60.34	475,073.31	369.22	485,350.31	77.55	0.00	272.08	544.79	962.31	1,488.63	867.95	806.91
7/3/07 18:41	59.99	473,907.41	368.84	484,864.09	77.59	0.00	271.91	544.87	963.17	1,490.88	867.75	806.84
7/3/07 18:42	60.11	476,127.91	368.47	486,195.69	76.58	0.00	271.71	545.02	964.75	1,498.61	867.74	807.09
7/3/07 18:43	60.11	468,449.41	368.24	487,527.31	78.28	0.00	271.47	545.37	967.43	1,490.04	868.03	807.32
7/3/07 18:44	60.38	479,075.69	367.97	488,858.91	80.06	0.00	271.25	545.64	968.91	1,503.60	867.94	808.12
7/3/07 18:45	60.63	477,294.81	367.80	490,190.50	79.06	0.00	271.10	546.35	971.97	1,502.87	868.52	808.73
7/3/07 18:46	61.30	483,785.19	367.67	491,522.09	78.10	0.00	270.94	546.81	972.60	1,506.12	868.85	808.94
7/3/07 18:47	61.30	483,052.19	367.50	492,853.69	78.80	0.00	270.94	547.01	972.33	1,505.09	868.98	808.84

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/3/07 18:48	61.15	482,549.81	367.35	490,359.59	82.70	0.00	271.02	546.97	970.95	1,503.22	868.76	809.24
7/3/07 18:49	60.87	483,148.41	367.26	487,784.09	81.81	0.00	271.12	547.07	970.37	1,503.27	868.76	811.32
7/3/07 18:50	60.45	476,989.91	367.19	485,208.69	83.67	0.00	271.20	547.18	970.11	1,496.00	868.96	813.34
7/3/07 18:51	60.37	478,693.81	367.06	483,281.69	84.80	0.00	271.31	546.98	967.38	1,498.56	868.19	813.93
7/3/07 18:52	60.10	478,800.81	367.03	482,217.19	84.31	0.00	271.37	546.78	964.61	1,497.97	867.42	812.78
7/3/07 18:53	60.34	478,741.31	366.89	481,152.69	86.21	0.00	271.39	546.80	963.77	1,501.49	866.86	812.32
7/3/07 18:54	60.47	482,411.09	366.82	480,088.19	85.43	0.00	271.28	546.81	963.18	1,503.12	866.63	811.79
7/3/07 18:55	60.61	481,428.00	366.77	479,023.81	83.96	0.00	271.25	546.59	962.92	1,502.56	866.09	810.90
7/3/07 18:56	60.53	483,667.91	366.69	477,959.31	82.91	0.00	271.17	546.40	963.43	1,503.39	865.74	810.17
7/3/07 18:57	59.87	476,110.91	366.59	476,894.81	82.23	0.00	271.08	546.17	964.61	1,496.28	865.40	809.69
7/3/07 18:58	59.52	473,685.81	366.47	475,853.81	82.81	0.00	271.08	545.73	963.01	1,495.54	864.31	808.02
7/3/07 18:59	58.99	469,806.19	366.33	474,851.09	84.45	0.00	270.99	545.62	962.62	1,493.11	863.34	807.02
7/3/07 19:00	58.67	467,136.41	366.18	473,848.50	84.49	0.00	270.81	545.79	963.81	1,492.03	862.71	806.90
7/3/07 19:01	59.09	469,554.00	366.12	472,845.91	86.51	0.00	270.61	545.67	964.15	1,498.10	862.33	806.80
7/3/07 19:02	59.06	469,645.50	366.04	471,843.31	88.55	0.00	270.38	545.69	964.81	1,499.30	861.97	806.80
7/3/07 19:03	58.45	464,292.59	365.98	470,840.69	88.69	0.00	270.17	545.61	965.93	1,493.95	861.78	806.27
7/3/07 19:04	58.69	464,512.19	365.83	469,838.00	88.24	0.00	270.04	545.47	966.83	1,496.79	861.36	805.77
7/3/07 19:05	58.93	466,653.59	365.76	468,835.41	88.82	0.00	269.87	545.44	967.00	1,500.62	860.86	805.14
7/3/07 19:06	58.56	463,886.81	365.65	467,832.81	88.96	0.00	269.72	545.36	966.91	1,496.09	860.49	805.03
7/3/07 19:07	58.78	464,516.09	365.52	466,830.19	85.22	0.00	269.64	545.22	966.29	1,498.58	860.15	804.36
7/3/07 19:08	58.66	464,878.91	365.47	465,827.50	87.59	0.00	269.54	545.04	966.59	1,497.22	859.74	804.13
7/3/07 19:09	58.45	462,512.81	365.30	464,824.91	81.83	0.00	269.52	544.64	964.95	1,495.80	859.05	804.63
7/3/07 19:10	58.27	462,132.91	365.22	463,822.31	81.41	0.00	269.48	544.51	965.18	1,496.48	858.55	804.84
7/3/07 19:11	57.85	460,401.31	365.08	462,819.69	79.56	0.00	269.38	544.31	964.17	1,497.96	858.00	804.70
7/3/07 19:12	57.94	459,471.59	364.93	461,817.09	81.25	0.00	269.27	544.24	964.85	1,495.29	857.59	803.84
7/3/07 19:13	57.64	457,519.41	364.82	460,814.41	83.05	0.00	269.17	544.12	964.38	1,495.24	857.15	803.07
7/3/07 19:14	58.11	460,076.91	364.69	459,811.81	83.90	0.00	269.02	544.25	967.04	1,501.66	857.31	802.86
7/3/07 19:15	57.83	457,365.09	364.57	458,809.19	84.16	0.00	268.84	544.37	969.81	1,495.30	857.58	804.22
7/3/07 19:16	57.78	456,720.00	364.47	457,806.59	87.39	0.00	268.74	544.20	969.97	1,496.74	857.31	804.14
7/3/07 19:17	57.51	454,307.69	364.35	456,804.00	85.84	0.00	268.60	544.15	970.46	1,495.50	856.83	804.53
7/3/07 19:18	57.83	456,986.19	364.23	455,801.31	83.25	0.00	268.51	544.29	971.33	1,499.57	856.83	805.71
7/3/07 19:19	57.30	452,093.69	364.09	455,008.09	82.91	0.00	268.38	544.07	968.61	1,494.35	856.22	804.93
7/3/07 19:20	57.47	453,722.69	363.92	456,649.81	82.99	0.00	268.27	544.05	967.65	1,498.17	855.58	804.07
7/3/07 19:21	57.47	454,911.91	363.81	458,291.59	82.99	0.00	268.16	544.08	967.34	1,498.15	855.48	803.97
7/3/07 19:22	57.30	452,150.31	363.70	459,933.41	80.18	0.00	268.04	543.91	966.43	1,496.81	855.20	802.86
7/3/07 19:23	57.23	450,182.19	363.56	461,575.09	78.22	0.00	267.91	543.81	966.20	1,495.12	854.75	802.11
7/3/07 19:24	57.99	455,740.59	363.44	463,216.91	81.71	0.00	267.82	543.94	969.08	1,505.54	854.69	803.08
7/3/07 19:25	57.82	454,537.91	363.40	463,740.59	80.80	0.00	267.71	544.07	971.06	1,499.14	855.07	802.89
7/3/07 19:26	58.02	457,966.41	363.28	464,060.41	80.88	0.00	267.72	543.75	971.34	1,503.25	854.87	802.84
7/3/07 19:27	57.87	455,126.59	363.17	464,380.31	81.24	0.00	267.80	543.53	971.64	1,498.40	855.01	802.74
7/3/07 19:28	57.87	455,172.91	363.07	464,700.19	78.43	0.00	267.84	543.34	971.14	1,499.44	854.90	802.73
7/3/07 19:29	57.74	454,765.31	362.96	465,020.09	77.04	0.00	267.89	543.21	969.74	1,497.22	854.87	802.33
7/3/07 19:30	57.66	453,256.81	362.85	465,339.91	77.18	0.00	267.87	543.04	969.21	1,498.11	854.83	802.24
7/3/07 19:31	57.74	456,191.81	362.72	465,659.81	75.43	0.00	267.86	542.85	968.41	1,498.55	854.70	801.89
7/3/07 19:32	58.91	464,232.91	362.60	466,068.19	76.25	0.00	267.82	542.87	970.67	1,510.79	855.28	802.59
7/3/07 19:33	59.30	466,487.81	362.60	467,803.69	78.31	0.00	267.77	542.98	972.22	1,509.93	856.23	803.70
7/3/07 19:34	59.68	472,593.81	362.60	469,539.19	80.77	0.00	267.87	542.64	972.85	1,510.21	856.77	804.38
7/3/07 19:35	60.14	474,043.91	362.48	471,274.69	79.28	0.00	268.08	542.27	972.40	1,506.33	856.83	804.31
7/3/07 19:36	60.49	477,190.00	362.36	473,010.19	78.99	0.00	268.35	541.70	971.31	1,509.36	856.43	803.29
7/3/07 19:37	60.34	475,219.41	362.19	474,745.69	83.20	0.00	268.63	541.13	970.38	1,502.06	855.82	802.65

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/3/07 19:38	60.55	478,515.00	362.02	476,481.09	80.67	0.00	268.91	540.55	969.40	1,504.26	855.39	801.98
7/3/07 19:39	60.41	480,184.50	361.91	478,216.59	76.30	0.00	269.20	540.16	970.21	1,504.34	855.44	802.26
7/3/07 19:40	60.26	479,779.31	361.88	479,952.09	77.28	0.00	269.43	539.72	970.32	1,503.12	855.76	802.35
7/3/07 19:41	60.06	474,495.41	361.87	481,002.41	75.60	0.00	269.70	539.24	970.37	1,497.03	856.18	803.38
7/3/07 19:42	59.88	472,782.81	361.96	481,141.31	74.92	0.00	269.84	539.17	972.06	1,495.10	857.28	805.74
7/3/07 19:43	60.22	472,864.41	361.98	481,280.19	77.83	0.00	269.90	538.91	971.02	1,498.72	857.97	806.37
7/3/07 19:44	60.88	478,851.31	362.15	481,419.00	75.75	0.00	269.84	538.98	971.46	1,505.45	858.68	806.86
7/3/07 19:45	60.92	480,140.69	362.20	481,557.91	79.68	0.00	269.79	539.01	971.82	1,505.37	859.70	807.03
7/3/07 19:46	61.02	478,677.81	362.37	481,696.81	77.32	0.00	269.86	538.78	970.76	1,499.99	860.09	807.00
7/3/07 19:47	61.12	480,225.31	362.46	481,835.59	80.86	0.00	269.90	538.56	970.26	1,503.38	860.42	806.56
7/3/07 19:48	61.85	487,273.09	362.54	481,974.50	82.68	0.00	270.05	538.58	970.84	1,509.43	860.99	806.72
7/3/07 19:49	61.26	481,255.41	362.68	482,113.41	80.71	0.00	270.17	538.59	971.99	1,498.23	861.95	806.79
7/3/07 19:50	61.21	480,957.69	362.73	482,564.69	81.75	0.00	270.30	538.24	971.22	1,498.91	862.27	807.10
7/3/07 19:51	61.81	485,965.69	362.80	483,565.59	80.45	0.00	270.48	538.26	972.30	1,506.92	862.95	807.23
7/3/07 19:52	62.05	487,939.41	362.91	484,566.50	77.16	0.00	270.64	538.35	973.76	1,508.64	863.85	808.05
7/3/07 19:53	62.12	487,954.59	363.09	485,567.41	78.69	0.00	270.76	538.52	975.56	1,507.63	865.10	809.44
7/3/07 19:54	62.28	488,223.19	363.20	486,568.31	82.37	0.00	270.91	538.39	974.74	1,508.93	865.80	810.19
7/3/07 19:55	62.32	489,797.81	363.32	487,569.19	73.45	0.00	271.06	538.34	974.17	1,509.41	866.16	809.88
7/3/07 19:56	62.13	488,220.91	363.47	487,691.31	81.62	0.00	271.22	538.42	973.43	1,505.84	866.70	809.83
7/3/07 19:57	62.11	488,718.91	363.59	487,429.19	81.46	0.00	271.31	538.45	972.29	1,505.18	867.15	810.42
7/3/07 19:58	62.40	491,866.00	363.75	487,167.19	82.43	0.00	271.46	538.52	971.59	1,511.27	867.67	810.71
7/3/07 19:59	62.48	493,146.50	363.93	486,905.19	83.97	0.00	271.51	538.86	972.30	1,513.62	868.30	811.57
7/3/07 20:00	62.56	493,140.81	364.10	486,643.09	84.11	0.00	271.59	538.95	970.69	1,514.66	868.55	811.01
7/3/07 20:01	62.61	493,856.31	364.24	486,381.09	89.35	0.00	271.70	539.06	971.10	1,515.27	868.53	811.48
7/3/07 20:02	62.53	493,944.31	364.39	486,119.09	96.85	0.00	271.82	539.29	968.94	1,512.61	868.33	811.28
7/3/07 20:03	62.08	491,656.31	364.51	485,857.00	98.43	0.00	271.93	539.39	967.08	1,504.57	867.91	811.13
7/3/07 20:04	62.07	491,717.41	364.65	485,595.00	95.16	0.00	271.97	539.58	965.07	1,504.73	867.57	811.23
7/3/07 20:05	61.60	487,721.31	364.72	485,333.00	88.40	0.00	271.94	539.81	964.53	1,495.41	867.59	811.01
7/3/07 20:06	61.44	488,635.31	364.82	485,070.91	82.65	0.00	271.96	539.92	964.27	1,497.55	867.67	811.18
7/3/07 20:07	61.05	483,812.41	364.89	484,808.91	80.65	0.00	271.88	539.99	964.61	1,485.51	867.48	810.47
7/3/07 20:08	60.99	483,983.50	364.95	484,546.91	79.95	0.00	271.83	539.91	965.00	1,486.76	867.01	810.56
7/3/07 20:09	61.04	483,611.91	365.06	484,284.81	82.27	0.00	271.72	539.97	967.05	1,488.19	867.34	810.83
7/3/07 20:10	60.69	480,262.59	365.12	484,022.81	83.65	0.00	271.60	540.09	968.07	1,483.77	867.30	811.17
7/3/07 20:11	60.65	479,971.19	365.20	481,614.31	84.20	0.00	271.53	540.09	968.22	1,487.30	866.93	810.41
7/3/07 20:12	60.72	480,453.31	365.28	478,851.59	81.23	0.00	271.38	540.29	968.98	1,490.98	866.73	810.20
7/3/07 20:13	60.06	469,300.69	365.37	476,088.81	80.94	0.00	271.23	540.55	969.98	1,486.34	867.03	810.31
7/3/07 20:14	59.84	470,209.59	365.42	475,805.31	82.70	0.00	271.12	540.57	969.02	1,491.31	866.53	809.95
7/3/07 20:15	61.23	481,574.19	365.43	477,584.69	86.82	0.00	270.90	540.97	971.45	1,505.89	866.27	809.34
7/3/07 20:16	61.32	479,078.50	365.49	479,364.00	87.39	0.00	270.65	541.39	974.92	1,500.03	866.73	809.08
7/3/07 20:17	61.55	479,602.31	365.49	481,143.41	89.90	0.00	270.64	541.17	975.07	1,501.08	866.22	808.29
7/3/07 20:18	61.69	483,240.31	365.44	482,922.69	91.72	0.00	270.76	541.06	975.68	1,505.79	866.03	808.16
7/3/07 20:19	61.62	482,814.81	365.43	484,702.09	89.09	0.00	270.83	540.98	974.93	1,503.46	866.05	808.76
7/3/07 20:20	61.89	484,704.81	365.45	486,481.41	90.28	0.00	270.91	541.06	974.73	1,507.04	866.36	809.21
7/3/07 20:21	62.15	488,478.09	365.52	488,260.81	87.80	0.00	271.01	541.08	972.89	1,508.96	866.45	809.80
7/3/07 20:22	62.41	490,825.69	365.57	490,040.09	85.43	0.00	271.13	541.09	972.06	1,512.23	866.64	809.94
7/3/07 20:23	62.96	494,296.69	365.65	491,819.50	81.18	0.00	271.20	541.06	971.67	1,519.92	866.95	810.33
7/3/07 20:24	62.86	494,242.50	365.77	493,598.81	82.41	0.00	271.34	541.10	971.32	1,517.25	867.51	810.71
7/3/07 20:25	62.52	491,152.41	365.79	495,378.19	86.44	0.00	271.51	540.90	968.90	1,510.77	867.47	810.36
7/3/07 20:26	62.77	495,860.59	365.87	495,562.00	87.07	0.00	271.65	540.60	967.13	1,517.59	867.02	810.38
7/3/07 20:27	62.61	494,759.50	365.93	495,560.31	86.33	0.00	271.80	540.77	968.51	1,513.42	867.60	810.71

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/3/07 20:28	62.39	494,307.69	366.01	495,558.59	88.92	0.00	271.89	540.56	966.90	1,509.19	867.40	810.71
7/3/07 20:29	62.89	497,937.59	366.05	495,556.91	86.47	0.00	271.94	540.40	967.27	1,512.48	867.46	810.46
7/3/07 20:30	63.01	498,710.31	366.19	495,555.19	82.29	0.00	271.93	540.26	968.48	1,511.21	867.89	810.00
7/3/07 20:31	62.81	495,165.41	366.33	495,553.50	79.81	0.00	272.05	540.06	968.80	1,506.25	868.21	809.72
7/3/07 20:32	63.15	499,352.31	366.49	495,551.81	81.75	0.00	272.11	540.18	970.51	1,509.26	869.40	810.52
7/3/07 20:33	62.57	495,297.50	366.73	495,550.19	81.21	0.00	272.17	540.16	970.33	1,501.83	870.70	811.18
7/3/07 20:34	62.62	495,212.81	366.98	495,548.41	82.73	0.00	272.30	540.23	970.78	1,501.49	871.76	811.65
7/3/07 20:35	62.59	494,314.69	367.18	495,546.81	80.71	0.00	272.31	540.35	971.40	1,500.61	872.87	812.02
7/3/07 20:36	62.89	495,358.81	367.39	495,545.09	78.33	0.00	272.32	540.36	971.46	1,503.19	873.73	812.59
7/3/07 20:37	63.05	496,946.09	367.53	495,543.41	82.09	0.00	272.33	540.51	972.06	1,506.29	874.76	813.87
7/3/07 20:38	62.95	495,935.31	367.78	495,541.69	83.71	0.00	272.39	540.72	972.85	1,502.22	875.87	814.72
7/3/07 20:39	63.14	498,615.50	367.97	495,975.50	84.53	0.00	272.45	540.65	972.05	1,505.61	876.65	815.21
7/3/07 20:40	63.79	503,774.91	368.15	497,745.59	82.86	0.00	272.53	540.88	973.34	1,512.34	877.71	816.06
7/3/07 20:41	64.32	503,254.69	368.35	499,515.59	77.41	0.00	272.60	541.18	974.85	1,510.51	878.90	816.72
7/3/07 20:42	65.07	512,236.81	368.58	501,285.69	80.49	0.00	272.78	541.39	976.32	1,519.47	879.90	817.87
7/3/07 20:43	64.97	511,547.00	368.80	503,055.69	83.69	0.00	272.97	541.66	976.62	1,514.59	880.88	818.88
7/3/07 20:44	64.86	512,033.31	369.02	504,825.81	85.54	0.00	273.27	541.69	975.01	1,510.52	881.33	818.97
7/3/07 20:45	64.63	509,372.91	369.12	505,744.69	85.43	0.00	273.55	541.61	971.41	1,506.28	881.08	818.70
7/3/07 20:46	64.78	512,086.00	369.26	504,466.09	85.97	0.00	273.76	541.77	969.85	1,507.55	880.97	818.57
7/3/07 20:47	64.36	508,100.91	369.40	503,187.41	85.50	0.00	273.96	541.74	966.28	1,503.14	880.60	817.67
7/3/07 20:48	64.14	507,821.59	369.53	501,908.81	88.13	0.00	274.10	541.99	965.12	1,499.84	880.54	817.92
7/3/07 20:49	63.60	503,926.41	369.63	500,630.09	87.24	0.00	274.16	542.06	963.64	1,494.98	880.37	817.80
7/3/07 20:50	63.21	501,053.69	369.70	499,351.50	87.99	0.00	274.13	542.10	962.97	1,492.86	879.86	816.79
7/3/07 20:51	63.04	498,655.50	369.80	498,072.81	88.06	0.00	274.01	542.22	962.53	1,495.76	879.18	816.26
7/3/07 20:52	62.52	493,801.09	369.91	496,794.19	87.54	0.00	273.82	542.60	964.92	1,490.21	879.14	815.95
7/3/07 20:53	62.29	490,230.91	370.01	495,515.50	87.17	0.00	273.53	542.69	964.98	1,490.65	878.61	815.19
7/3/07 20:54	62.81	493,512.50	370.10	494,236.91	88.39	0.00	273.35	542.84	967.59	1,500.89	878.45	815.10
7/3/07 20:55	62.56	487,478.50	370.21	493,287.00	89.74	0.00	273.11	543.37	971.30	1,490.72	879.00	816.17
7/3/07 20:56	62.22	487,830.69	370.36	492,745.81	88.10	0.00	272.90	543.42	970.74	1,493.48	876.97	815.50
7/3/07 20:57	62.19	486,538.41	370.40	492,204.50	89.85	0.00	272.79	544.08	970.87	1,493.71	873.85	814.21
7/3/07 20:58	61.68	481,095.50	370.51	491,663.31	87.51	0.00	272.57	544.72	970.35	1,482.92	873.17	814.19
7/3/07 20:59	61.65	483,349.50	370.59	491,122.00	83.40	0.00	272.37	544.75	968.30	1,483.37	872.27	813.37
7/3/07 21:00	62.12	485,361.31	370.63	490,580.81	81.60	0.00	272.19	544.97	969.55	1,491.55	872.51	813.54
7/3/07 21:01	61.55	480,897.19	370.71	490,923.31	85.56	0.00	272.00	545.31	971.20	1,485.16	873.53	814.19
7/3/07 21:02	61.71	480,372.31	370.69	492,052.31	89.35	0.00	271.87	545.36	971.21	1,487.56	874.03	813.91
7/3/07 21:03	61.81	484,205.31	370.64	493,181.31	89.00	0.00	271.77	545.79	972.44	1,495.67	874.83	814.25
7/3/07 21:04	61.83	483,001.41	370.56	494,310.19	88.81	0.00	271.65	546.38	973.07	1,495.90	875.67	814.67
7/3/07 21:05	61.94	483,763.19	370.36	495,439.19	90.01	0.00	271.53	546.71	973.04	1,498.73	876.25	814.68
7/3/07 21:06	61.82	482,706.41	370.08	496,568.09	89.93	0.00	271.43	546.83	971.99	1,496.94	876.72	814.78
7/3/07 21:07	61.58	481,883.50	369.74	497,697.09	89.17	0.00	271.36	546.79	970.33	1,496.30	876.81	814.70
7/3/07 21:08	61.83	483,975.31	369.35	498,826.09	87.56	0.00	271.24	546.95	969.72	1,500.84	876.77	814.52
7/3/07 21:09	62.23	485,997.81	368.98	499,955.00	87.45	0.00	271.12	547.48	971.84	1,505.49	877.44	815.36
7/3/07 21:10	62.00	485,061.41	368.61	501,084.00	88.11	0.00	271.04	547.74	971.32	1,501.54	877.72	815.31
7/3/07 21:11	62.12	485,619.41	368.08	502,212.91	85.25	0.00	270.97	548.05	971.48	1,503.61	877.93	815.31
7/3/07 21:12	62.69	490,251.41	367.60	503,341.91	81.93	0.00	270.93	548.21	971.52	1,512.04	878.28	815.72
7/3/07 21:13	62.64	489,802.69	367.21	504,470.91	82.28	0.00	270.88	548.31	971.60	1,509.37	878.70	816.21
7/3/07 21:14	62.91	493,445.00	366.88	505,599.81	81.66	0.00	270.90	548.01	969.49	1,513.97	878.55	816.43
7/3/07 21:15	63.14	491,543.31	366.61	506,728.81	81.97	0.00	270.92	548.05	971.41	1,513.58	879.17	817.36
7/3/07 21:16	63.22	494,718.50	366.41	507,857.81	81.12	0.00	271.02	547.75	970.09	1,518.72	879.40	817.65
7/3/07 21:17	63.26	492,418.69	366.29	508,986.69	83.89	0.00	271.13	547.66	971.59	1,515.30	880.06	818.54

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/3/07 21:18	63.47	497,525.91	366.16	510,115.69	83.41	0.00	271.23	547.40	970.73	1,518.23	880.09	818.54
7/3/07 21:19	64.44	505,401.31	366.04	511,244.69	88.28	0.00	271.35	547.24	972.29	1,524.61	880.09	818.68
7/3/07 21:20	65.52	514,772.69	365.93	511,570.31	93.36	0.00	271.54	546.97	974.13	1,530.04	880.38	819.51
7/3/07 21:21	65.16	513,430.69	365.90	511,622.19	94.03	0.00	271.87	546.57	975.15	1,520.73	880.97	820.54
7/3/07 21:22	65.12	512,710.50	365.87	511,674.00	92.93	0.00	272.28	545.71	971.71	1,514.93	880.75	820.21
7/3/07 21:23	64.95	511,112.00	365.91	511,725.91	91.91	0.00	272.73	545.29	970.54	1,509.07	881.02	820.89
7/3/07 21:24	64.34	507,814.81	365.96	511,777.81	87.80	0.00	273.02	544.96	967.97	1,500.72	881.41	821.21
7/3/07 21:25	63.76	502,525.31	366.01	510,219.50	85.50	0.00	273.25	544.47	963.98	1,493.72	881.02	820.13
7/3/07 21:26	63.68	503,243.19	365.98	508,289.59	84.41	0.00	273.38	544.19	962.61	1,498.69	880.75	819.64
7/3/07 21:27	63.85	503,660.41	366.06	506,359.81	82.66	0.00	273.29	544.38	964.23	1,500.41	881.07	820.02
7/3/07 21:28	63.84	503,203.19	366.15	504,429.91	86.10	0.00	273.20	544.47	965.54	1,501.98	881.44	820.52
7/3/07 21:29	63.82	501,847.81	366.29	503,383.31	86.26	0.00	273.10	544.57	968.70	1,500.73	882.21	820.96
7/3/07 21:30	63.49	496,314.31	366.40	503,594.69	86.47	0.00	272.99	544.64	971.14	1,496.27	882.92	821.31
7/3/07 21:31	64.01	501,363.81	366.51	503,806.09	86.44	0.00	272.97	544.55	972.43	1,504.94	883.21	821.28
7/3/07 21:32	64.47	504,732.41	366.63	504,017.50	85.55	0.00	272.88	544.90	974.57	1,508.01	884.17	821.83
7/3/07 21:33	64.27	502,249.09	366.79	504,228.91	84.50	0.00	272.84	545.18	975.38	1,503.42	885.10	822.61
7/3/07 21:34	64.26	503,025.69	366.92	504,440.41	87.28	0.00	272.98	545.09	973.35	1,503.04	885.40	822.85
7/3/07 21:35	64.30	504,735.50	367.04	504,651.81	92.91	0.00	273.05	545.23	972.58	1,505.88	885.85	823.17
7/3/07 21:36	64.35	504,455.69	367.17	504,863.19	94.96	0.00	273.14	545.53	972.64	1,504.20	886.62	824.18
7/3/07 21:37	64.32	504,800.19	367.29	505,074.59	92.64	0.00	273.23	545.67	971.74	1,503.36	887.09	825.11
7/3/07 21:38	64.34	503,691.59	367.48	505,286.00	92.78	0.00	273.33	545.97	971.08	1,503.59	886.32	825.76
7/3/07 21:39	63.91	500,186.19	367.66	505,497.41	90.81	0.00	273.45	546.64	971.15	1,497.87	883.56	823.69
7/3/07 21:40	64.01	501,661.41	367.83	505,708.81	89.52	0.00	273.49	546.84	969.35	1,500.56	882.54	822.94
7/3/07 21:41	64.54	505,054.81	368.06	505,920.31	85.82	0.00	273.49	547.35	971.82	1,506.54	883.04	823.66
7/3/07 21:42	64.77	505,990.19	368.37	507,410.69	85.94	0.00	273.45	548.03	975.04	1,506.50	884.89	825.21
7/3/07 21:43	65.00	508,343.69	368.64	510,995.50	89.25	0.00	273.43	548.26	975.70	1,508.02	886.28	826.01
7/3/07 21:44	65.75	515,423.59	368.92	514,580.31	90.38	0.00	273.53	548.70	976.93	1,515.40	887.88	826.63
7/3/07 21:45	65.98	516,649.59	369.16	518,165.09	93.26	0.00	273.62	549.51	978.69	1,513.60	890.14	828.44
7/3/07 21:46	66.07	518,619.91	369.40	519,788.41	95.61	0.00	273.79	550.18	977.12	1,515.45	891.48	828.93
7/3/07 21:47	65.82	516,217.81	369.55	519,703.09	94.33	0.00	273.95	550.67	975.52	1,510.11	892.46	829.13
7/3/07 21:48	65.78	517,274.50	369.61	519,617.81	90.94	0.00	274.14	550.85	974.00	1,508.25	893.14	829.53
7/3/07 21:49	65.20	513,619.41	369.62	519,532.41	93.59	0.00	274.22	550.85	970.54	1,500.81	893.25	829.41
7/3/07 21:50	65.34	515,442.31	369.58	519,447.09	94.68	0.00	274.27	550.81	967.30	1,503.98	893.07	829.09
7/3/07 21:51	65.14	514,637.69	369.53	519,361.81	95.12	0.00	274.24	551.14	966.89	1,502.17	893.54	829.77
7/3/07 21:52	65.07	514,729.41	369.42	519,276.41	96.51	0.00	274.23	551.16	965.64	1,501.96	893.37	829.15
7/3/07 21:53	65.37	516,402.00	369.25	519,191.09	95.30	0.00	274.10	551.13	968.12	1,506.31	893.15	828.59
7/3/07 21:54	65.49	517,110.50	368.99	519,105.69	94.87	0.00	274.08	550.93	969.83	1,506.92	893.06	828.40
7/3/07 21:55	65.48	515,889.09	368.83	519,020.41	92.05	0.00	274.03	550.52	970.43	1,505.50	892.55	828.06
7/3/07 21:56	65.75	517,888.81	368.66	518,935.09	89.50	0.00	274.06	550.07	970.09	1,507.91	891.88	827.44
7/3/07 21:57	66.00	519,634.31	368.63	518,849.69	89.31	0.00	274.10	550.05	971.83	1,511.22	892.30	827.95
7/3/07 21:58	65.15	512,524.81	368.71	518,764.41	89.51	0.00	274.16	549.91	969.62	1,497.64	892.49	828.02
7/3/07 21:59	64.68	509,771.31	368.77	517,017.09	86.77	0.00	274.28	549.70	966.15	1,493.82	892.16	827.67
7/3/07 22:00	63.74	502,390.81	368.89	513,338.41	86.95	0.00	274.30	549.70	962.77	1,487.03	891.72	827.25
7/3/07 22:01	63.28	498,881.69	368.90	509,659.81	91.37	0.00	274.15	549.88	960.16	1,487.57	891.22	826.89
7/3/07 22:02	63.47	500,456.41	369.04	505,981.09	91.41	0.00	273.86	550.47	961.39	1,492.32	891.38	827.08
7/3/07 22:03	63.34	498,284.31	369.20	502,302.41	92.14	0.00	273.52	550.80	962.20	1,493.30	891.53	826.81
7/3/07 22:04	62.36	488,892.31	369.32	498,623.81	89.15	0.00	273.33	550.83	963.36	1,483.73	891.43	826.68
7/3/07 22:05	62.07	485,186.09	369.40	494,945.09	88.90	0.00	273.11	550.72	963.12	1,485.70	890.41	825.72
7/3/07 22:06	62.38	486,757.50	369.44	491,266.41	89.34	0.00	272.94	551.11	965.51	1,490.35	890.17	825.65
7/3/07 22:07	62.46	487,133.59	369.48	488,886.50	90.34	0.00	272.61	551.74	967.75	1,493.35	890.47	826.29

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/3/07 22:08	62.46	485,939.69	369.60	486,713.50	88.60	0.00	272.26	552.31	969.53	1,493.44	890.42	826.45
7/3/07 22:09	62.71	488,113.09	369.67	484,540.59	86.60	0.00	272.07	552.58	969.16	1,497.30	889.85	825.50
7/3/07 22:10	62.46	484,054.59	369.76	482,367.69	73.22	0.00	271.94	553.06	970.64	1,489.60	889.83	825.08
7/3/07 22:11	62.12	483,613.59	369.76	480,194.81	80.45	0.00	271.92	553.10	967.15	1,486.52	888.58	823.80
7/3/07 22:12	62.08	483,707.59	369.79	478,021.91	82.35	0.00	271.86	553.44	966.49	1,488.85	887.72	822.93
7/3/07 22:13	61.70	481,251.81	369.81	475,849.00	82.89	0.00	271.75	553.96	966.08	1,485.59	887.35	822.65
7/3/07 22:14	61.42	477,521.00	369.80	473,676.09	80.64	0.00	271.64	554.32	966.31	1,485.72	887.27	822.56
7/3/07 22:15	60.67	467,609.09	369.80	472,268.09	79.34	0.00	271.55	554.45	965.09	1,483.34	886.60	821.61
7/3/07 22:16	60.63	472,614.59	369.78	472,419.09	81.56	0.00	271.34	554.82	966.65	1,494.87	886.18	821.50
7/3/07 22:17	60.49	472,508.19	369.76	472,570.00	84.26	0.00	270.94	555.38	968.12	1,495.79	886.30	821.63
7/3/07 22:18	60.27	468,905.50	369.79	472,721.00	84.50	0.00	270.67	555.68	968.71	1,493.45	886.20	822.13
7/3/07 22:19	59.93	466,795.19	369.77	472,871.91	86.13	0.00	270.48	555.93	968.91	1,493.71	885.96	822.30
7/3/07 22:20	60.15	467,052.31	369.72	473,022.91	85.66	0.00	270.24	556.31	968.56	1,497.83	885.62	822.24
7/3/07 22:21	60.77	472,022.19	369.71	473,173.91	87.37	0.00	270.04	556.87	969.72	1,504.38	885.84	822.64
7/3/07 22:22	60.99	478,777.69	369.75	473,860.41	87.18	0.00	269.86	557.37	970.78	1,508.18	886.12	823.04
7/3/07 22:23	61.17	476,144.81	369.77	475,129.19	85.97	0.00	269.76	557.54	970.18	1,502.84	885.95	822.69
7/3/07 22:24	61.48	476,264.59	369.76	476,397.91	86.78	0.00	269.83	557.64	969.68	1,504.72	885.61	822.31
7/3/07 22:25	61.63	481,645.09	369.76	477,666.59	86.10	0.00	269.91	557.93	970.81	1,507.88	885.86	822.59
7/3/07 22:26	61.89	478,360.50	369.77	478,935.31	86.90	0.00	270.04	558.01	970.53	1,501.62	886.16	822.60
7/3/07 22:27	61.96	478,498.50	369.79	477,880.81	88.52	0.00	270.18	557.78	970.37	1,498.05	885.90	822.42
7/3/07 22:28	61.46	476,247.50	369.77	476,290.09	88.98	0.00	270.31	557.40	968.30	1,498.65	885.36	821.95
7/3/07 22:29	61.10	476,884.81	369.73	474,699.41	89.18	0.00	270.44	557.26	967.40	1,499.05	884.95	821.42
7/3/07 22:30	60.70	472,329.19	369.69	473,108.81	88.65	0.00	270.38	557.18	966.93	1,495.36	884.68	821.07
7/3/07 22:31	60.68	472,146.31	369.71	471,518.09	89.51	0.00	270.35	556.95	965.94	1,497.31	884.04	820.10
7/3/07 22:32	60.27	469,083.19	369.63	469,927.41	88.43	0.00	270.21	556.77	966.22	1,492.84	883.63	819.72
7/3/07 22:33	60.20	473,560.19	369.62	468,336.69	89.55	0.00	270.08	556.49	966.18	1,499.88	883.22	819.72
7/3/07 22:34	60.36	473,857.41	369.62	466,746.00	89.07	0.00	269.93	556.40	967.49	1,499.27	883.13	819.80
7/3/07 22:35	59.68	461,196.50	369.56	465,879.91	87.72	0.00	269.73	556.31	967.79	1,490.96	882.64	818.59
7/3/07 22:36	59.79	464,970.09	369.59	470,729.81	88.87	0.00	269.59	556.11	967.87	1,498.77	881.52	817.13
7/3/07 22:37	60.44	472,979.19	369.73	475,579.69	89.56	0.00	269.35	556.52	973.61	1,507.46	879.51	819.37
7/3/07 22:38	60.79	470,301.31	369.84	478,929.81	90.87	0.00	269.16	556.44	975.95	1,503.21	876.49	819.38
7/3/07 22:39	61.34	478,208.09	369.83	481,854.81	91.91	0.00	269.10	555.88	974.81	1,508.60	874.61	817.23
7/3/07 22:40	62.45	482,713.50	369.81	484,779.91	93.43	0.00	269.11	555.41	975.31	1,511.96	874.57	818.56
7/3/07 22:41	62.57	482,922.69	369.85	487,705.00	95.15	0.00	269.26	555.16	976.88	1,507.58	876.26	820.83
7/3/07 22:42	62.03	480,414.59	369.89	490,630.00	93.92	0.00	269.46	554.34	975.76	1,501.64	875.40	821.90
7/3/07 22:43	61.52	477,509.19	369.89	491,533.69	86.70	0.00	269.82	553.38	972.87	1,499.18	873.99	822.92
7/3/07 22:44	60.77	473,108.41	369.87	490,755.31	83.32	0.00	270.03	552.65	969.10	1,495.11	873.99	823.64
7/3/07 22:45	60.64	471,426.91	369.81	489,976.91	89.57	0.00	270.09	552.10	966.09	1,495.67	873.81	822.21
7/3/07 22:46	60.68	473,563.31	369.80	489,198.59	91.49	0.00	269.97	551.71	966.69	1,498.64	873.20	821.17
7/3/07 22:47	60.57	472,959.81	369.86	488,419.59	91.52	0.00	269.77	551.66	972.23	1,498.37	871.90	822.18
7/3/07 22:48	59.68	464,490.91	369.90	487,638.91	95.01	0.00	269.57	550.88	971.11	1,493.03	869.37	819.58
7/3/07 22:49	60.19	468,531.31	369.91	486,858.19	94.64	0.00	269.41	550.42	971.81	1,499.90	868.54	818.32
7/3/07 22:50	60.39	470,718.31	369.90	487,516.81	93.96	0.00	269.09	550.35	972.47	1,500.74	869.93	819.71
7/3/07 22:51	60.47	471,077.00	370.02	488,507.69	89.11	0.00	268.79	550.37	972.80	1,501.80	871.62	821.42
7/3/07 22:52	60.24	468,121.59	370.19	489,498.41	82.97	0.00	268.63	550.63	975.58	1,496.53	872.50	824.50
7/3/07 22:53	60.70	471,101.81	370.38	490,489.31	73.58	0.00	268.55	550.64	975.78	1,502.27	873.93	826.89
7/3/07 22:54	60.59	466,688.59	370.51	491,480.09	71.72	0.00	268.53	550.56	973.50	1,497.59	875.65	827.43
7/3/07 22:55	61.00	472,708.19	370.64	492,470.81	76.12	0.00	268.45	550.67	972.87	1,504.44	876.88	827.48
7/3/07 22:56	61.95	480,180.81	370.78	493,348.81	85.05	0.00	268.39	551.02	974.80	1,507.72	878.09	828.56
7/3/07 22:57	61.12	472,524.81	370.99	494,051.50	88.73	0.00	268.51	551.06	974.27	1,498.58	878.02	829.00

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/3/07 22:58	60.88	472,262.31	371.15	494,754.31	88.89	0.00	268.70	550.72	973.19	1,497.47	877.24	827.38
7/3/07 22:59	61.25	480,434.50	371.27	495,457.00	84.02	0.00	268.83	550.45	972.83	1,507.21	877.63	827.08
7/3/07 23:00	61.55	477,825.50	371.35	496,159.69	79.49	0.00	268.93	550.65	972.11	1,502.37	879.34	827.74
7/3/07 23:01	61.95	479,148.50	371.47	496,862.41	79.91	0.00	269.09	550.53	970.11	1,504.69	879.99	828.03
7/3/07 23:02	62.27	484,024.09	371.63	497,221.81	80.79	0.00	269.21	550.70	972.02	1,505.96	880.66	829.64
7/3/07 23:03	61.69	478,613.41	371.78	496,171.50	79.47	0.00	269.33	550.53	971.80	1,498.60	881.56	830.62
7/3/07 23:04	61.34	483,131.41	371.92	495,121.09	78.59	0.00	269.46	550.34	972.56	1,503.93	882.47	830.49
7/3/07 23:05	61.39	480,335.81	371.96	494,070.81	80.67	0.00	269.61	550.20	971.02	1,501.77	882.13	830.22
7/3/07 23:06	62.37	482,877.81	372.06	493,883.31	83.80	0.00	269.65	550.52	971.14	1,506.12	881.69	831.19
7/3/07 23:07	62.61	486,755.50	372.22	494,924.81	85.13	0.00	269.59	550.90	971.22	1,507.80	881.10	831.95
7/3/07 23:08	63.41	494,239.69	372.37	495,966.31	85.52	0.00	269.67	551.18	972.92	1,518.56	881.25	832.77
7/3/07 23:09	63.09	489,581.69	372.60	497,007.81	85.35	0.00	269.87	551.24	974.92	1,509.49	882.38	834.33
7/3/07 23:10	63.11	489,982.69	372.68	498,049.31	85.02	0.00	270.12	550.86	971.48	1,508.52	882.03	832.99
7/3/07 23:11	63.15	490,968.59	372.71	496,718.91	83.55	0.00	270.34	550.62	968.03	1,509.71	881.63	832.12
7/3/07 23:12	62.95	490,007.09	372.79	495,296.19	81.47	0.00	270.50	550.64	967.99	1,504.30	881.38	832.03
7/3/07 23:13	62.38	486,330.69	372.76	493,873.41	80.40	0.00	270.70	549.94	964.74	1,494.30	880.40	830.05
7/3/07 23:14	62.08	484,040.41	372.62	492,450.69	79.41	0.00	270.85	549.30	963.39	1,490.94	879.57	827.25
7/3/07 23:15	61.89	482,235.09	372.57	491,028.00	79.66	0.00	270.85	548.98	967.14	1,490.30	879.37	825.06
7/3/07 23:16	61.07	474,520.09	372.62	489,605.19	83.16	0.00	270.84	548.99	971.61	1,487.65	877.16	823.87
7/3/07 23:17	60.50	467,476.41	372.78	489,384.31	85.61	0.00	270.76	549.11	975.88	1,485.65	875.29	823.52
7/3/07 23:18	60.15	465,792.00	372.94	489,328.41	84.40	0.00	270.64	549.22	976.89	1,488.74	875.51	821.77
7/3/07 23:19	60.01	464,460.50	373.07	489,272.59	84.09	0.00	270.40	549.23	975.93	1,492.51	876.72	822.29
7/3/07 23:20	60.28	464,283.31	373.19	489,216.81	85.07	0.00	269.98	549.53	976.24	1,496.26	878.30	823.91
7/3/07 23:21	61.12	472,856.00	373.36	489,161.00	80.95	0.00	269.67	550.03	979.47	1,504.83	878.54	825.85
7/3/07 23:22	60.83	469,089.09	373.52	490,111.41	83.22	0.00	269.42	550.40	980.66	1,499.97	879.03	827.33
7/3/07 23:23	61.71	473,283.50	373.68	491,178.81	83.82	0.00	269.35	550.54	978.62	1,505.57	880.57	828.55
7/3/07 23:24	62.24	480,005.91	373.83	492,246.31	82.88	0.00	269.34	550.83	978.61	1,507.45	882.79	828.39
7/3/07 23:25	62.30	481,944.69	374.03	493,313.69	80.98	0.00	269.48	550.81	977.54	1,507.15	883.24	827.62
7/3/07 23:26	62.53	485,041.69	374.19	494,381.09	79.27	0.00	269.68	550.89	977.38	1,507.41	881.26	827.05
7/3/07 23:27	62.82	485,763.50	374.40	495,448.50	82.52	0.00	269.90	551.08	977.51	1,508.68	880.05	825.80
7/3/07 23:28	62.49	482,783.00	374.58	496,515.91	84.29	0.00	270.15	550.95	974.86	1,502.40	880.36	824.80
7/3/07 23:29	62.16	481,859.91	374.73	497,583.31	82.74	0.00	270.33	550.92	971.51	1,499.08	881.51	825.40
7/3/07 23:30	62.11	484,410.19	374.86	497,982.31	83.57	0.00	270.47	550.64	969.28	1,502.97	882.01	826.09
7/3/07 23:31	62.33	484,639.09	374.99	497,987.19	84.34	0.00	270.52	550.89	969.94	1,503.54	881.29	826.62
7/3/07 23:32	62.28	483,993.91	375.15	497,992.19	84.33	0.00	270.49	551.16	970.97	1,501.42	881.50	827.42
7/3/07 23:33	62.52	485,887.81	375.33	497,997.09	85.46	0.00	270.49	551.21	970.48	1,504.92	882.83	828.06
7/3/07 23:34	62.16	483,008.59	375.46	498,002.00	86.24	0.00	270.47	551.32	970.10	1,499.14	883.64	826.39
7/3/07 23:35	62.48	485,736.81	375.58	498,006.91	87.80	0.00	270.50	551.31	970.63	1,505.02	883.00	824.87
7/3/07 23:36	63.11	489,758.41	375.78	498,011.91	88.18	0.00	270.50	551.59	972.92	1,511.35	881.43	824.77
7/3/07 23:37	62.78	486,838.00	375.97	498,016.81	86.72	0.00	270.53	551.86	974.19	1,504.54	880.74	823.21
7/3/07 23:38	62.81	487,230.31	376.12	498,021.81	87.41	0.00	270.61	551.68	973.19	1,504.24	880.91	822.25
7/3/07 23:39	63.15	489,623.09	376.29	498,026.69	87.38	0.00	270.73	551.87	973.39	1,509.62	882.41	824.18
7/3/07 23:40	62.79	487,616.91	376.45	498,031.59	87.44	0.00	270.79	551.90	971.27	1,501.95	882.94	825.19
7/3/07 23:41	63.02	489,073.81	376.61	498,036.50	87.80	0.00	270.90	551.78	969.99	1,507.33	882.17	826.39
7/3/07 23:42	62.94	488,649.09	376.78	498,041.50	86.77	0.00	270.99	551.71	969.24	1,505.59	882.71	827.48
7/3/07 23:43	62.81	487,904.59	376.94	498,046.41	86.28	0.00	271.09	551.72	968.58	1,502.81	884.33	827.91
7/3/07 23:44	62.57	487,252.50	377.08	498,051.31	87.14	0.00	271.15	551.35	966.61	1,498.62	884.88	824.82
7/3/07 23:45	62.63	487,723.31	377.21	498,056.31	87.33	0.00	271.21	550.97	966.16	1,499.49	882.23	822.14
7/3/07 23:46	62.61	487,199.31	377.36	498,061.19	86.19	0.00	271.25	550.91	968.44	1,499.82	878.96	820.88
7/3/07 23:47	62.30	483,746.50	377.54	498,066.09	87.58	0.00	271.29	550.78	967.29	1,493.70	877.91	818.80

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/3/07 23:48	61.93	482,199.91	377.67	497,977.00	89.20	0.00	271.30	550.59	966.53	1,491.27	878.18	818.94
7/3/07 23:49	62.00	480,873.91	377.76	497,645.09	94.88	0.00	271.24	550.59	967.60	1,492.49	879.16	821.29
7/3/07 23:50	62.01	479,447.31	377.82	497,313.09	91.22	0.00	271.14	550.64	967.99	1,495.10	878.21	822.08
7/3/07 23:51	62.03	478,822.09	377.96	496,981.09	87.82	0.00	270.98	550.86	970.01	1,497.02	877.28	823.47
7/3/07 23:52	61.69	477,122.19	378.09	496,649.19	85.23	0.00	270.87	551.19	971.14	1,495.44	878.38	824.95
7/3/07 23:53	61.30	474,082.09	378.14	496,317.19	83.43	0.00	270.79	551.22	969.50	1,495.71	879.12	823.76
7/3/07 23:54	61.96	481,063.59	378.23	495,985.31	79.55	0.00	270.70	551.46	970.54	1,504.95	879.46	821.12
7/3/07 23:55	61.96	479,274.59	378.37	495,864.59	75.44	0.00	270.50	551.71	972.67	1,500.67	877.88	820.19
7/3/07 23:56	61.42	474,405.91	378.47	495,887.19	75.17	0.00	270.44	551.59	971.47	1,496.61	875.25	818.32
7/3/07 23:57	60.91	472,529.09	378.51	495,909.81	75.14	0.00	270.39	551.42	969.02	1,495.45	874.34	814.82
7/3/07 23:58	61.67	479,040.59	378.53	495,932.41	74.78	0.00	270.37	551.59	969.02	1,505.14	875.20	815.15
7/3/07 23:59	61.04	473,935.31	378.55	495,955.00	77.38	0.00	270.22	551.82	969.08	1,496.34	876.65	816.54
7/4/07 0:00	61.15	474,714.50	378.61	495,977.69	79.64	0.00	270.18	551.77	968.04	1,500.69	875.89	817.85
7/4/07 0:01	61.29	477,290.09	378.77	496,000.31	80.40	0.00	270.15	552.02	969.05	1,500.49	875.97	820.26
7/4/07 0:02	61.50	476,774.31	378.88	496,022.91	78.41	0.00	270.11	552.29	968.11	1,501.15	877.60	822.59
7/4/07 0:03	61.17	475,279.19	378.99	496,045.50	81.44	0.00	270.12	552.66	968.68	1,497.95	879.67	821.39
7/4/07 0:04	61.34	477,512.59	379.15	496,068.09	82.45	0.00	270.13	552.84	968.19	1,503.86	880.24	819.71
7/4/07 0:05	60.84	471,748.69	379.32	496,090.81	86.23	0.00	270.08	553.16	969.67	1,496.06	878.50	819.73
7/4/07 0:06	61.44	475,719.50	379.46	496,113.31	83.01	0.00	270.07	553.32	969.57	1,502.00	876.65	818.33
7/4/07 0:07	62.10	481,038.00	379.58	496,113.31	81.49	0.00	270.02	553.84	971.13	1,506.04	877.83	815.84
7/4/07 0:08	62.00	480,739.81	379.72	495,359.41	83.41	0.00	269.98	554.15	971.46	1,503.37	879.85	817.08
7/4/07 0:09	62.39	484,686.19	379.85	494,605.50	81.73	0.00	270.01	554.31	972.20	1,506.94	881.36	819.50
7/4/07 0:10	62.76	485,700.91	379.95	493,851.59	84.80	0.00	270.09	554.30	971.88	1,507.87	881.09	821.80
7/4/07 0:11	62.42	482,511.09	380.07	493,097.69	84.45	0.00	270.21	554.53	972.85	1,500.95	881.90	824.24
7/4/07 0:12	62.01	479,436.91	380.12	492,343.81	81.21	0.00	270.29	554.41	969.32	1,497.63	882.86	825.29
7/4/07 0:13	62.51	484,097.09	380.14	492,920.19	80.74	0.00	270.43	554.41	968.74	1,505.48	883.79	821.49
7/4/07 0:14	62.73	485,514.69	380.24	494,680.41	81.89	0.00	270.47	554.61	972.61	1,505.47	882.59	818.18
7/4/07 0:15	62.90	486,078.41	380.35	496,440.50	79.83	0.00	270.53	554.28	972.89	1,507.18	878.10	816.09
7/4/07 0:16	63.02	486,503.81	380.39	498,200.69	76.30	0.00	270.60	554.10	974.35	1,506.08	875.49	812.95
7/4/07 0:17	63.77	491,888.91	380.42	499,960.81	78.77	0.00	270.66	553.93	975.86	1,516.74	875.64	811.36
7/4/07 0:18	64.00	493,588.09	380.43	501,721.00	83.26	0.00	270.76	553.88	977.56	1,520.41	876.93	808.40
7/4/07 0:19	64.26	496,059.59	380.42	503,481.09	81.85	0.00	270.94	553.51	976.55	1,524.56	875.66	806.14
7/4/07 0:20	64.13	494,316.91	380.39	505,241.31	79.25	0.00	271.10	553.23	977.08	1,518.10	872.53	806.24
7/4/07 0:21	64.12	495,349.31	380.34	507,001.41	64.79	0.00	271.30	552.70	973.28	1,514.01	870.84	803.66
7/4/07 0:22	64.32	498,880.31	380.32	508,761.59	73.99	0.00	271.44	552.53	972.09	1,512.96	871.98	803.46
7/4/07 0:23	64.06	497,663.31	380.35	510,521.69	80.06	0.00	271.62	552.24	969.46	1,509.14	873.16	806.20
7/4/07 0:24	63.74	494,459.09	380.41	510,703.41	81.21	0.00	271.76	551.82	967.06	1,503.77	873.21	808.48
7/4/07 0:25	63.57	493,425.19	380.47	510,019.41	85.30	0.00	271.83	551.52	965.55	1,501.39	872.29	810.57
7/4/07 0:26	63.44	492,568.50	380.58	509,335.50	85.53	0.00	271.83	551.48	965.14	1,499.18	873.02	812.89
7/4/07 0:27	62.61	486,537.41	380.52	508,651.59	88.17	0.00	271.77	551.06	962.67	1,487.75	873.53	812.24
7/4/07 0:28	63.19	489,779.81	380.31	507,967.69	91.98	0.00	271.73	550.27	964.84	1,498.99	873.00	805.12
7/4/07 0:29	63.48	491,594.19	380.09	507,283.69	97.41	0.00	271.55	549.75	971.29	1,504.19	869.18	803.15
7/4/07 0:30	63.64	490,799.31	379.89	506,118.50	100.00	0.00	271.42	549.15	974.87	1,506.12	864.45	801.65
7/4/07 0:31	63.19	486,338.81	379.63	504,743.00	95.93	0.00	271.46	548.42	976.18	1,495.26	862.41	796.88
7/4/07 0:32	63.36	488,464.31	379.38	503,367.41	90.02	0.00	271.48	547.58	974.16	1,500.72	862.14	795.86
7/4/07 0:33	63.01	485,007.31	379.11	501,991.91	92.77	0.00	271.46	546.98	973.35	1,493.60	862.47	797.63
7/4/07 0:34	62.93	485,730.69	378.86	500,616.31	91.40	0.00	271.38	546.23	970.79	1,492.71	860.94	799.15
7/4/07 0:35	63.04	487,462.41	378.61	499,240.81	91.93	0.00	271.37	545.58	969.04	1,496.24	859.08	800.33
7/4/07 0:36	62.63	484,595.81	378.38	497,865.19	88.79	0.00	271.27	545.08	966.95	1,489.05	858.85	801.33
7/4/07 0:37	62.51	485,190.09	378.10	496,489.69	87.60	0.00	271.21	544.56	965.72	1,489.49	859.24	799.28

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/4/07 0:38	61.94	480,876.91	377.87	495,114.09	87.48	0.00	271.21	543.86	964.09	1,482.15	858.97	795.13
7/4/07 0:39	61.43	476,273.31	377.63	493,738.50	87.58	0.00	271.15	543.45	964.25	1,481.45	856.77	794.51
7/4/07 0:40	60.71	470,563.59	377.48	492,394.41	84.64	0.00	271.04	543.19	964.65	1,483.90	855.03	793.34
7/4/07 0:41	60.48	470,300.41	377.37	491,131.50	83.75	0.00	270.82	543.20	965.49	1,489.67	855.78	791.52
7/4/07 0:42	59.40	460,433.09	377.25	489,868.59	81.45	0.00	270.52	543.34	966.80	1,484.70	857.29	793.49
7/4/07 0:43	60.19	467,032.59	377.01	488,605.59	80.02	0.00	270.19	543.32	967.62	1,496.43	857.73	795.16
7/4/07 0:44	60.34	467,277.91	376.88	487,811.09	79.30	0.00	269.77	543.54	970.50	1,498.43	857.19	797.11
7/4/07 0:45	61.02	472,271.50	376.71	488,332.50	78.53	0.00	269.47	543.75	972.43	1,503.87	857.55	799.37
7/4/07 0:46	60.85	471,054.69	376.56	488,853.91	79.63	0.00	269.28	543.95	973.20	1,501.03	858.75	800.84
7/4/07 0:47	61.03	470,892.59	376.36	489,375.31	78.50	0.00	269.22	544.16	974.24	1,501.56	859.28	799.22
7/4/07 0:48	60.91	469,580.00	376.25	489,896.81	76.73	0.00	269.25	544.26	974.41	1,498.99	858.72	796.90
7/4/07 0:49	61.02	472,122.59	376.07	490,418.19	76.72	0.00	269.22	544.19	972.24	1,501.49	857.78	795.34
7/4/07 0:50	60.81	470,901.69	375.88	490,939.59	81.25	0.00	269.27	544.30	971.20	1,501.28	856.91	793.60
7/4/07 0:51	60.94	470,967.50	375.74	491,461.09	80.77	0.00	269.29	544.30	969.51	1,500.74	856.92	793.47
7/4/07 0:52	60.88	471,152.81	375.53	491,982.50	81.90	0.00	269.31	544.35	969.18	1,501.33	857.65	795.43
7/4/07 0:53	61.11	471,548.81	375.39	492,503.91	82.85	0.00	269.30	544.41	970.31	1,499.62	857.93	797.27
7/4/07 0:54	61.06	472,045.91	375.24	493,025.31	82.95	0.00	269.31	544.17	969.62	1,500.57	857.52	797.94
7/4/07 0:55	61.08	473,805.81	375.06	493,546.81	78.93	0.00	269.36	543.97	968.23	1,503.14	856.83	798.89
7/4/07 0:56	62.09	478,793.19	374.91	494,045.69	78.86	0.00	269.39	544.14	969.94	1,508.56	857.82	799.70
7/4/07 0:57	62.19	479,765.41	374.80	492,762.59	77.41	0.00	269.33	544.29	972.25	1,503.36	859.43	799.54
7/4/07 0:58	61.65	476,639.69	374.63	491,479.59	78.18	0.00	269.47	544.02	971.22	1,498.70	859.54	798.32
7/4/07 0:59	61.56	477,597.59	374.38	490,196.59	80.51	0.00	269.64	543.49	970.11	1,501.44	858.85	796.58
7/4/07 1:00	61.68	482,408.50	374.08	488,913.50	79.26	0.00	269.74	543.28	970.89	1,506.91	858.69	795.39
7/4/07 1:01	60.74	469,468.41	373.84	487,630.50	80.88	0.00	269.75	543.24	969.31	1,492.65	859.34	796.02
7/4/07 1:02	60.68	469,724.91	373.66	487,530.00	81.15	0.00	269.81	543.10	966.26	1,496.46	858.89	796.47
7/4/07 1:03	61.31	475,927.19	373.55	487,832.50	79.82	0.00	269.78	543.34	968.43	1,503.42	859.03	796.85
7/4/07 1:04	61.53	477,468.59	373.46	488,135.00	76.40	0.00	269.59	543.40	969.12	1,504.09	859.04	797.97
7/4/07 1:05	61.63	479,995.31	373.39	488,437.50	75.88	0.00	269.53	543.39	971.05	1,505.88	859.60	799.97
7/4/07 1:06	61.85	478,560.19	373.27	488,739.91	69.84	0.00	269.54	543.22	970.64	1,503.50	860.06	800.97
7/4/07 1:07	61.97	475,303.59	373.15	489,042.41	72.51	0.00	269.62	543.04	969.62	1,498.49	859.90	801.47
7/4/07 1:08	62.15	481,377.91	373.07	489,344.91	73.80	0.00	269.71	542.86	967.48	1,502.37	859.31	802.41
7/4/07 1:09	62.14	483,335.41	372.93	489,647.41	72.95	0.00	269.85	542.60	965.33	1,501.69	858.51	802.78
7/4/07 1:10	61.99	479,402.19	372.88	489,949.91	73.32	0.00	270.03	542.27	964.79	1,499.09	857.84	802.08
7/4/07 1:11	61.55	474,966.31	372.73	490,252.41	75.97	0.00	270.12	541.79	963.65	1,496.22	857.17	803.37
7/4/07 1:12	61.82	479,386.09	372.64	489,874.50	78.78	0.00	270.32	541.52	963.48	1,501.75	856.86	805.98
7/4/07 1:13	61.20	474,372.41	372.50	488,757.09	81.41	0.00	270.27	541.55	965.12	1,493.30	856.59	808.29
7/4/07 1:14	61.31	475,544.69	372.35	487,767.69	82.27	0.00	270.31	541.00	963.71	1,497.77	855.36	809.41
7/4/07 1:15	61.13	474,575.69	372.08	486,987.59	85.28	0.00	270.33	540.73	964.85	1,498.07	854.59	810.73
7/4/07 1:16	60.73	472,870.50	371.78	486,207.59	86.41	0.00	270.25	540.37	966.44	1,498.45	854.66	810.78
7/4/07 1:17	60.82	471,189.09	371.49	485,427.59	82.09	0.00	270.15	540.00	967.04	1,498.07	854.47	809.73
7/4/07 1:18	61.16	475,973.19	371.21	484,647.59	70.96	0.00	270.06	539.85	968.78	1,503.06	854.77	808.37
7/4/07 1:19	61.77	478,286.81	370.96	483,867.50	63.73	0.00	269.84	539.81	970.78	1,507.03	855.54	807.62
7/4/07 1:20	61.80	478,510.09	370.74	483,087.50	71.04	0.00	269.73	539.58	971.38	1,505.24	856.25	807.29
7/4/07 1:21	61.46	474,704.50	370.53	482,307.50	71.44	0.00	269.74	539.12	970.25	1,500.66	856.50	806.15
7/4/07 1:22	61.79	478,507.50	370.27	481,527.50	73.92	0.00	269.75	538.92	970.04	1,504.56	856.72	805.34
7/4/07 1:23	61.40	474,324.09	370.07	480,747.50	74.39	0.00	269.77	538.87	969.82	1,497.09	857.11	804.69
7/4/07 1:24	60.76	471,799.59	369.87	479,967.41	75.65	0.00	269.85	538.70	967.74	1,493.39	857.01	803.41
7/4/07 1:25	61.06	473,523.09	369.67	478,209.09	77.61	0.00	269.91	538.66	967.28	1,499.24	857.11	803.03
7/4/07 1:26	60.26	467,871.69	369.47	476,173.50	78.57	0.00	269.86	538.63	966.26	1,493.19	857.15	802.62
7/4/07 1:27	60.41	467,808.91	369.28	474,137.91	77.94	0.00	269.82	538.51	965.82	1,497.15	856.98	802.07

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/4/07 1:28	60.53	468,975.50	369.11	472,102.31	79.96	0.00	269.71	538.71	968.06	1,497.88	857.38	801.98
7/4/07 1:29	60.12	466,041.09	368.98	470,066.59	78.78	0.00	269.65	538.68	968.22	1,497.17	857.48	801.73
7/4/07 1:30	59.97	461,581.19	368.85	468,031.00	79.56	0.00	269.59	538.62	969.15	1,493.98	857.47	801.62
7/4/07 1:31	60.28	466,049.09	368.72	465,995.41	77.72	0.00	269.53	538.76	970.43	1,501.32	857.74	801.78
7/4/07 1:32	59.72	460,189.59	368.59	463,959.81	76.81	0.00	269.42	538.97	971.46	1,494.22	858.22	802.01
7/4/07 1:33	59.38	457,999.69	368.44	461,924.09	77.01	0.00	269.33	539.00	970.03	1,492.18	858.00	801.45
7/4/07 1:34	59.57	459,456.19	368.27	459,888.50	76.16	0.00	269.30	539.11	969.45	1,497.53	857.60	800.89
7/4/07 1:35	59.55	458,494.19	368.13	457,852.91	74.88	0.00	269.17	539.70	970.48	1,495.95	856.20	800.95
7/4/07 1:36	58.40	449,526.81	368.11	455,817.31	75.72	0.00	269.01	540.59	970.45	1,486.79	853.93	799.20
7/4/07 1:37	58.57	451,177.19	368.02	454,064.19	74.02	0.00	268.97	540.96	969.16	1,493.08	853.05	798.73
7/4/07 1:38	58.01	447,647.31	367.96	454,216.09	76.56	0.00	268.80	541.33	969.45	1,488.69	853.04	799.02
7/4/07 1:39	58.11	447,398.69	367.89	454,368.09	76.50	0.00	268.59	541.51	968.13	1,493.20	853.24	799.37
7/4/07 1:40	57.53	443,660.50	367.73	454,520.00	74.26	0.00	268.34	541.77	967.91	1,488.52	853.69	799.56
7/4/07 1:41	56.95	439,672.59	367.54	454,671.91	73.75	0.00	268.13	541.87	966.14	1,489.11	853.83	799.35
7/4/07 1:42	57.34	442,078.59	367.32	454,823.81	78.09	0.00	267.88	542.54	968.21	1,495.53	854.57	800.12
7/4/07 1:43	58.19	449,448.09	367.08	454,975.69	77.45	0.00	267.52	543.50	970.95	1,505.20	855.95	801.33
7/4/07 1:44	58.32	447,475.31	366.84	457,826.00	76.74	0.00	267.32	544.45	973.99	1,500.66	857.57	802.52
7/4/07 1:45	58.35	449,040.91	366.50	460,781.41	76.59	0.00	267.22	544.41	973.08	1,502.59	858.21	802.64
7/4/07 1:46	59.20	455,543.81	366.06	463,736.81	75.60	0.00	267.18	544.60	974.31	1,508.25	858.99	803.63
7/4/07 1:47	59.31	455,253.31	365.65	466,692.19	74.00	0.00	267.20	544.82	974.93	1,505.79	860.12	804.53
7/4/07 1:48	59.86	459,943.59	365.17	469,647.59	73.03	0.00	267.28	545.05	974.14	1,508.53	860.94	805.05
7/4/07 1:49	60.23	461,690.19	364.70	472,603.00	71.74	0.00	267.41	545.45	973.28	1,508.47	861.93	806.00
7/4/07 1:50	60.58	465,478.91	364.18	475,558.41	77.20	0.00	267.59	545.91	973.37	1,505.95	863.12	807.16
7/4/07 1:51	61.36	472,673.31	363.64	478,513.81	76.10	0.00	267.77	546.12	972.20	1,511.10	864.12	808.00
7/4/07 1:52	61.73	474,570.31	363.25	481,469.19	77.43	0.00	267.99	546.39	972.82	1,507.51	865.28	809.24
7/4/07 1:53	61.88	475,546.09	362.91	484,424.59	77.05	0.00	268.25	546.19	971.08	1,506.19	865.71	809.39
7/4/07 1:54	61.79	475,302.50	362.53	485,313.00	78.13	0.00	268.56	546.08	970.72	1,502.81	866.19	809.82
7/4/07 1:55	62.39	479,035.91	362.37	484,481.69	78.65	0.00	268.78	545.89	970.18	1,506.80	866.81	810.53
7/4/07 1:56	61.67	473,547.81	362.27	483,650.41	77.71	0.00	269.05	545.63	969.60	1,497.04	867.28	810.94
7/4/07 1:57	61.84	480,067.19	362.18	482,819.00	77.20	0.00	269.32	545.46	968.19	1,506.30	867.21	812.43
7/4/07 1:58	61.46	471,835.69	362.09	481,987.69	77.47	0.00	269.41	545.54	968.53	1,493.78	867.71	813.38
7/4/07 1:59	61.19	472,430.50	361.94	481,525.19	77.78	0.00	269.58	545.37	965.34	1,495.98	866.96	813.09
7/4/07 2:00	60.86	470,125.41	361.96	481,211.59	78.84	0.00	269.63	545.29	963.27	1,494.24	866.10	811.84
7/4/07 2:01	61.76	475,478.91	361.93	480,898.00	81.86	0.00	269.58	545.49	963.55	1,503.55	865.80	811.89
7/4/07 2:02	61.64	475,839.00	361.97	480,584.41	81.59	0.00	269.53	545.55	964.13	1,499.57	865.85	811.51
7/4/07 2:03	62.23	480,629.59	361.97	480,270.81	81.20	0.00	269.60	545.18	963.87	1,506.89	865.35	810.77
7/4/07 2:04	62.08	479,249.69	362.03	479,957.19	81.25	0.00	269.68	544.99	966.32	1,503.06	865.66	810.84
7/4/07 2:05	61.70	476,380.81	362.04	479,643.50	81.59	0.00	269.81	544.61	966.51	1,500.87	865.76	811.13
7/4/07 2:06	62.08	479,542.91	362.13	479,329.91	75.98	0.00	269.97	544.55	966.66	1,505.59	866.09	811.44
7/4/07 2:07	61.83	477,945.81	362.40	479,016.31	77.15	0.00	270.16	544.76	967.79	1,499.48	867.10	812.41
7/4/07 2:08	61.08	470,470.09	362.53	478,702.69	78.41	0.00	270.28	544.61	966.18	1,492.65	867.56	813.21
7/4/07 2:09	61.18	472,193.69	362.64	478,075.41	75.51	0.00	270.43	544.32	965.02	1,497.29	867.57	813.16
7/4/07 2:10	61.28	473,124.59	362.77	477,411.69	78.46	0.00	270.38	544.35	965.29	1,498.71	867.75	814.07
7/4/07 2:11	60.80	469,093.59	362.88	476,747.91	80.14	0.00	270.31	544.35	965.14	1,493.36	867.78	813.44
7/4/07 2:12	60.04	463,907.59	362.84	476,084.19	81.28	0.00	270.26	544.04	963.97	1,491.51	866.83	812.24
7/4/07 2:13	60.24	464,926.50	362.76	475,420.41	83.61	0.00	270.18	543.79	964.19	1,496.18	865.58	810.71
7/4/07 2:14	60.88	469,600.59	362.68	474,756.69	82.94	0.00	269.91	543.66	965.08	1,504.40	864.67	810.56
7/4/07 2:15	61.69	475,531.91	362.66	475,298.19	83.26	0.00	269.68	544.07	969.05	1,507.20	865.01	811.22
7/4/07 2:16	61.34	471,838.00	362.74	476,326.09	80.73	0.00	269.59	544.09	969.22	1,501.55	865.30	811.79
7/4/07 2:17	60.79	468,386.31	362.81	477,353.91	75.60	0.00	269.64	544.02	968.41	1,496.69	865.33	812.10

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/4/07 2:18	61.74	477,157.81	362.93	478,587.09	76.77	0.00	269.70	544.04	968.42	1,507.18	865.62	812.75
7/4/07 2:19	61.29	472,058.09	363.08	479,844.09	79.50	0.00	269.67	544.32	968.68	1,497.88	866.31	813.14
7/4/07 2:20	60.54	467,224.09	363.12	480,209.09	82.47	0.00	269.71	544.25	965.11	1,493.86	866.01	812.44
7/4/07 2:21	60.38	465,358.50	363.17	480,084.91	85.05	0.00	269.75	544.18	963.03	1,493.86	865.47	811.71
7/4/07 2:22	60.81	470,952.00	363.17	479,960.81	81.97	0.00	269.66	544.42	964.49	1,502.11	865.62	812.11
7/4/07 2:23	60.34	467,042.31	363.26	479,836.59	78.50	0.00	269.52	544.75	966.47	1,496.76	866.06	813.13
7/4/07 2:24	60.24	466,324.41	363.34	479,712.41	76.60	0.00	269.46	544.73	967.01	1,498.70	865.99	812.73
7/4/07 2:25	60.22	464,609.50	363.34	479,588.19	75.46	0.00	269.35	544.64	968.29	1,499.31	865.61	813.00
7/4/07 2:26	60.84	469,818.41	363.38	479,342.09	74.84	0.00	269.21	544.79	970.71	1,504.10	865.79	813.87
7/4/07 2:27	59.89	461,922.50	363.41	478,273.31	75.76	0.00	269.13	544.73	969.88	1,495.11	865.67	813.75
7/4/07 2:28	60.08	464,684.81	363.42	477,204.50	77.30	0.00	269.13	544.60	968.38	1,499.75	865.10	812.97
7/4/07 2:29	60.27	465,518.81	363.42	476,135.81	75.09	0.00	269.09	544.72	968.59	1,499.30	865.08	812.41
7/4/07 2:30	60.29	465,786.19	363.45	475,116.50	74.85	0.00	269.02	544.68	967.78	1,500.52	864.97	811.56
7/4/07 2:31	59.30	458,515.41	363.40	474,101.00	73.18	0.00	268.98	544.44	965.87	1,490.72	864.45	810.89
7/4/07 2:32	59.63	461,477.69	363.35	473,085.50	72.26	0.00	269.00	544.40	965.88	1,497.11	863.64	810.48
7/4/07 2:33	60.22	465,254.00	363.31	473,260.19	76.49	0.00	268.89	544.58	967.77	1,503.09	863.72	810.76
7/4/07 2:34	60.83	469,507.59	363.44	475,017.81	78.29	0.00	268.76	544.98	970.77	1,506.38	864.81	812.13
7/4/07 2:35	61.60	471,524.59	363.61	476,775.50	77.21	0.00	268.76	545.31	972.88	1,507.03	866.65	813.56
7/4/07 2:36	62.21	478,017.59	363.83	481,401.00	76.40	0.00	268.86	545.58	976.03	1,509.19	868.54	816.08
7/4/07 2:37	63.00	484,233.09	364.07	486,360.00	70.76	0.00	268.97	545.51	977.02	1,509.86	870.21	817.55
7/4/07 2:38	62.84	483,753.31	364.19	491,319.00	71.72	0.00	269.25	545.30	975.72	1,506.72	871.30	818.43
7/4/07 2:39	62.83	482,949.09	364.32	492,423.81	71.14	0.00	269.54	545.15	973.23	1,505.94	872.05	818.77
7/4/07 2:40	62.90	484,766.19	364.40	491,810.50	73.55	0.00	269.86	545.19	971.19	1,506.21	872.54	819.42
7/4/07 2:41	63.09	486,834.59	364.52	491,197.09	74.78	0.00	270.12	545.37	969.75	1,507.28	873.05	820.52
7/4/07 2:42	63.06	487,294.09	364.61	490,583.81	74.33	0.00	270.31	545.45	968.18	1,506.84	873.41	820.76
7/4/07 2:43	63.13	487,738.09	364.70	489,970.50	75.37	0.00	270.45	545.20	967.67	1,507.05	873.47	821.09
7/4/07 2:44	63.14	488,230.31	364.84	489,357.19	75.13	0.00	270.58	545.28	967.82	1,504.25	873.70	820.62
7/4/07 2:45	63.32	489,400.50	364.93	488,743.81	76.58	0.00	270.71	545.29	968.12	1,507.27	873.80	820.60
7/4/07 2:46	63.03	486,723.31	365.04	488,130.50	79.64	0.00	270.77	545.10	966.94	1,502.64	873.60	819.55
7/4/07 2:47	62.87	486,259.59	365.04	487,517.19	78.89	0.00	270.92	544.86	966.36	1,499.64	873.40	819.00
7/4/07 2:48	62.86	486,636.50	365.12	486,903.91	81.80	0.00	270.94	544.67	966.36	1,501.22	873.25	818.08
7/4/07 2:49	62.68	483,675.59	365.19	486,290.50	78.49	0.00	270.97	544.64	968.88	1,497.24	873.49	818.88
7/4/07 2:50	62.43	482,209.09	365.30	485,677.19	78.30	0.00	270.94	544.45	969.96	1,495.73	873.59	819.97
7/4/07 2:51	62.22	477,664.31	365.38	485,172.91	74.99	0.00	270.92	544.29	970.39	1,494.80	873.30	820.09
7/4/07 2:52	62.69	483,625.91	365.48	486,937.41	74.10	0.00	270.91	544.40	971.74	1,501.76	873.18	820.76
7/4/07 2:53	61.92	477,498.91	365.53	485,948.09	78.49	0.00	270.83	544.34	971.16	1,495.93	873.29	820.91
7/4/07 2:54	62.36	476,016.91	365.61	484,451.19	79.22	0.00	270.83	544.29	969.75	1,496.50	872.77	820.36
7/4/07 2:55	62.81	483,921.81	365.69	491,135.59	81.69	0.00	270.74	544.31	970.10	1,505.20	872.92	819.78
7/4/07 2:56	62.22	478,733.91	365.78	490,258.81	81.56	0.00	270.71	544.34	969.86	1,499.48	873.02	819.36
7/4/07 2:57	62.93	485,827.19	365.85	489,847.31	82.85	0.00	270.75	544.21	969.90	1,505.93	873.00	818.87
7/4/07 2:58	62.96	484,667.00	366.00	492,662.19	83.47	0.00	270.85	544.17	971.57	1,504.05	873.48	819.30
7/4/07 2:59	62.33	480,042.91	366.07	491,625.59	83.55	0.00	270.91	543.79	971.06	1,498.18	873.54	819.17
7/4/07 3:00	62.86	482,923.19	366.10	488,266.59	81.06	0.00	270.98	543.82	971.29	1,504.45	873.36	819.52
7/4/07 3:01	63.22	485,893.81	366.20	496,062.09	82.18	0.00	271.01	544.06	973.26	1,506.98	874.04	820.86
7/4/07 3:02	62.83	483,782.59	366.34	493,853.59	83.71	0.00	271.05	544.18	973.21	1,500.35	874.60	820.91
7/4/07 3:03	62.99	485,287.81	366.42	493,618.31	81.31	0.00	271.11	544.13	972.12	1,502.64	874.56	820.17
7/4/07 3:04	62.84	484,637.59	366.50	494,393.19	79.18	0.00	271.17	544.16	971.24	1,499.94	874.64	819.42
7/4/07 3:05	62.94	485,280.09	366.57	491,353.41	79.92	0.00	271.17	544.29	969.84	1,503.43	874.62	819.24
7/4/07 3:06	62.74	483,567.31	366.62	494,850.19	79.22	0.00	271.16	544.51	969.77	1,498.20	874.84	818.89
7/4/07 3:07	63.12	486,958.59	366.71	493,540.69	81.48	0.00	271.09	544.43	968.93	1,505.75	874.59	819.02

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/4/07 3:08	63.01	486,100.91	366.72	493,943.91	83.23	0.00	271.10	544.49	969.41	1,504.43	874.84	818.91
7/4/07 3:09	62.81	484,947.69	366.81	494,166.81	86.75	0.00	271.07	544.42	969.15	1,499.88	874.55	818.87
7/4/07 3:10	62.70	485,009.59	366.84	493,255.00	85.32	0.00	271.09	544.23	967.88	1,498.60	873.97	818.91
7/4/07 3:11	62.53	482,996.41	366.84	490,774.09	89.21	0.00	271.05	544.01	966.94	1,497.34	873.63	819.09
7/4/07 3:12	61.17	471,528.09	366.84	487,088.81	85.02	0.00	271.05	543.83	964.57	1,488.99	872.84	818.60
7/4/07 3:13	61.44	476,369.31	366.81	483,403.59	86.15	0.00	271.00	543.64	963.67	1,496.36	871.97	818.01
7/4/07 3:14	60.84	471,328.50	366.80	479,332.41	85.02	0.00	270.87	543.90	965.57	1,490.26	872.18	818.08
7/4/07 3:15	60.47	466,886.19	366.75	475,058.81	81.44	0.00	270.65	543.60	965.31	1,491.84	872.00	817.99
7/4/07 3:16	60.68	468,872.91	366.78	475,331.19	80.49	0.00	270.45	543.47	966.73	1,497.65	871.44	818.14
7/4/07 3:17	60.37	466,510.81	366.73	477,292.00	78.35	0.00	270.21	543.51	967.76	1,497.46	871.03	817.24
7/4/07 3:18	61.73	476,403.91	366.74	479,252.81	79.37	0.00	269.97	543.62	969.62	1,506.93	870.68	817.64
7/4/07 3:19	61.89	476,806.19	366.81	481,213.59	80.60	0.00	269.79	543.91	971.60	1,504.48	871.45	818.60
7/4/07 3:20	61.78	475,316.09	366.83	483,999.50	80.47	0.00	269.79	543.66	970.11	1,504.43	871.28	818.07
7/4/07 3:21	63.34	489,626.31	366.90	488,346.00	85.50	0.00	269.87	543.79	971.47	1,515.44	871.79	818.87
7/4/07 3:22	62.89	484,601.69	367.02	492,692.59	83.58	0.00	269.96	544.08	973.43	1,504.20	873.03	820.07
7/4/07 3:23	62.42	482,090.50	367.04	494,164.19	81.56	0.00	270.17	543.61	970.40	1,500.72	872.79	819.29
7/4/07 3:24	63.09	486,903.41	367.05	492,511.00	80.25	0.00	270.45	543.49	969.84	1,507.80	872.76	819.02
7/4/07 3:25	62.43	480,552.59	367.09	490,857.69	80.55	0.00	270.62	543.72	970.28	1,498.77	872.92	819.32
7/4/07 3:26	62.45	481,798.09	367.06	489,940.59	78.14	0.00	270.70	543.55	968.38	1,501.07	872.68	818.59
7/4/07 3:27	62.66	483,886.59	367.07	489,074.81	81.29	0.00	270.74	543.64	969.48	1,505.32	872.90	820.02
7/4/07 3:28	62.67	481,691.59	367.14	488,209.09	80.74	0.00	270.66	543.88	971.94	1,501.72	873.87	821.05
7/4/07 3:29	62.26	480,777.69	367.13	487,343.41	81.69	0.00	270.65	543.72	971.01	1,499.62	873.72	820.96
7/4/07 3:30	62.58	481,617.59	367.14	487,974.50	80.49	0.00	270.56	543.70	971.17	1,503.30	873.59	820.85
7/4/07 3:31	63.18	487,245.69	367.20	488,313.19	81.62	0.00	270.46	543.97	971.28	1,509.01	873.77	821.13
7/4/07 3:32	62.89	485,207.50	367.25	488,651.81	85.36	0.00	270.44	543.92	970.12	1,503.32	873.78	821.46
7/4/07 3:33	62.80	485,597.69	367.26	488,990.41	82.69	0.00	270.45	543.73	968.56	1,502.97	873.51	821.06
7/4/07 3:34	63.51	490,953.19	367.28	489,329.09	77.89	0.00	270.52	543.71	968.48	1,512.45	873.39	821.04
7/4/07 3:35	63.20	487,732.81	367.37	489,667.81	81.91	0.00	270.58	543.72	968.72	1,506.09	873.80	821.09
7/4/07 3:36	63.01	486,726.69	367.35	490,006.41	82.12	0.00	270.71	543.42	967.84	1,503.04	873.41	821.11
7/4/07 3:37	63.16	486,633.19	367.39	490,345.09	81.14	0.00	270.80	543.33	968.64	1,504.59	873.51	820.86
7/4/07 3:38	62.91	484,590.00	367.39	490,683.69	81.79	0.00	270.86	543.35	970.49	1,497.79	874.17	820.78
7/4/07 3:39	62.75	483,840.91	367.37	491,018.31	81.30	0.00	270.96	542.95	969.56	1,497.05	874.15	820.06
7/4/07 3:40	62.44	482,233.59	367.38	491,292.31	81.97	0.00	271.04	542.62	968.88	1,495.41	873.98	819.40
7/4/07 3:41	62.55	482,600.41	367.36	491,566.41	81.09	0.00	271.06	542.48	970.12	1,496.89	874.00	818.96
7/4/07 3:42	63.34	487,377.00	367.40	491,840.41	79.36	0.00	271.01	542.38	971.05	1,508.64	874.23	818.68
7/4/07 3:43	63.24	485,877.59	367.46	492,114.50	76.32	0.00	270.97	542.42	972.53	1,505.89	874.91	819.00
7/4/07 3:44	63.51	487,749.00	367.49	492,388.50	75.82	0.00	271.02	542.24	973.57	1,507.94	875.45	819.42
7/4/07 3:45	63.44	487,039.91	367.52	492,662.59	76.00	0.00	271.09	542.17	974.16	1,505.89	875.45	819.66
7/4/07 3:46	63.24	484,672.69	367.61	492,936.59	78.12	0.00	271.16	542.59	974.85	1,501.27	872.89	817.92
7/4/07 3:47	63.25	485,317.09	367.72	493,210.69	80.30	0.00	271.24	543.12	973.83	1,501.53	871.42	817.23
7/4/07 3:48	63.11	485,143.41	367.85	493,484.69	81.96	0.00	271.29	543.54	973.25	1,499.54	871.38	816.92
7/4/07 3:49	62.98	483,485.41	367.93	493,758.81	82.53	0.00	271.29	543.66	971.98	1,498.97	871.97	816.72
7/4/07 3:50	63.27	485,986.31	367.99	494,032.81	80.93	0.00	271.29	543.74	972.05	1,504.30	872.82	817.12
7/4/07 3:51	63.38	486,936.50	368.09	494,306.81	80.44	0.00	271.25	543.89	973.11	1,505.64	874.23	818.32
7/4/07 3:52	63.37	486,137.09	368.13	494,580.91	80.07	0.00	271.21	544.22	973.35	1,504.49	875.49	819.35
7/4/07 3:53	63.20	485,264.69	368.11	494,854.91	80.32	0.00	271.20	544.42	972.53	1,501.35	876.24	819.76
7/4/07 3:54	63.49	488,228.41	368.01	495,128.91	82.44	0.00	271.21	544.85	973.48	1,506.22	877.30	820.83
7/4/07 3:55	63.30	486,825.69	367.85	495,403.00	82.60	0.00	271.16	544.92	972.71	1,502.12	878.03	821.69
7/4/07 3:56	63.47	487,933.69	367.63	495,677.00	84.57	0.00	271.17	544.86	971.87	1,505.49	878.48	822.09
7/4/07 3:57	63.58	488,810.91	367.41	495,951.09	80.75	0.00	271.12	544.97	973.25	1,506.48	879.36	823.34

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/4/07 3:58	63.26	486,096.91	367.12	496,225.09	82.72	0.00	271.13	544.87	971.97	1,500.89	879.74	823.13
7/4/07 3:59	63.38	488,428.91	366.77	496,499.19	81.58	0.00	271.09	544.81	970.13	1,503.25	879.50	822.73
7/4/07 4:00	63.70	490,975.81	366.40	496,773.19	79.16	0.00	271.06	545.11	970.70	1,508.78	879.94	823.40
7/4/07 4:01	63.44	488,163.09	365.98	497,047.31	80.44	0.00	271.05	545.30	970.14	1,503.10	880.35	823.54
7/4/07 4:02	63.60	490,080.41	365.61	497,321.31	77.00	0.00	271.08	545.18	968.85	1,507.45	880.20	823.24
7/4/07 4:03	63.48	489,939.50	365.29	497,595.31	78.56	0.00	271.09	544.94	968.20	1,503.99	880.26	823.14
7/4/07 4:04	63.48	489,915.69	365.06	497,869.41	78.51	0.00	271.12	544.78	967.74	1,503.97	880.17	823.13
7/4/07 4:05	63.49	489,937.50	364.81	498,143.41	76.35	0.00	271.14	544.60	968.01	1,503.26	880.25	823.87
7/4/07 4:06	63.51	489,982.50	364.67	498,417.41	75.53	0.00	271.14	544.48	967.67	1,503.86	880.18	824.06
7/4/07 4:07	63.75	492,051.31	364.58	497,869.19	75.04	0.00	271.18	544.57	968.05	1,509.07	880.51	824.41
7/4/07 4:08	63.66	490,951.41	364.59	497,317.50	75.82	0.00	271.18	544.88	969.46	1,505.58	881.41	825.10
7/4/07 4:09	63.61	490,595.69	364.69	496,765.81	77.03	0.00	271.27	545.08	969.66	1,505.32	882.06	826.10
7/4/07 4:10	64.00	492,875.50	364.79	496,214.09	80.25	0.00	271.27	545.38	970.97	1,512.06	882.78	826.92
7/4/07 4:11	63.79	490,175.09	364.90	495,662.41	81.75	0.00	271.37	545.53	971.45	1,505.83	883.37	826.92
7/4/07 4:12	63.59	489,239.41	365.02	495,110.81	79.32	0.00	271.41	545.57	970.53	1,501.22	883.53	826.91
7/4/07 4:13	63.30	487,658.31	365.11	494,559.09	76.24	0.00	271.49	545.69	970.06	1,495.49	883.69	827.07
7/4/07 4:14	63.65	490,667.41	365.18	494,007.41	76.44	0.00	271.47	545.67	968.57	1,502.76	883.45	826.62
7/4/07 4:15	63.35	488,690.81	365.30	493,455.69	78.36	0.00	271.46	545.87	968.41	1,497.11	883.41	826.35
7/4/07 4:16	63.13	485,973.31	365.44	492,904.00	83.41	0.00	271.47	546.12	968.21	1,492.58	883.51	826.53
7/4/07 4:17	63.20	486,151.69	365.53	492,352.31	83.43	0.00	271.42	546.18	968.09	1,496.13	883.38	826.23
7/4/07 4:18	63.49	488,187.91	365.64	491,800.59	81.17	0.00	271.41	546.53	970.05	1,501.97	883.63	826.35
7/4/07 4:19	63.24	486,566.81	365.80	491,248.91	80.71	0.00	271.40	546.81	970.69	1,495.65	883.88	826.42
7/4/07 4:20	63.35	486,908.00	365.96	490,697.19	83.45	0.00	271.37	546.94	970.81	1,498.00	883.88	826.20
7/4/07 4:21	63.26	486,131.50	366.05	490,145.50	86.47	0.00	271.35	547.18	971.86	1,496.04	883.98	826.07
7/4/07 4:22	63.52	487,979.31	366.18	489,593.81	88.09	0.00	271.38	547.25	971.20	1,502.48	883.87	825.75
7/4/07 4:23	63.65	488,683.91	366.35	489,042.19	85.79	0.00	271.42	547.54	972.34	1,504.94	884.21	826.03
7/4/07 4:24	63.39	487,494.31	366.51	488,490.50	84.69	0.00	271.46	547.63	970.66	1,499.37	883.99	825.39
7/4/07 4:25	63.48	489,072.41	366.61	487,938.81	87.31	0.00	271.53	547.51	969.03	1,501.19	883.54	824.72
7/4/07 4:26	63.74	490,587.81	366.77	487,387.09	90.81	0.00	271.55	547.84	969.73	1,506.43	883.96	825.72
7/4/07 4:27	63.39	486,899.31	366.99	486,835.41	88.93	0.00	271.56	548.00	968.21	1,498.94	884.09	826.01
7/4/07 4:28	63.39	487,678.81	367.20	486,283.69	88.72	0.00	271.64	548.15	968.17	1,499.03	884.29	826.38
7/4/07 4:29	63.34	487,750.50	367.43	485,732.00	83.93	0.00	271.63	548.40	969.37	1,498.16	884.77	826.94
7/4/07 4:30	63.09	485,287.31	367.57	485,180.31	82.90	0.00	271.59	548.37	968.28	1,493.82	884.68	826.92
7/4/07 4:31	63.14	486,143.19	367.71	484,628.59	79.53	0.00	271.55	548.40	968.67	1,496.19	884.36	826.68
7/4/07 4:32	62.74	483,839.81	367.82	484,076.91	77.67	0.00	271.53	548.41	967.39	1,489.79	883.80	826.20
7/4/07 4:33	62.28	480,455.19	367.89	483,525.31	78.61	0.00	271.45	548.43	966.73	1,486.45	883.26	825.69
7/4/07 4:34	62.59	482,615.41	368.01	482,973.50	78.11	0.00	271.39	548.61	967.32	1,494.39	883.14	826.10
7/4/07 4:35	62.36	480,095.00	368.20	482,421.81	78.26	0.00	271.18	549.01	969.15	1,493.32	883.66	826.86
7/4/07 4:36	62.14	479,926.69	368.45	481,870.19	81.83	0.00	271.09	549.28	970.05	1,495.44	884.21	827.23
7/4/07 4:37	60.95	468,890.69	368.64	481,229.09	81.29	0.00	270.98	549.31	969.63	1,489.27	884.35	827.84
7/4/07 4:38	60.85	468,489.81	368.84	480,527.31	82.43	0.00	270.85	549.54	969.60	1,490.58	884.14	827.96
7/4/07 4:39	60.88	469,639.91	368.99	479,825.59	82.07	0.00	270.57	549.95	969.60	1,494.96	883.91	827.54
7/4/07 4:40	60.41	465,994.59	369.11	479,123.91	80.88	0.00	270.31	550.21	969.53	1,492.89	883.70	827.31
7/4/07 4:41	60.91	468,514.91	369.22	478,422.09	82.80	0.00	270.11	550.26	969.81	1,500.12	883.24	827.12
7/4/07 4:42	61.65	474,504.09	369.26	477,720.41	79.65	0.00	269.93	550.30	971.45	1,505.85	882.80	826.52
7/4/07 4:43	61.59	473,618.31	369.31	478,174.91	82.95	0.00	269.81	550.30	972.44	1,501.93	882.41	825.83
7/4/07 4:44	61.41	472,310.81	369.34	478,896.19	83.04	0.00	269.86	550.11	972.22	1,501.15	881.69	825.50
7/4/07 4:45	61.60	472,282.50	369.36	479,617.59	80.91	0.00	269.98	550.01	971.70	1,500.55	881.09	824.76
7/4/07 4:46	61.19	470,538.50	369.39	480,338.91	79.13	0.00	270.06	549.91	970.16	1,497.94	880.42	824.09
7/4/07 4:47	61.05	469,911.91	369.43	481,060.31	80.06	0.00	270.06	549.94	968.91	1,497.23	879.95	823.28

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/4/07 4:48	60.42	466,389.81	369.43	481,781.59	79.34	0.00	270.02	549.86	967.16	1,494.17	879.43	822.25
7/4/07 4:49	61.19	472,341.91	369.47	482,502.91	82.19	0.00	269.92	549.76	966.67	1,503.16	878.99	821.79
7/4/07 4:50	61.33	473,969.31	369.48	483,224.31	82.92	0.00	269.80	549.82	967.85	1,503.88	878.79	821.35
7/4/07 4:51	61.95	478,787.81	369.41	483,945.59	79.15	0.00	269.73	549.64	968.78	1,507.43	878.23	820.52
7/4/07 4:52	61.91	476,030.41	369.32	483,749.00	83.42	0.00	269.71	549.34	969.92	1,503.52	877.78	820.28
7/4/07 4:53	61.93	476,754.00	369.20	483,118.81	83.01	0.00	269.81	549.01	970.23	1,501.88	877.11	819.62
7/4/07 4:54	61.61	475,581.59	369.05	482,488.59	80.99	0.00	269.86	548.49	969.29	1,502.13	876.18	818.74
7/4/07 4:55	61.54	474,297.00	368.93	481,858.41	82.19	0.00	269.91	548.34	969.91	1,500.13	875.93	818.84
7/4/07 4:56	60.38	469,106.59	368.89	481,228.19	81.21	0.00	269.87	548.31	969.05	1,489.65	876.04	818.79
7/4/07 4:57	60.29	466,053.00	368.85	480,598.00	78.80	0.00	269.86	547.98	966.88	1,493.85	875.66	817.99
7/4/07 4:58	60.68	469,747.50	368.76	479,967.81	78.23	0.00	269.72	547.83	967.11	1,500.53	875.50	817.80
7/4/07 4:59	60.83	470,279.81	368.67	479,337.59	76.52	0.00	269.49	547.87	968.94	1,501.11	875.71	817.73
7/4/07 5:00	60.14	464,748.31	368.54	478,707.41	79.19	0.00	269.39	547.53	968.68	1,495.97	875.29	817.03
7/4/07 5:01	60.89	470,398.09	368.32	478,077.31	82.53	0.00	269.31	547.22	970.11	1,502.96	874.83	816.81
7/4/07 5:02	60.78	468,159.31	368.14	477,901.81	83.83	0.00	269.17	547.07	971.72	1,500.83	874.73	816.61
7/4/07 5:03	60.51	466,250.31	367.96	478,374.00	86.71	0.00	269.12	546.66	971.41	1,498.76	874.11	815.84
7/4/07 5:04	61.15	471,115.19	367.74	478,846.31	86.34	0.00	269.12	546.20	971.31	1,502.13	873.58	815.65
7/4/07 5:05	61.06	469,501.59	367.59	479,318.50	85.76	0.00	269.10	546.01	972.92	1,501.39	873.76	815.84
7/4/07 5:06	61.02	471,201.69	367.51	479,790.69	84.97	0.00	269.11	545.73	972.62	1,499.73	873.93	815.84
7/4/07 5:07	61.30	471,667.50	367.45	480,262.91	89.11	0.00	269.15	545.35	972.05	1,504.42	873.85	815.58
7/4/07 5:08	61.30	472,005.69	367.36	480,735.19	89.29	0.00	269.26	545.11	972.08	1,503.26	873.99	815.61
7/4/07 5:09	61.69	473,950.69	367.32	481,207.41	88.35	0.00	269.33	544.91	972.04	1,503.80	874.14	815.69
7/4/07 5:10	61.29	470,647.81	367.26	481,679.59	83.70	0.00	269.37	544.72	971.65	1,501.09	874.26	815.63
7/4/07 5:11	61.56	474,586.81	367.11	482,151.81	81.97	0.00	269.44	544.45	970.82	1,504.37	873.77	814.83
7/4/07 5:12	61.54	474,267.09	367.02	482,624.09	84.38	0.00	269.50	544.21	970.92	1,501.72	873.34	814.48
7/4/07 5:13	61.27	472,792.09	366.84	483,096.31	87.86	0.00	269.53	543.82	970.32	1,499.11	872.86	814.15
7/4/07 5:14	61.24	472,081.19	366.66	483,568.50	86.17	0.00	269.60	543.36	969.41	1,500.91	871.92	813.32
7/4/07 5:15	62.18	477,676.69	366.51	484,040.81	83.75	0.00	269.63	543.20	970.86	1,505.96	871.45	813.30
7/4/07 5:16	61.48	474,659.91	366.29	483,495.59	81.44	0.00	269.60	542.67	970.48	1,498.66	870.84	812.90
7/4/07 5:17	60.58	466,165.00	366.05	481,501.50	80.04	0.00	269.69	541.89	968.52	1,494.02	869.69	811.84
7/4/07 5:18	60.68	468,332.19	365.81	479,507.50	80.05	0.00	269.78	541.49	968.25	1,496.70	868.70	811.23
7/4/07 5:19	61.26	471,266.09	365.66	477,513.41	76.31	0.00	269.66	541.65	969.52	1,502.60	868.67	811.56
7/4/07 5:20	59.85	460,403.81	365.59	475,519.31	77.03	0.00	269.58	541.62	969.44	1,490.59	868.92	811.34
7/4/07 5:21	59.90	462,262.41	365.53	473,525.19	78.69	0.00	269.54	541.53	968.46	1,495.73	868.63	809.57
7/4/07 5:22	61.10	471,213.19	365.65	473,031.81	77.66	0.00	269.33	541.84	972.17	1,506.59	867.75	810.36
7/4/07 5:23	60.98	468,579.09	365.86	476,413.19	74.59	0.00	269.14	542.30	976.12	1,501.47	866.05	811.94
7/4/07 5:24	61.36	472,059.31	365.98	479,794.59	73.74	0.00	269.16	542.05	975.12	1,505.63	865.12	810.90
7/4/07 5:25	62.70	482,381.31	366.16	483,176.00	68.96	0.00	269.19	542.03	976.00	1,513.61	865.84	812.38
7/4/07 5:26	62.42	478,705.09	366.30	486,557.41	69.64	0.00	269.28	542.09	976.09	1,503.57	868.21	815.21
7/4/07 5:27	62.34	479,847.59	366.46	488,943.59	71.52	0.00	269.50	541.99	974.23	1,505.33	869.12	817.69
7/4/07 5:28	61.90	476,130.09	366.72	489,447.19	76.80	0.00	269.71	542.28	975.20	1,498.91	869.24	821.96
7/4/07 5:29	61.95	475,528.81	366.94	489,950.91	78.49	0.00	269.91	542.32	971.52	1,502.10	870.45	824.47
7/4/07 5:30	62.15	478,218.09	367.10	490,454.50	78.62	0.00	270.03	542.27	968.56	1,502.67	871.80	825.10
7/4/07 5:31	62.32	480,864.81	367.22	490,958.19	78.91	0.00	270.04	542.59	969.17	1,504.25	872.96	824.46
7/4/07 5:32	62.36	480,373.50	367.40	491,461.81	80.36	0.00	270.03	542.75	970.93	1,504.01	872.38	824.97
7/4/07 5:33	62.64	481,356.19	367.63	491,965.50	79.28	0.00	270.05	543.10	974.48	1,503.42	871.62	825.37
7/4/07 5:34	62.59	482,679.59	367.84	492,469.09	80.43	0.00	270.03	543.25	973.93	1,503.98	871.25	823.48
7/4/07 5:35	63.03	486,471.81	367.98	492,972.81	83.00	0.00	270.05	543.23	972.61	1,507.45	872.05	823.63
7/4/07 5:36	62.90	484,981.59	368.06	493,476.41	81.88	0.00	270.09	543.16	972.36	1,503.36	873.44	824.67
7/4/07 5:37	62.85	485,096.41	368.14	493,980.00	81.87	0.00	270.14	543.00	972.43	1,502.59	873.25	825.98

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/4/07 5:38	63.05	485,930.00	368.31	494,483.69	80.45	0.00	270.24	543.35	973.09	1,504.82	873.79	827.77
7/4/07 5:39	63.24	488,166.59	368.47	494,987.31	82.44	0.00	270.29	543.66	971.68	1,506.97	875.61	829.10
7/4/07 5:40	62.90	484,862.19	368.66	495,491.00	82.76	0.00	270.37	543.74	969.37	1,502.16	876.87	828.58
7/4/07 5:41	62.81	483,758.09	368.84	495,994.59	83.63	0.00	270.44	543.84	968.85	1,499.72	877.29	828.17
7/4/07 5:42	62.65	483,051.69	368.97	496,707.50	88.04	0.00	270.44	543.91	968.08	1,500.30	876.51	827.93
7/4/07 5:43	62.64	483,370.91	369.18	497,788.41	88.26	0.00	270.44	544.37	969.82	1,498.20	875.84	827.03
7/4/07 5:44	61.93	474,953.09	369.31	498,869.31	89.31	0.00	270.49	544.42	969.36	1,493.17	875.23	825.01
7/4/07 5:45	62.01	479,622.50	369.32	499,950.31	84.89	0.00	270.46	544.27	968.31	1,500.15	875.18	824.46
7/4/07 5:46	62.89	485,604.09	369.35	501,031.19	83.55	0.00	270.39	544.19	968.18	1,505.55	875.08	824.35
7/4/07 5:47	63.13	487,894.81	369.35	502,112.09	82.61	0.00	270.29	544.19	969.21	1,508.41	874.56	824.37
7/4/07 5:48	63.47	488,295.41	369.44	501,699.81	78.40	0.00	270.30	544.20	971.36	1,510.98	875.09	825.22
7/4/07 5:49	63.14	486,369.31	369.51	501,229.41	77.80	0.00	270.47	544.07	971.88	1,504.57	876.05	825.48
7/4/07 5:50	63.43	488,950.50	369.58	500,759.00	79.09	0.00	270.64	543.85	972.18	1,508.95	875.81	824.92
7/4/07 5:51	63.57	489,791.91	369.66	500,288.69	79.63	0.00	270.74	543.91	972.97	1,507.78	875.70	826.12
7/4/07 5:52	63.51	490,348.50	369.85	499,818.31	80.83	0.00	270.91	544.15	970.67	1,507.35	875.04	826.74
7/4/07 5:53	63.52	490,646.91	370.03	499,347.81	87.24	0.00	271.03	544.17	968.54	1,508.31	874.66	827.10
7/4/07 5:54	63.47	490,768.31	370.26	498,877.50	86.64	0.00	271.09	544.30	968.51	1,508.15	875.35	828.40
7/4/07 5:55	63.22	488,441.91	370.41	498,407.09	88.18	0.00	271.14	544.31	967.30	1,504.94	876.06	828.59
7/4/07 5:56	63.14	490,227.69	370.57	497,936.69	83.95	0.00	271.15	544.21	964.27	1,503.06	876.03	828.33
7/4/07 5:57	63.30	491,605.09	370.64	497,466.31	86.06	0.00	271.15	544.15	964.29	1,506.15	875.62	828.36
7/4/07 5:58	63.21	489,929.81	370.71	496,995.91	83.96	0.00	271.12	543.98	964.85	1,503.35	875.37	828.02
7/4/07 5:59	63.05	487,164.31	370.69	496,525.50	82.03	0.00	271.11	543.85	966.31	1,498.61	875.52	826.91
7/4/07 6:00	62.99	487,626.31	370.66	496,055.09	81.74	0.00	271.14	543.71	968.85	1,496.74	875.38	822.81
7/4/07 6:01	62.64	482,738.31	370.71	495,584.69	80.27	0.00	271.15	543.53	971.27	1,490.64	873.30	819.91
7/4/07 6:02	62.36	480,963.31	370.74	495,114.31	80.24	0.00	271.11	543.42	972.27	1,488.85	870.02	818.09
7/4/07 6:03	62.55	481,781.81	370.77	494,643.91	82.86	0.00	270.95	543.59	974.11	1,492.68	869.37	815.76
7/4/07 6:04	62.31	480,354.81	370.84	494,173.50	80.91	0.00	270.76	543.68	974.12	1,492.93	870.44	815.58
7/4/07 6:05	62.15	478,138.41	370.89	493,688.00	77.70	0.00	270.61	543.66	973.94	1,495.42	871.96	816.71
7/4/07 6:06	62.19	478,360.31	370.97	492,976.09	79.39	0.00	270.51	543.87	976.49	1,496.10	872.27	818.58
7/4/07 6:07	62.09	477,825.31	370.99	492,264.19	81.75	0.00	270.40	543.97	977.90	1,497.80	871.92	820.32
7/4/07 6:08	62.47	477,560.81	371.04	491,552.19	82.33	0.00	270.28	544.06	976.67	1,502.88	872.96	821.67
7/4/07 6:09	61.55	474,139.91	371.05	490,840.31	78.59	0.00	270.18	544.04	973.85	1,496.09	874.38	821.28
7/4/07 6:10	61.89	476,341.09	371.00	490,070.69	76.82	0.00	270.12	543.98	971.98	1,501.07	874.43	818.89
7/4/07 6:11	62.21	479,939.19	371.01	489,287.69	77.42	0.00	270.01	544.23	972.63	1,502.51	872.67	817.82
7/4/07 6:12	61.27	472,078.81	371.06	488,504.69	80.98	0.00	269.93	544.21	970.56	1,494.14	870.01	816.17
7/4/07 6:13	62.36	481,424.91	371.07	489,937.19	82.14	0.00	269.90	544.26	969.12	1,507.22	869.11	813.88
7/4/07 6:14	62.33	480,657.41	371.10	491,674.19	82.80	0.00	269.86	544.68	971.44	1,502.89	870.90	815.11
7/4/07 6:15	62.59	481,620.09	371.18	493,411.19	82.71	0.00	269.86	544.84	970.98	1,503.37	872.10	815.70
7/4/07 6:16	62.88	484,331.00	371.21	495,148.19	80.84	0.00	269.95	544.82	972.27	1,506.81	871.86	817.34
7/4/07 6:17	63.57	489,378.41	371.32	496,885.19	75.81	0.00	270.07	545.24	975.74	1,513.29	872.57	820.61
7/4/07 6:18	63.54	488,294.41	371.40	498,622.19	74.97	0.00	270.20	545.28	974.63	1,511.27	874.14	822.20
7/4/07 6:19	63.44	487,919.59	371.50	500,359.19	77.31	0.00	270.37	545.42	974.94	1,507.06	875.81	822.20
7/4/07 6:20	63.85	492,362.19	371.56	501,415.81	82.01	0.00	270.50	545.19	973.79	1,513.78	876.19	821.12
7/4/07 6:21	63.34	487,273.19	371.60	499,951.00	79.49	0.00	270.65	545.24	973.66	1,503.54	874.76	821.50
7/4/07 6:22	63.30	488,296.31	371.67	498,486.31	76.08	0.00	270.75	545.10	971.45	1,503.94	872.85	820.04
7/4/07 6:23	63.44	489,117.09	371.72	497,021.50	76.36	0.00	270.84	545.12	969.76	1,506.73	872.83	818.05
7/4/07 6:24	63.08	486,760.09	371.78	495,556.69	78.14	0.00	270.88	545.33	969.23	1,499.06	874.16	818.76
7/4/07 6:25	62.74	485,540.91	371.82	494,091.91	80.17	0.00	270.89	545.01	965.58	1,494.85	874.22	818.68
7/4/07 6:26	62.72	485,017.59	371.87	492,627.09	81.97	0.00	270.88	545.00	965.72	1,495.41	873.44	820.70
7/4/07 6:27	62.39	483,321.50	371.98	491,162.31	82.81	0.00	270.80	545.20	965.79	1,492.72	873.81	822.87

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/4/07 6:28	61.35	475,055.09	372.15	489,697.59	80.31	0.00	270.71	545.44	964.65	1,488.07	875.38	824.10
7/4/07 6:29	61.56	477,086.00	372.32	489,194.91	77.74	0.00	270.61	545.72	964.99	1,494.23	876.91	822.04
7/4/07 6:30	62.15	481,706.81	372.53	488,890.41	83.14	0.00	270.40	546.04	967.21	1,501.19	876.51	819.65
7/4/07 6:31	62.35	480,778.50	372.74	488,585.91	83.04	0.00	270.14	546.48	970.09	1,499.80	873.80	818.71
7/4/07 6:32	60.87	469,031.00	372.95	488,577.19	82.94	0.00	270.08	546.47	968.67	1,490.72	872.08	816.58
7/4/07 6:33	60.86	469,528.59	373.03	489,052.59	82.23	0.00	270.07	546.67	968.67	1,493.02	872.09	814.75
7/4/07 6:34	61.19	471,632.59	373.14	489,528.00	82.47	0.00	269.94	547.15	969.04	1,499.19	873.27	815.89
7/4/07 6:35	60.71	468,511.81	373.32	490,003.50	79.10	0.00	269.80	547.55	970.47	1,493.22	873.95	817.51
7/4/07 6:36	61.20	472,761.81	373.37	490,478.91	81.36	0.00	269.75	547.62	970.08	1,501.30	872.60	818.75
7/4/07 6:37	61.27	470,608.81	373.47	490,954.31	80.83	0.00	269.68	547.93	970.02	1,499.43	872.91	820.55
7/4/07 6:38	61.53	474,149.50	373.59	491,429.81	81.04	0.00	269.60	548.38	970.74	1,501.60	874.62	821.72
7/4/07 6:39	61.09	471,344.09	373.64	491,905.19	80.90	0.00	269.61	548.46	969.02	1,499.92	875.35	818.86
7/4/07 6:40	61.91	477,215.91	373.69	492,380.59	77.79	0.00	269.65	548.73	971.20	1,505.31	874.23	818.72
7/4/07 6:41	62.11	477,137.19	373.78	493,423.09	74.90	0.00	269.68	548.93	972.01	1,503.71	872.06	818.62
7/4/07 6:42	61.50	474,254.69	373.80	495,051.69	77.05	0.00	269.75	548.95	970.18	1,498.93	871.10	816.02
7/4/07 6:43	63.22	486,917.81	373.84	496,680.31	75.80	0.00	269.82	549.28	970.15	1,512.92	871.78	814.80
7/4/07 6:44	62.56	481,636.69	373.91	496,709.41	78.50	0.00	269.84	549.67	971.00	1,500.83	873.80	816.96
7/4/07 6:45	62.80	483,226.09	374.01	496,447.00	80.88	0.00	269.99	549.54	969.95	1,502.45	873.66	818.30
7/4/07 6:46	63.49	490,255.81	374.07	496,184.59	81.17	0.00	270.14	549.56	970.48	1,513.82	872.91	820.02
7/4/07 6:47	62.99	485,577.00	374.13	495,922.19	82.30	0.00	270.31	549.83	970.74	1,502.30	874.06	821.73
7/4/07 6:48	62.69	484,426.50	374.16	495,659.81	84.39	0.00	270.45	549.69	968.11	1,499.92	874.89	820.37
7/4/07 6:49	63.05	487,911.41	374.12	495,397.31	82.27	0.00	270.55	549.49	968.03	1,505.56	875.01	816.54
7/4/07 6:50	63.19	487,130.31	374.08	495,134.91	82.08	0.00	270.51	549.23	968.76	1,506.57	872.42	814.66
7/4/07 6:51	62.93	485,602.09	374.02	494,872.50	79.22	0.00	270.52	549.06	969.57	1,499.90	869.43	813.59
7/4/07 6:52	62.64	483,951.81	374.01	494,610.09	77.30	0.00	270.56	548.85	967.90	1,496.20	869.11	810.33
7/4/07 6:53	62.43	482,932.81	374.05	494,347.69	80.20	0.00	270.59	548.57	966.30	1,495.32	869.61	809.62
7/4/07 6:54	62.74	486,203.31	374.10	494,085.31	82.10	0.00	270.56	548.51	966.55	1,501.61	870.86	811.66
7/4/07 6:55	62.11	479,098.91	374.12	493,822.81	85.89	0.00	270.49	548.21	966.38	1,492.75	870.56	813.12
7/4/07 6:56	62.34	482,260.31	374.18	493,560.41	87.78	0.00	270.43	547.88	966.84	1,499.05	870.23	815.09
7/4/07 6:57	61.67	477,533.00	374.17	493,216.81	85.11	0.00	270.30	547.76	967.08	1,496.92	871.63	817.23
7/4/07 6:58	60.83	470,094.81	374.18	491,656.09	85.14	0.00	270.27	547.57	967.26	1,489.31	872.78	814.81
7/4/07 6:59	60.75	469,203.69	374.15	490,095.31	79.11	0.00	270.20	547.24	968.13	1,493.59	871.67	809.11
7/4/07 7:00	59.82	461,696.81	374.09	488,534.50	78.42	0.00	270.04	546.90	969.13	1,488.16	867.17	806.76
7/4/07 7:01	59.81	462,350.81	374.02	486,973.69	80.15	0.00	269.89	546.61	968.71	1,492.24	862.89	803.78
7/4/07 7:02	60.27	465,186.69	373.88	485,412.91	82.38	0.00	269.53	546.46	969.57	1,500.57	861.82	800.22
7/4/07 7:03	60.54	466,175.81	373.70	484,851.91	83.83	0.00	269.17	546.51	971.65	1,499.58	862.28	797.87
7/4/07 7:04	60.87	468,522.81	373.54	486,328.50	83.49	0.00	269.02	546.23	972.65	1,501.15	861.66	795.87
7/4/07 7:05	61.61	474,221.91	373.41	487,805.09	84.17	0.00	268.98	545.90	973.54	1,507.17	858.36	796.00
7/4/07 7:06	62.32	478,923.31	373.27	489,281.69	82.54	0.00	269.03	545.67	974.24	1,511.03	856.43	795.04
7/4/07 7:07	61.66	477,148.59	373.19	490,758.31	81.22	0.00	269.15	545.49	973.73	1,501.26	857.35	793.63
7/4/07 7:08	61.42	472,473.81	373.12	491,820.59	81.24	0.00	269.38	545.27	971.51	1,498.45	858.68	795.74
7/4/07 7:09	61.47	475,415.50	373.14	491,813.00	86.04	0.00	269.54	545.21	970.23	1,500.63	859.70	798.85
7/4/07 7:10	61.24	472,965.41	373.26	491,805.41	89.48	0.00	269.60	545.12	968.77	1,497.27	859.01	801.23
7/4/07 7:11	60.62	468,970.91	373.24	491,797.81	85.11	0.00	269.60	545.03	966.76	1,493.72	859.06	803.10
7/4/07 7:12	61.03	471,126.31	373.19	491,790.19	80.86	0.00	269.53	545.24	967.41	1,499.13	860.70	805.54
7/4/07 7:13	60.57	468,925.50	373.21	491,782.59	79.73	0.00	269.42	545.24	968.23	1,497.16	862.41	801.21
7/4/07 7:14	61.16	473,224.81	373.21	491,775.00	77.93	0.00	269.33	545.21	970.82	1,503.12	860.71	797.94
7/4/07 7:15	61.33	474,742.81	373.27	491,767.50	76.62	0.00	269.18	545.19	973.99	1,503.97	856.95	797.46
7/4/07 7:16	61.03	471,250.69	373.31	491,708.09	76.08	0.00	269.10	545.12	975.42	1,498.90	855.39	794.69
7/4/07 7:17	61.24	471,454.91	373.30	491,635.50	77.64	0.00	269.05	545.02	974.83	1,501.41	856.11	792.66

	5250-JI-013 TURBINE OUTPUT (gross MW)	3311-FI-015 STEAM FLOW (LB/HR)	3223-TIC-036 SDA INLET TEMP (DEGF)	4331-FIC-078 TOAL FEEDWATER FLOW (LB/HR)	8243-SCI-211 BIOMASS FUEL FLOW (TPH)	3233-FI-510 PROPANE FLOW (SCFH)	4331-TI-071 FWP DISCH TEMP (DEGF)	4331-TI-100 ECONOMIZER OUT FW TEMP (DEGF)	3311-TIC-010 SH OUT STEAM TEMP	3311-PI-012 SH OUTLET STEAM PRESS (PSI)	3223-TI-015A SH OUTLET FLUE GAS TEMP (DEGF)	3223-TI-015B SH OUTLET FLUE GAS TEMP (DEGF)
7/4/07 7:18	62.26	478,826.19	373.24	491,562.91	78.30	0.00	268.99	545.12	975.72	1,507.62	857.94	795.56
7/4/07 7:19	61.79	476,361.09	373.28	491,490.31	75.93	0.00	268.96	545.03	976.42	1,498.30	858.52	798.61
7/4/07 7:20	62.00	475,780.59	373.24	491,803.31	81.03	0.00	269.13	544.42	973.69	1,503.56	857.03	799.97
7/4/07 7:21	63.01	485,202.91	373.21	493,199.81	81.54	0.00	269.32	544.30	974.22	1,509.32	857.72	802.23
7/4/07 7:22	63.01	484,887.00	373.19	494,596.31	78.76	0.00	269.41	544.38	974.54	1,506.76	859.57	803.09
7/4/07 7:23	62.09	479,001.81	373.17	495,992.81	76.58	0.00	269.61	543.79	972.26	1,498.93	860.20	798.41
7/4/07 7:24	62.69	482,983.59	373.06	495,818.91	75.30	0.00	269.84	543.32	972.28	1,502.89	858.62	797.50
7/4/07 7:25	62.69	483,736.31	373.02	495,462.31	78.55	0.00	269.97	542.94	971.37	1,503.94	856.15	796.64
7/4/07 7:26	62.83	485,130.41	372.99	495,105.81	80.65	0.00	270.11	542.61	970.63	1,504.72	856.14	793.16
7/4/07 7:27	62.17	480,269.41	372.99	494,749.19	79.02	0.00	270.17	542.30	969.88	1,495.85	857.20	794.07
7/4/07 7:28	62.47	481,795.41	372.88	494,392.59	82.01	0.00	270.29	541.68	968.45	1,501.30	857.43	795.88
7/4/07 7:29	62.98	487,350.50	372.77	494,036.00	85.04	0.00	270.32	541.39	970.50	1,507.72	856.53	797.54
7/4/07 7:30	62.49	483,117.09	372.58	493,679.50	85.37	0.00	270.35	540.89	970.93	1,500.22	855.45	798.46
7/4/07 7:31	62.73	484,895.19	372.36	495,759.81	87.22	0.00	270.38	540.45	970.89	1,504.50	855.22	799.18
7/4/07 7:32	63.56	489,632.91	372.19	498,905.50	83.31	0.00	270.39	540.64	974.70	1,513.27	855.90	798.60
7/4/07 7:33	63.14	486,316.19	372.08	502,051.19	85.48	0.00	270.44	540.41	974.95	1,504.03	855.04	794.94
7/4/07 7:34	63.71	490,735.81	371.95	503,016.31	83.48	0.00	270.59	540.08	974.83	1,514.41	853.87	793.03
7/4/07 7:35	63.89	490,766.81	371.92	502,696.31	82.24	0.00	270.67	539.91	976.32	1,515.61	853.39	792.03
7/4/07 7:36	63.74	490,221.91	371.88	502,376.31	82.88	0.00	270.76	539.62	975.62	1,511.43	853.06	790.80
7/4/07 7:37	63.60	490,632.31	371.80	502,056.31	86.30	0.00	270.94	539.05	972.35	1,508.74	853.14	792.03
7/4/07 7:38	63.58	490,506.41	371.74	501,736.31	85.14	0.00	271.02	538.72	971.82	1,509.37	853.00	793.35
7/4/07 7:39	63.97	494,105.69	371.65	501,416.31	88.72	0.00	271.10	538.40	970.77	1,515.68	852.65	793.78
7/4/07 7:40	63.36	489,948.31	371.70	501,096.31	90.38	0.00	271.18	538.07	969.69	1,503.13	852.22	794.71
7/4/07 7:41	63.33	491,323.81	371.60	500,776.31	88.24	0.00	271.26	537.55	967.48	1,503.98	852.36	795.38
7/4/07 7:42	63.42	490,760.59	371.57	500,456.31	87.27	0.00	271.30	537.29	967.53	1,506.19	853.03	794.02
7/4/07 7:43	63.39	490,469.31	371.50	500,136.31	86.08	0.00	271.30	537.27	969.22	1,503.91	853.86	794.67
7/4/07 7:44	63.22	489,372.09	371.56	499,816.31	82.98	0.00	271.32	537.00	967.99	1,501.00	854.44	794.34
7/4/07 7:45	63.00	487,321.00	371.58	499,496.31	82.94	0.00	271.37	536.88	967.97	1,496.48	854.66	793.20
7/4/07 7:46	63.32	490,014.00	371.61	499,176.31	85.04	0.00	271.32	536.90	969.92	1,503.23	855.72	793.71
7/4/07 7:47	62.54	483,339.81	371.59	498,856.31	85.44	0.00	271.31	536.86	969.34	1,486.70	856.52	795.40
7/4/07 7:48	62.41	483,678.69	371.63	497,022.31	85.94	0.00	271.32	536.71	967.50	1,487.49	856.30	795.87
7/4/07 7:49	62.39	484,129.00	371.70	493,306.41	84.56	0.00	271.25	536.94	966.71	1,490.41	856.44	796.76
7/4/07 7:50	61.68	477,066.91	371.75	489,590.59	86.70	0.00	271.14	537.42	967.92	1,480.67	857.14	798.97
7/4/07 7:51	60.83	471,067.31	371.74	485,874.69	87.28	0.00	271.00	537.45	965.46	1,482.80	857.44	799.54
7/4/07 7:52	60.32	469,261.31	371.88	483,444.59	88.58	0.00	270.84	537.73	964.20	1,486.02	857.28	799.46
7/4/07 7:53	60.69	473,625.00	371.81	483,634.81	89.26	0.00	270.58	538.14	962.51	1,495.65	856.86	800.07
7/4/07 7:54	60.59	471,138.69	371.92	483,825.00	87.14	0.00	270.26	538.80	962.68	1,494.84	856.51	801.22
7/4/07 7:55	60.56	472,026.19	372.05	484,015.19	85.88	0.00	270.02	539.08	963.11	1,497.26	856.15	801.53
7/4/07 7:56	60.93	473,436.69	372.06	484,205.41	83.91	0.00	269.88	539.51	965.51	1,501.59	856.40	802.63
7/4/07 7:57	61.41	475,712.69	372.12	484,395.59	83.75	0.00	269.81	540.07	969.73	1,502.95	857.23	806.43
7/4/07 7:58	61.31	475,155.50	372.22	484,585.81	82.21	0.00	269.74	540.37	970.38	1,502.40	857.56	809.63

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/3/07 17:58	838.81	357,984.91	253,824.41	70,636.34	4.29	27.88	14.45	279.68	31.40	54.55	0.00	9,451.33
7/3/07 17:59	837.81	366,817.41	255,239.09	70,716.20	3.11	27.75	14.43	280.37	31.95	54.25	0.00	8,964.34
7/3/07 18:00	836.97	332,846.91	252,867.09	69,765.38	5.10	27.50	14.42	279.68	31.15	54.15	0.00	8,964.68
7/3/07 18:01	836.97	354,401.81	252,233.70	70,157.15	3.04	27.59	14.40	279.57	31.55	53.70	0.00	10,916.42
7/3/07 18:02	839.17	367,838.81	253,064.09	70,553.02	3.70	27.50	14.38	279.01	31.80	53.80	0.00	10,477.17
7/3/07 18:03	841.10	364,736.59	255,877.80	70,502.44	4.65	27.63	14.37	279.33	30.95	53.95	0.00	10,395.19
7/3/07 18:04	842.69	368,985.59	256,492.91	71,091.09	5.14	27.72	14.35	279.36	35.30	59.95	0.00	10,416.11
7/3/07 18:05	844.44	353,924.09	253,599.20	71,190.32	5.14	27.59	14.34	279.37	35.10	60.10	0.00	10,265.00
7/3/07 18:06	845.34	359,792.91	253,453.41	70,812.86	5.14	27.50	14.46	279.35	35.10	60.00	0.00	9,746.15
7/3/07 18:07	842.98	361,886.19	254,262.30	70,095.70	5.14	26.69	14.48	279.01	35.05	60.05	0.00	9,674.07
7/3/07 18:08	840.10	358,251.69	254,462.20	70,812.19	4.88	26.54	14.57	279.35	34.45	58.30	0.00	9,555.29
7/3/07 18:09	837.72	362,253.81	253,223.00	70,545.20	4.64	26.50	14.66	280.02	33.25	57.25	0.00	9,816.95
7/3/07 18:10	835.25	358,501.09	253,514.20	70,875.93	4.21	26.52	14.77	280.35	33.00	56.10	0.00	7,584.30
7/3/07 18:11	833.98	365,329.09	251,438.91	70,288.87	4.17	26.75	14.75	280.72	31.65	54.60	0.00	0.00
7/3/07 18:12	834.43	354,931.91	249,897.80	70,490.19	3.43	26.67	14.73	280.70	31.25	54.50	0.00	0.00
7/3/07 18:13	835.93	368,209.50	253,064.59	70,636.17	3.25	26.91	14.71	280.70	31.10	53.95	0.00	0.00
7/3/07 18:14	838.05	361,923.19	251,517.80	70,073.53	4.23	27.00	14.69	280.70	31.45	54.35	0.00	0.00
7/3/07 18:15	839.06	348,112.00	249,380.09	69,927.13	5.97	27.00	14.67	279.65	31.40	53.85	0.00	0.00
7/3/07 18:16	839.53	353,198.69	250,019.41	69,853.72	3.34	27.38	14.65	279.36	31.85	53.75	0.00	0.00
7/3/07 18:17	840.15	364,267.81	253,072.50	70,749.84	1.95	26.77	14.63	279.01	31.50	54.25	0.00	0.00
7/3/07 18:18	840.88	348,526.91	251,065.59	70,184.72	4.37	26.70	14.61	279.35	31.80	54.20	0.00	0.00
7/3/07 18:19	841.15	347,270.81	249,923.09	70,314.23	4.10	26.97	14.59	279.36	31.80	53.80	0.00	0.00
7/3/07 18:20	842.01	377,579.91	252,039.59	70,411.80	3.74	26.88	14.57	279.36	31.85	54.10	0.00	0.00
7/3/07 18:21	842.33	355,848.81	251,389.50	70,779.19	4.04	27.19	14.55	279.65	32.00	54.05	0.00	8,984.01
7/3/07 18:22	842.17	360,474.41	251,696.00	70,757.98	4.61	27.00	14.45	280.36	31.40	54.00	0.00	7,731.49
7/3/07 18:23	842.66	353,353.69	251,610.50	70,782.98	6.14	26.75	14.45	280.35	31.05	53.95	0.00	5,646.17
7/3/07 18:24	843.64	358,298.59	253,515.00	71,113.44	6.04	27.13	14.45	280.35	34.15	60.00	0.00	6,052.77
7/3/07 18:25	844.31	354,345.50	253,593.00	71,284.66	6.04	25.88	14.45	280.04	34.85	60.20	0.00	6,454.37
7/3/07 18:26	844.52	356,739.50	248,624.41	70,242.13	6.04	26.88	14.46	279.67	35.00	59.90	0.00	7,981.46
7/3/07 18:27	844.51	363,938.81	250,489.80	70,821.77	6.04	26.79	14.46	279.67	35.05	59.95	0.00	8,327.63
7/3/07 18:28	844.93	358,595.59	251,387.30	71,225.91	4.26	26.91	14.46	280.01	35.25	59.65	0.00	8,307.46
7/3/07 18:29	845.63	364,923.00	251,668.70	72,119.02	4.32	26.25	14.55	280.02	35.45	59.25	0.00	8,418.50
7/3/07 18:30	845.85	347,456.50	248,083.80	71,184.00	5.15	25.97	14.71	279.67	34.70	58.70	0.00	6,600.71
7/3/07 18:31	845.34	326,522.91	246,692.80	70,986.62	3.35	26.79	14.76	279.01	34.00	58.85	0.00	6,374.60
7/3/07 18:32	844.79	356,891.19	252,061.41	70,841.57	4.82	27.00	14.71	279.01	33.55	57.80	0.00	5,609.78
7/3/07 18:33	844.77	354,230.41	247,632.20	70,854.55	5.51	27.72	14.65	278.01	33.65	56.30	0.00	6,191.95
7/3/07 18:34	846.10	361,836.59	253,310.00	71,415.81	3.08	27.88	14.60	278.02	32.70	56.70	0.00	5,779.01
7/3/07 18:35	847.10	350,444.00	249,059.91	71,794.34	6.37	27.91	14.54	277.35	33.05	55.60	0.00	7,946.97
7/3/07 18:36	847.21	349,433.00	246,075.50	70,750.15	3.62	27.84	14.49	276.65	32.05	55.45	0.00	7,834.11
7/3/07 18:37	847.26	362,274.09	246,352.80	71,710.91	3.88	27.88	14.43	275.70	32.10	55.15	0.00	0.00
7/3/07 18:38	847.36	356,710.09	250,640.80	72,335.77	4.58	27.72	14.38	274.65	31.55	55.40	0.00	0.00
7/3/07 18:39	847.27	342,181.81	246,715.59	71,312.47	7.38	27.75	14.32	273.98	31.85	55.20	0.00	0.00
7/3/07 18:40	847.24	354,855.00	246,786.91	70,788.91	4.39	28.05	14.31	273.53	31.20	54.70	0.00	0.00
7/3/07 18:41	846.91	353,999.59	250,451.00	73,408.38	3.75	27.05	14.31	273.00	31.65	54.70	0.00	0.00
7/3/07 18:42	846.81	355,930.81	247,020.41	71,489.59	6.17	26.91	14.31	273.00	32.10	54.65	0.00	0.00
7/3/07 18:43	846.93	342,670.31	241,662.59	72,129.74	4.70	26.75	14.27	273.00	31.20	54.35	0.00	0.00
7/3/07 18:44	846.13	354,175.09	247,192.09	71,839.20	8.65	27.84	14.19	272.69	35.00	60.20	0.00	0.00
7/3/07 18:45	846.42	354,134.41	245,465.91	71,856.06	8.65	27.81	14.11	272.70	35.15	59.75	0.00	0.00
7/3/07 18:46	846.65	352,993.41	244,883.00	71,965.21	8.65	27.73	14.01	272.32	35.25	60.10	0.00	0.00
7/3/07 18:47	847.04	357,133.41	248,615.80	71,944.02	8.65	27.78	14.10	272.32	34.90	59.90	0.00	0.00

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/3/07 18:48	846.03	344,713.19	243,462.00	71,038.12	6.71	27.41	13.94	272.03	35.10	60.10	0.00	5,510.92
7/3/07 18:49	843.85	348,769.31	243,344.91	71,808.52	6.77	27.72	13.94	272.16	34.60	59.15	0.00	0.00
7/3/07 18:50	841.46	344,125.91	238,569.50	70,462.80	4.16	27.41	13.94	272.03	33.70	58.15	0.00	6,447.05
7/3/07 18:51	839.36	353,214.81	244,438.50	71,728.11	4.30	27.24	13.95	272.03	33.45	56.90	0.00	0.00
7/3/07 18:52	838.22	348,530.31	242,701.09	71,285.79	7.62	26.75	13.95	272.03	32.80	56.40	0.00	7,195.63
7/3/07 18:53	838.49	344,441.69	241,801.91	70,831.28	5.01	26.29	13.95	272.72	32.75	55.60	0.00	0.00
7/3/07 18:54	839.31	345,860.81	241,933.70	70,949.35	5.76	25.50	13.95	272.72	31.95	54.85	0.00	5,233.00
7/3/07 18:55	839.85	347,862.00	240,988.91	70,776.52	6.58	25.66	13.95	272.72	32.20	53.90	0.00	0.00
7/3/07 18:56	839.95	341,487.09	239,054.80	70,129.48	5.62	25.88	13.95	273.00	31.70	54.00	0.00	0.00
7/3/07 18:57	839.65	348,974.50	237,938.20	71,011.27	6.19	25.75	14.03	273.00	31.75	54.25	0.00	0.00
7/3/07 18:58	838.81	341,472.19	239,785.09	70,631.30	6.14	25.38	13.99	273.09	31.20	53.85	0.00	0.00
7/3/07 18:59	838.53	335,927.31	237,969.59	70,417.30	5.79	24.85	13.79	273.03	33.15	54.00	0.00	4,462.45
7/3/07 19:00	838.42	343,854.09	236,142.20	70,483.31	2.77	24.72	13.89	273.40	31.65	53.95	0.00	0.00
7/3/07 19:01	837.85	346,325.69	243,575.50	70,755.47	4.33	23.88	13.98	273.65	32.65	53.65	0.00	6,734.49
7/3/07 19:02	836.93	343,285.19	237,276.00	70,106.39	6.63	24.00	14.08	273.65	31.10	53.90	0.00	0.00
7/3/07 19:03	836.79	330,794.91	234,975.20	71,014.01	4.21	23.88	14.17	273.97	31.45	53.90	0.00	6,118.29
7/3/07 19:04	836.90	356,497.19	242,548.09	70,418.84	5.05	23.84	14.48	273.96	35.15	59.95	0.00	0.00
7/3/07 19:05	837.21	342,883.31	234,960.70	70,659.61	5.05	23.82	14.37	273.97	35.15	59.90	0.00	9,750.66
7/3/07 19:06	836.47	339,642.59	236,325.30	70,761.80	5.05	23.88	14.26	274.45	35.00	60.00	0.00	0.00
7/3/07 19:07	836.14	337,549.31	234,409.20	70,047.79	5.05	24.13	14.13	274.31	35.45	60.05	0.00	3,174.21
7/3/07 19:08	836.11	342,898.81	235,216.80	70,324.94	2.70	23.00	14.10	273.97	34.80	59.55	0.00	0.00
7/3/07 19:09	834.02	339,376.09	235,367.30	70,191.08	6.25	22.81	14.14	273.96	34.10	58.35	0.00	0.00
7/3/07 19:10	832.81	346,789.91	240,278.59	70,680.73	4.11	23.00	14.17	275.01	33.10	57.45	0.00	3,907.99
7/3/07 19:11	831.66	353,522.09	242,684.70	71,701.24	7.83	23.00	14.21	275.34	32.95	56.85	0.00	0.00
7/3/07 19:12	831.59	338,686.91	234,159.91	70,381.16	5.65	22.25	14.24	275.34	32.10	54.80	0.00	6,287.72
7/3/07 19:13	830.92	331,470.19	234,612.00	71,531.70	5.76	22.13	14.28	274.99	31.45	54.25	0.00	0.00
7/3/07 19:14	831.63	342,314.81	232,957.09	70,533.23	5.27	22.13	14.32	275.01	31.65	53.90	0.00	5,795.58
7/3/07 19:15	831.19	337,522.09	235,702.50	71,152.75	5.14	21.88	14.35	274.98	31.20	54.10	0.00	0.00
7/3/07 19:16	830.59	334,079.69	231,799.91	70,731.53	5.77	22.66	14.39	275.02	32.25	54.15	0.00	7,289.00
7/3/07 19:17	829.98	331,013.09	231,285.50	70,858.45	6.60	22.00	14.43	275.36	31.25	53.85	0.00	0.00
7/3/07 19:18	829.02	354,104.31	239,426.80	71,947.06	3.98	21.60	14.46	275.34	32.15	54.25	0.00	0.00
7/3/07 19:19	828.64	336,210.81	232,052.50	71,584.92	8.30	21.75	14.50	275.70	31.65	53.95	0.00	0.00
7/3/07 19:20	828.84	341,639.59	237,604.09	71,871.45	4.92	21.88	14.53	275.70	30.95	54.20	0.00	0.00
7/3/07 19:21	828.54	348,776.09	237,425.70	71,629.09	6.48	21.34	14.57	275.70	31.85	54.10	0.00	3,890.79
7/3/07 19:22	828.70	330,687.91	231,592.00	71,903.12	5.49	21.38	14.61	275.70	31.70	53.85	0.00	0.00
7/3/07 19:23	828.74	325,386.50	229,154.91	70,919.45	6.34	21.50	14.64	275.70	31.25	53.95	0.00	6,047.91
7/3/07 19:24	828.91	345,036.31	229,796.00	70,835.46	4.00	21.38	14.54	275.70	34.20	60.05	0.00	0.00
7/3/07 19:25	830.22	345,455.41	235,021.91	71,725.67	4.00	21.97	14.48	276.01	35.05	60.05	0.00	6,193.18
7/3/07 19:26	829.99	343,621.91	236,374.80	72,208.61	4.00	22.97	14.43	275.70	34.65	59.85	0.00	0.00
7/3/07 19:27	829.91	331,074.81	235,638.30	70,710.30	4.00	22.06	14.38	274.99	34.70	60.05	0.00	8,664.24
7/3/07 19:28	829.75	336,185.19	238,241.91	71,594.98	5.99	22.00	14.43	275.01	34.30	59.15	0.00	0.00
7/3/07 19:29	830.09	324,212.59	235,319.30	71,743.71	5.17	21.78	14.32	275.01	33.50	57.85	0.00	8,743.41
7/3/07 19:30	830.24	338,823.09	241,491.50	70,824.73	5.94	20.88	14.21	274.99	33.40	56.95	0.00	0.00
7/3/07 19:31	830.55	323,886.69	238,552.70	69,871.24	5.20	21.97	14.10	275.01	31.85	55.40	0.00	0.00
7/3/07 19:32	831.43	350,909.19	241,516.20	70,969.00	2.73	21.88	13.99	275.01	31.60	54.20	0.00	1,625.65
7/3/07 19:33	831.89	334,686.69	238,607.00	70,856.08	5.31	22.00	13.88	275.17	31.85	54.00	0.00	0.00
7/3/07 19:34	832.28	335,726.81	233,778.50	70,405.24	4.17	22.88	13.77	275.34	31.55	54.15	0.00	5,934.00
7/3/07 19:35	832.25	327,963.00	233,406.09	70,445.38	3.40	23.13	13.78	275.01	31.10	53.65	0.00	0.00
7/3/07 19:36	832.15	333,988.50	242,069.20	71,199.32	3.38	22.11	13.90	274.62	31.25	54.15	0.00	8,017.19
7/3/07 19:37	831.58	327,701.81	237,175.70	69,982.19	4.56	21.91	14.01	274.31	31.25	54.35	0.00	0.00

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/3/07 19:38	831.43	329,986.19	234,660.00	71,010.30	2.42	21.22	14.13	274.33	30.85	54.25	0.00	9,687.48
7/3/07 19:39	831.48	328,983.91	235,168.50	69,924.00	3.39	20.91	14.24	274.62	31.85	54.25	0.00	0.00
7/3/07 19:40	832.28	331,963.31	236,280.80	70,044.81	3.94	20.97	14.36	274.99	32.25	53.95	0.00	2,158.28
7/3/07 19:41	832.51	326,629.09	237,128.30	69,490.95	5.24	22.25	14.47	276.00	31.95	53.65	0.00	739.77
7/3/07 19:42	832.09	335,433.19	236,696.80	69,995.88	2.52	21.00	14.59	276.00	31.80	54.05	0.00	0.00
7/3/07 19:43	832.43	336,932.19	239,345.00	70,177.06	4.38	21.13	14.70	276.65	31.98	54.15	0.00	5,339.48
7/3/07 19:44	833.73	335,638.00	239,394.59	69,759.08	4.55	21.00	14.82	276.65	34.75	59.85	0.00	0.00
7/3/07 19:45	835.54	336,949.69	239,635.30	70,010.63	4.55	21.00	14.93	277.68	35.05	60.05	0.00	5,649.79
7/3/07 19:46	836.61	324,194.41	237,592.50	69,922.30	4.55	21.66	14.88	277.68	35.05	59.85	0.00	0.00
7/3/07 19:47	837.98	331,525.59	240,010.80	70,225.28	4.55	21.75	14.86	277.34	34.75	59.85	0.00	6,462.28
7/3/07 19:48	839.27	340,299.09	237,460.41	70,152.41	4.75	21.63	14.85	276.66	34.60	59.00	0.00	0.00
7/3/07 19:49	840.59	328,026.81	239,346.00	70,008.38	5.42	21.63	14.84	276.67	33.70	58.05	0.00	10,442.02
7/3/07 19:50	840.00	334,660.19	236,221.70	69,733.76	3.15	21.88	14.83	276.34	33.50	57.10	0.00	0.00
7/3/07 19:51	840.71	342,001.81	244,498.70	70,431.61	2.91	21.75	14.82	276.34	32.30	55.85	0.00	3,047.13
7/3/07 19:52	841.78	335,375.59	240,545.00	71,030.70	4.13	21.66	14.81	276.35	31.45	54.55	0.00	0.00
7/3/07 19:53	842.26	334,320.81	244,806.70	70,113.18	3.38	22.00	14.82	276.67	31.30	53.95	0.00	0.00
7/3/07 19:54	842.41	336,187.81	245,499.00	70,975.45	5.15	22.88	14.82	276.67	31.85	53.95	0.00	2,501.03
7/3/07 19:55	843.48	338,689.69	245,871.09	70,924.55	5.89	22.53	14.82	276.67	31.85	54.05	0.00	0.00
7/3/07 19:56	844.72	326,992.41	237,808.09	69,944.47	4.37	22.38	14.83	276.34	31.65	54.40	0.00	6,372.02
7/3/07 19:57	844.91	338,263.09	241,253.80	70,642.92	3.82	23.13	14.83	276.32	31.35	54.05	0.00	0.00
7/3/07 19:58	845.85	331,902.41	238,962.09	71,974.59	2.86	22.50	14.83	276.00	30.80	54.05	0.00	8,715.54
7/3/07 19:59	846.88	347,913.00	247,044.30	72,490.95	2.05	22.28	14.83	276.33	31.30	54.25	0.00	0.00
7/3/07 20:00	847.77	335,087.31	239,434.00	71,965.98	6.18	23.00	14.83	275.98	30.55	54.25	0.00	10,261.44
7/3/07 20:01	848.15	346,892.31	243,536.50	71,762.09	3.12	22.97	14.83	275.70	31.40	53.75	0.00	0.00
7/3/07 20:02	848.41	339,088.41	244,053.50	72,195.48	5.45	23.00	14.83	275.70	31.90	53.75	0.00	0.00
7/3/07 20:03	847.76	337,837.00	244,595.20	72,159.36	5.58	22.75	14.84	275.70	31.35	53.95	0.00	0.00
7/3/07 20:04	846.72	339,403.31	243,584.41	71,858.63	4.51	21.78	14.90	275.70	35.00	60.00	0.00	0.00
7/3/07 20:05	846.40	327,821.31	239,694.00	71,346.21	4.51	22.19	14.95	275.70	35.60	59.90	0.00	6,226.78
7/3/07 20:06	845.90	350,494.91	247,742.50	71,694.43	4.51	22.09	14.99	276.01	35.05	59.90	0.00	0.00
7/3/07 20:07	846.18	331,156.41	238,816.70	70,766.41	4.51	21.88	15.03	276.34	34.90	60.20	0.00	8,142.12
7/3/07 20:08	845.44	341,877.81	243,139.59	71,978.60	3.04	21.91	15.08	276.65	34.50	59.15	0.00	0.00
7/3/07 20:09	845.03	342,850.09	246,443.80	71,420.27	4.62	21.88	15.08	276.65	34.15	58.55	0.00	8,268.03
7/3/07 20:10	844.40	337,662.31	242,384.80	71,503.01	4.38	21.88	15.05	276.65	33.70	57.70	0.00	0.00
7/3/07 20:11	844.78	342,816.09	241,799.91	70,922.95	5.17	22.00	15.11	276.66	32.75	57.25	0.00	4,115.32
7/3/07 20:12	845.41	342,200.00	244,853.80	71,388.16	4.28	21.75	15.18	276.35	32.30	56.35	0.00	0.00
7/3/07 20:13	845.98	352,481.09	240,566.91	71,027.30	5.25	21.75	15.24	276.66	32.45	55.65	0.00	0.00
7/3/07 20:14	845.35	337,484.31	242,482.20	71,719.87	4.04	21.84	15.30	276.66	31.85	54.80	0.00	3,378.48
7/3/07 20:15	846.34	339,329.69	243,502.50	72,027.33	1.87	21.88	15.37	276.66	32.15	54.05	0.00	0.00
7/3/07 20:16	847.54	329,897.50	239,255.30	71,125.06	3.38	21.78	15.43	276.34	31.65	53.90	0.00	7,945.36
7/3/07 20:17	847.22	334,327.59	241,278.80	71,503.48	3.81	22.75	15.49	276.35	31.65	54.15	0.00	0.00
7/3/07 20:18	847.10	350,651.59	252,680.91	71,809.37	2.77	22.25	15.56	276.01	32.05	53.95	0.00	8,570.04
7/3/07 20:19	846.01	339,781.31	245,283.80	71,500.92	4.41	21.00	15.62	275.53	30.85	54.25	0.00	0.00
7/3/07 20:20	845.89	341,825.41	243,635.91	71,299.28	3.08	21.00	15.67	276.03	31.45	54.00	0.00	3,029.09
7/3/07 20:21	845.54	341,592.31	246,617.91	71,952.05	3.42	21.00	15.60	275.70	31.75	54.25	0.00	0.00
7/3/07 20:22	845.80	336,463.09	245,383.80	70,648.73	4.38	20.78	15.53	275.70	31.90	53.75	0.00	0.00
7/3/07 20:23	846.51	341,506.41	247,370.50	71,677.93	3.32	21.00	15.47	275.70	31.70	53.95	0.00	4,685.64
7/3/07 20:24	847.08	339,347.69	246,403.80	71,627.17	3.25	21.50	15.40	276.34	34.75	60.00	0.00	0.00
7/3/07 20:25	847.37	336,931.19	245,265.70	70,467.66	3.25	21.97	15.45	276.00	33.90	60.05	0.00	6,008.81
7/3/07 20:26	847.12	342,995.81	248,235.20	72,192.38	3.25	21.88	15.48	276.01	34.90	59.70	0.00	0.00
7/3/07 20:27	847.98	341,919.81	248,687.00	72,215.40	3.25	21.59	15.51	275.70	34.70	60.10	0.00	8,528.81

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/3/07 20:28	847.79	343,054.19	247,183.41	71,656.52	6.50	21.75	15.34	275.34	34.65	59.70	0.00	0.00
7/3/07 20:29	848.53	330,119.00	248,826.30	71,051.14	3.73	23.13	15.05	275.35	34.65	58.15	0.00	0.00
7/3/07 20:30	849.69	338,464.50	251,770.80	72,109.51	4.93	22.06	14.75	275.01	33.90	58.05	0.00	0.00
7/3/07 20:31	851.17	346,915.81	249,950.70	71,050.33	6.43	22.91	11.84	275.01	32.65	57.25	0.00	0.00
7/3/07 20:32	852.90	360,419.31	259,358.50	71,996.23	4.22	23.81	11.39	276.01	33.00	56.60	0.00	0.00
7/3/07 20:33	854.16	337,249.09	248,417.80	71,239.23	7.82	23.97	11.25	277.34	32.95	55.90	0.00	0.00
7/3/07 20:34	855.66	339,312.59	249,213.70	71,238.86	3.62	23.75	11.21	278.32	31.85	55.20	0.00	0.00
7/3/07 20:35	857.07	351,971.00	254,265.59	72,216.71	3.88	24.13	11.18	278.70	32.35	54.90	0.00	0.00
7/3/07 20:36	857.77	342,849.91	248,863.30	72,258.25	4.04	24.63	11.30	279.35	31.35	54.20	0.00	0.00
7/3/07 20:37	858.29	349,249.81	255,222.20	71,435.60	4.88	25.13	11.07	279.35	31.25	53.80	0.00	0.00
7/3/07 20:38	859.06	346,153.31	245,189.50	72,107.12	4.95	25.53	10.83	280.04	31.35	54.20	0.00	0.00
7/3/07 20:39	858.88	341,856.00	253,203.00	72,391.77	4.23	25.88	10.60	280.35	32.05	53.80	0.00	0.00
7/3/07 20:40	859.34	339,946.50	249,259.00	71,345.04	4.81	25.77	10.36	280.35	31.70	54.55	0.00	0.00
7/3/07 20:41	860.62	333,665.59	247,339.70	71,610.05	4.72	25.94	10.13	280.35	31.40	54.10	0.00	0.00
7/3/07 20:42	861.77	343,487.81	247,606.09	71,869.93	2.49	26.88	9.89	281.01	31.10	54.15	0.00	0.00
7/3/07 20:43	862.68	335,868.31	247,785.50	72,566.72	4.11	27.75	9.85	281.03	31.70	53.55	0.00	0.00
7/3/07 20:44	862.93	345,759.00	252,129.00	72,823.34	3.45	28.00	10.05	280.35	34.60	59.95	0.00	0.00
7/3/07 20:45	862.35	337,824.09	246,542.70	71,712.15	3.45	27.19	10.25	280.35	34.85	60.05	0.00	0.00
7/3/07 20:46	862.97	358,601.00	255,990.41	72,304.20	3.45	25.91	10.35	281.04	35.25	60.00	0.00	0.00
7/3/07 20:47	863.03	351,268.19	248,245.80	71,838.16	3.45	25.63	10.43	281.03	34.40	60.05	0.00	0.00
7/3/07 20:48	862.44	348,118.41	253,886.80	72,378.70	4.61	26.00	10.51	281.37	34.90	59.30	0.00	0.00
7/3/07 20:49	861.29	343,455.91	247,917.00	73,199.09	4.78	26.86	10.31	281.37	34.90	59.40	0.00	0.00
7/3/07 20:50	860.86	344,200.59	249,054.09	73,415.21	5.20	26.59	10.17	281.67	34.50	58.95	0.00	0.00
7/3/07 20:51	860.40	335,577.19	246,587.70	72,869.43	5.81	26.51	10.12	281.37	34.30	59.20	0.00	0.00
7/3/07 20:52	860.82	340,317.09	245,174.30	73,070.27	4.42	26.50	10.08	281.37	34.90	59.20	0.00	0.00
7/3/07 20:53	860.60	338,530.50	247,701.91	72,352.98	4.30	27.00	10.16	281.37	34.45	59.00	0.00	0.00
7/3/07 20:54	860.92	347,737.59	248,106.00	72,046.42	3.27	26.25	10.15	281.66	34.10	59.00	0.00	0.00
7/3/07 20:55	861.09	338,071.09	244,157.91	71,748.28	3.48	25.80	10.13	282.04	33.75	58.50	0.00	10,165.42
7/3/07 20:56	858.23	345,278.69	246,300.00	72,801.74	3.22	26.50	10.12	282.35	33.45	57.40	0.00	8,643.76
7/3/07 20:57	856.03	349,511.81	249,737.59	73,950.95	6.82	25.97	10.11	282.02	33.60	56.90	0.00	8,125.30
7/3/07 20:58	855.53	331,394.19	243,411.80	71,820.91	4.27	25.88	10.10	282.35	33.00	56.95	0.00	7,803.33
7/3/07 20:59	855.53	334,175.09	243,961.00	72,351.69	3.60	25.97	10.09	282.84	32.60	56.30	0.00	6,401.40
7/3/07 21:00	856.42	338,929.91	245,655.80	71,375.60	3.02	24.75	10.08	283.99	33.10	55.85	0.00	6,212.87
7/3/07 21:01	857.39	333,752.31	243,994.70	71,933.55	3.03	25.75	10.07	284.66	31.65	54.70	0.00	6,441.64
7/3/07 21:02	857.71	342,707.50	249,673.00	71,724.96	2.79	26.84	10.06	285.35	31.65	54.75	0.00	8,332.90
7/3/07 21:03	858.26	350,048.59	248,842.59	72,285.18	3.11	27.00	10.05	285.20	32.55	54.45	0.00	6,426.81
7/3/07 21:04	858.64	349,454.59	247,012.30	72,559.55	4.27	26.88	10.04	285.06	34.80	60.00	0.00	6,837.96
7/3/07 21:05	858.90	350,875.59	252,139.91	71,884.82	4.27	26.97	10.03	285.06	35.15	60.10	0.00	8,585.37
7/3/07 21:06	858.48	343,538.09	244,714.41	72,655.07	4.27	26.75	10.02	284.38	34.80	60.00	0.00	6,925.10
7/3/07 21:07	857.98	342,621.31	246,892.91	71,994.12	4.27	26.75	10.01	283.99	34.90	60.10	0.00	6,992.20
7/3/07 21:08	858.38	336,013.09	245,944.91	71,705.19	3.95	26.84	10.00	283.04	34.50	60.30	0.00	6,402.76
7/3/07 21:09	859.79	350,648.31	247,798.30	72,454.07	2.48	27.13	9.98	282.36	34.70	59.70	0.00	5,724.77
7/3/07 21:10	860.14	339,422.50	246,319.50	72,663.62	6.69	27.91	9.97	281.37	34.55	59.00	0.00	5,820.60
7/3/07 21:11	860.44	345,835.19	246,682.70	72,239.48	4.67	29.00	9.96	280.72	34.70	59.00	0.00	0.00
7/3/07 21:12	860.23	353,408.31	252,109.80	72,269.64	4.57	28.38	9.94	279.67	34.65	59.10	0.00	0.00
7/3/07 21:13	860.18	355,878.81	251,922.30	72,639.72	5.63	28.08	9.92	278.70	33.80	58.35	0.00	0.00
7/3/07 21:14	859.39	341,819.19	245,802.00	71,766.77	6.98	27.91	9.91	278.01	33.40	57.45	0.00	0.00
7/3/07 21:15	859.69	349,640.31	249,339.09	71,758.83	5.06	27.28	9.89	278.01	33.40	57.20	0.00	0.00
7/3/07 21:16	859.49	335,490.00	243,614.70	72,407.99	4.63	29.34	9.87	277.70	32.70	56.30	0.00	0.00
7/3/07 21:17	860.03	364,541.41	248,013.00	72,032.05	3.27	28.80	9.86	277.03	32.95	56.35	0.00	0.00

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/3/07 21:18	859.87	342,817.09	246,351.91	72,003.12	3.30	28.78	9.84	277.03	32.50	55.40	0.00	0.00
7/3/07 21:19	860.33	322,527.59	245,560.30	72,238.62	2.29	28.75	9.82	276.53	32.35	54.65	0.00	0.00
7/3/07 21:20	860.37	341,178.81	243,235.30	72,195.84	3.35	28.00	9.81	276.34	30.95	53.80	0.00	0.00
7/3/07 21:21	860.82	357,255.81	252,307.30	72,774.73	5.81	28.95	9.79	276.34	32.35	54.25	0.00	0.00
7/3/07 21:22	860.05	341,072.41	247,861.41	72,491.30	7.00	29.51	9.77	276.34	32.30	54.20	0.00	0.00
7/3/07 21:23	860.05	337,067.91	247,000.41	72,479.60	3.46	28.38	9.76	276.33	31.85	54.05	0.00	0.00
7/3/07 21:24	859.93	346,776.81	249,843.70	72,252.77	4.38	28.00	9.74	276.66	35.45	60.05	0.00	0.00
7/3/07 21:25	859.41	348,438.81	250,908.20	73,283.81	4.38	27.78	9.72	276.34	34.90	60.05	0.00	0.00
7/3/07 21:26	859.12	347,200.00	247,689.09	72,687.18	4.38	27.13	9.96	276.65	35.45	59.85	0.00	0.00
7/3/07 21:27	860.07	351,293.31	250,189.41	73,307.13	4.38	27.13	9.82	277.33	34.65	60.05	0.00	0.00
7/3/07 21:28	860.76	338,900.91	251,586.50	73,697.70	5.46	27.97	9.61	277.99	35.05	59.90	0.00	0.00
7/3/07 21:29	861.63	338,869.31	247,101.20	73,353.92	4.20	27.97	9.54	277.68	35.40	60.40	0.00	0.00
7/3/07 21:30	862.46	335,922.31	244,329.00	72,475.52	3.43	27.75	9.47	278.01	34.30	59.50	0.00	0.00
7/3/07 21:31	863.11	341,802.09	249,461.70	72,456.39	1.97	29.68	9.41	278.01	34.50	59.35	0.00	0.00
7/3/07 21:32	864.29	344,369.81	250,856.70	72,703.76	4.11	29.12	9.34	278.01	33.95	59.00	0.00	0.00
7/3/07 21:33	865.17	345,813.19	249,185.59	72,381.41	4.72	29.84	9.27	278.00	34.20	58.80	0.00	0.00
7/3/07 21:34	865.05	341,609.69	250,558.09	72,817.45	4.80	30.13	9.21	277.03	33.90	58.80	0.00	0.00
7/3/07 21:35	865.28	336,950.41	248,450.09	72,170.27	3.04	29.00	9.14	277.03	34.00	58.20	0.00	0.00
7/3/07 21:36	865.94	351,722.41	251,005.30	72,317.30	3.84	29.00	9.07	277.18	33.75	57.75	0.00	0.00
7/3/07 21:37	866.12	350,690.59	251,356.50	72,021.47	3.05	29.70	9.01	277.19	33.40	57.90	0.00	1,288.83
7/3/07 21:38	864.03	348,359.09	251,918.41	72,939.96	3.24	30.00	8.94	277.70	34.05	57.20	0.00	5,927.83
7/3/07 21:39	863.72	350,278.59	251,341.30	72,837.69	3.57	29.88	8.87	277.84	34.20	57.05	0.00	8,106.36
7/3/07 21:40	864.24	345,361.50	252,691.09	72,725.71	5.61	29.88	8.80	278.01	33.35	56.95	0.00	8,555.44
7/3/07 21:41	866.14	347,955.81	250,567.50	71,772.17	3.20	29.22	8.74	278.69	33.30	56.95	0.00	8,106.31
7/3/07 21:42	868.22	352,127.19	251,631.09	72,651.16	1.36	29.50	8.67	279.01	32.80	56.20	0.00	8,884.01
7/3/07 21:43	869.92	349,140.41	251,692.70	71,647.75	2.93	31.38	8.37	279.68	32.80	55.20	0.00	7,362.99
7/3/07 21:44	871.70	355,703.69	256,071.50	71,896.01	5.06	32.50	7.73	279.68	35.00	60.00	0.00	7,117.54
7/3/07 21:45	873.22	362,900.81	254,617.80	72,314.36	5.06	30.69	7.91	279.36	35.35	59.90	0.00	5,858.39
7/3/07 21:46	874.05	353,415.91	257,239.80	72,243.77	5.06	30.75	8.03	279.67	34.85	60.20	0.00	5,475.67
7/3/07 21:47	874.87	341,814.69	254,758.91	72,356.08	5.06	30.47	8.16	279.65	34.65	59.85	0.00	5,658.47
7/3/07 21:48	875.20	355,243.41	256,698.70	72,271.94	3.85	31.00	8.29	279.65	35.05	60.20	0.00	6,844.48
7/3/07 21:49	874.86	350,338.59	256,768.91	72,472.98	5.19	31.00	8.42	279.65	35.00	60.05	0.00	8,621.14
7/3/07 21:50	874.63	350,106.50	256,569.50	72,115.33	4.40	30.91	8.61	279.65	34.90	59.85	0.00	8,069.69
7/3/07 21:51	875.26	360,348.69	260,884.50	72,765.22	4.93	30.00	8.58	279.67	35.35	59.90	0.00	7,969.41
7/3/07 21:52	875.39	339,887.81	255,298.30	72,046.41	5.18	31.88	8.56	279.01	35.45	60.00	0.00	7,580.51
7/3/07 21:53	875.79	351,735.09	257,091.80	72,733.15	3.08	31.28	8.53	278.69	35.00	60.05	0.00	0.00
7/3/07 21:54	875.72	354,259.00	258,929.30	72,672.09	3.58	32.31	8.51	278.01	34.75	59.70	0.00	0.00
7/3/07 21:55	874.87	355,508.31	258,649.20	72,468.27	5.23	32.75	8.48	277.69	34.70	58.90	0.00	0.00
7/3/07 21:56	874.40	338,095.09	259,906.41	71,764.02	5.50	31.66	8.46	277.03	34.50	58.50	0.00	0.00
7/3/07 21:57	875.10	371,074.00	261,870.70	72,337.04	3.52	31.74	8.44	277.03	34.15	58.30	0.00	0.00
7/3/07 21:58	875.44	357,243.00	261,709.20	71,689.74	6.77	33.25	8.41	277.02	34.35	57.90	0.00	0.00
7/3/07 21:59	875.54	361,579.00	266,628.81	72,772.02	5.65	32.81	8.39	277.03	33.60	58.10	0.00	0.00
7/3/07 22:00	875.11	355,571.91	262,175.41	72,490.88	7.22	32.44	8.36	277.03	34.35	58.50	0.00	0.00
7/3/07 22:01	874.45	347,045.59	259,750.70	71,827.26	6.37	31.84	8.34	276.65	34.35	58.30	0.00	0.00
7/3/07 22:02	875.31	361,966.50	263,248.81	72,379.48	3.54	31.88	8.31	277.02	34.20	59.05	0.00	0.00
7/3/07 22:03	876.02	351,839.69	260,862.59	72,736.02	5.06	32.00	8.31	277.34	34.55	59.35	0.00	0.00
7/3/07 22:04	876.12	356,539.91	263,608.41	72,465.86	4.20	31.91	8.33	277.34	35.03	60.15	0.00	0.00
7/3/07 22:05	875.23	357,938.00	261,651.41	72,234.05	4.20	31.13	8.34	277.03	35.20	59.90	0.00	0.00
7/3/07 22:06	875.12	361,506.19	260,512.00	72,399.41	4.20	30.16	8.35	277.34	34.55	60.20	0.00	0.00
7/3/07 22:07	875.29	354,866.00	261,074.30	72,622.06	4.20	30.38	8.36	277.01	34.55	59.95	0.00	0.00

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/3/07 22:08	875.76	368,084.50	262,887.09	72,730.27	5.01	31.75	8.37	277.70	35.75	60.50	0.00	0.00
7/3/07 22:09	875.90	359,408.91	267,383.81	72,598.63	6.72	31.88	8.38	277.33	35.25	60.50	0.00	0.00
7/3/07 22:10	876.60	363,808.41	260,490.70	72,270.39	5.15	31.75	8.40	277.33	35.25	60.30	0.00	0.00
7/3/07 22:11	875.78	355,648.31	263,126.41	72,839.54	5.93	31.80	8.41	276.66	35.45	60.50	0.00	0.00
7/3/07 22:12	876.11	367,806.50	264,465.91	73,406.65	5.46	31.38	8.42	277.02	35.35	59.95	0.00	0.00
7/3/07 22:13	876.02	356,927.50	259,133.20	71,945.95	7.44	30.81	8.37	277.02	35.30	60.55	0.00	0.00
7/3/07 22:14	875.73	361,268.31	261,316.09	72,731.66	4.40	30.78	8.49	276.66	35.20	60.70	0.00	0.00
7/3/07 22:15	874.76	342,812.91	258,903.20	72,344.77	6.72	30.86	8.59	277.03	35.45	60.80	0.00	0.00
7/3/07 22:16	874.73	369,305.00	262,659.41	73,191.12	3.46	30.88	8.60	277.03	35.45	60.60	0.00	0.00
7/3/07 22:17	875.28	362,472.31	262,733.00	72,251.21	5.85	30.59	8.61	277.03	35.60	60.90	0.00	0.00
7/3/07 22:18	874.28	352,664.81	258,524.30	72,461.52	6.64	30.63	8.62	277.03	34.70	61.00	0.00	0.00
7/3/07 22:19	873.10	356,479.69	258,111.00	72,240.95	5.40	30.61	8.71	277.34	35.70	61.10	0.00	0.00
7/3/07 22:20	871.88	352,348.50	258,733.20	72,366.47	6.23	30.50	8.74	278.03	35.55	60.95	0.00	0.00
7/3/07 22:21	871.89	360,016.69	260,460.41	72,959.29	4.69	29.50	8.78	278.01	35.25	60.85	0.00	0.00
7/3/07 22:22	872.53	361,975.41	267,540.09	73,078.03	4.96	29.88	8.81	278.01	35.85	60.95	0.00	0.00
7/3/07 22:23	872.41	351,746.59	256,661.30	72,288.75	6.79	30.13	8.85	278.70	34.20	61.35	0.00	0.00
7/3/07 22:24	872.17	345,685.31	255,661.30	72,263.11	4.73	29.88	8.89	278.69	34.90	60.05	0.00	0.00
7/3/07 22:25	872.75	347,337.59	256,071.70	72,586.95	4.73	30.00	8.92	278.33	35.45	60.00	0.00	0.00
7/3/07 22:26	873.00	341,856.59	252,483.09	72,340.43	4.73	30.75	8.96	278.01	35.15	60.10	0.00	0.00
7/3/07 22:27	873.05	354,840.31	260,251.20	71,862.39	4.73	31.00	8.99	278.32	34.60	60.40	0.00	0.00
7/3/07 22:28	872.14	348,107.31	253,531.30	72,529.31	5.02	31.00	9.03	278.68	34.95	59.60	0.00	0.00
7/3/07 22:29	871.97	344,340.31	253,938.80	73,406.48	4.65	31.03	9.07	278.33	34.70	59.50	0.00	0.00
7/3/07 22:30	872.07	350,519.09	253,574.50	71,754.51	5.75	30.13	9.10	278.33	34.35	59.70	0.00	0.00
7/3/07 22:31	871.92	351,473.41	254,602.70	71,590.21	5.44	30.66	9.14	278.02	34.65	59.30	0.00	0.00
7/3/07 22:32	871.82	346,715.19	252,324.70	72,188.96	5.31	31.06	9.17	278.00	34.10	59.40	0.00	0.00
7/3/07 22:33	870.97	361,704.91	262,915.81	72,745.40	5.01	31.13	9.21	278.00	34.65	58.75	0.00	0.00
7/3/07 22:34	870.71	353,227.59	257,745.20	73,374.48	7.71	30.22	9.24	278.01	33.95	58.65	0.00	0.00
7/3/07 22:35	870.70	360,931.91	253,357.50	72,353.14	6.65	29.88	9.28	278.00	33.85	58.85	0.00	13,685.58
7/3/07 22:36	870.40	362,640.00	258,716.59	72,816.06	4.69	30.00	9.32	278.01	34.05	58.05	0.00	13,719.04
7/3/07 22:37	871.35	366,466.09	262,373.81	73,538.56	4.37	29.13	9.35	278.01	33.60	57.65	0.00	13,696.46
7/3/07 22:38	871.85	341,321.69	253,348.59	72,550.72	6.69	29.07	9.39	278.38	33.30	56.70	0.00	13,601.08
7/3/07 22:39	871.62	347,383.19	254,890.09	73,071.66	4.95	30.25	9.42	278.33	32.50	56.35	0.00	5,335.00
7/3/07 22:40	868.66	345,697.09	253,206.70	72,393.34	5.70	29.00	9.45	278.69	32.60	54.75	0.00	11,121.60
7/3/07 22:41	864.62	356,058.81	255,685.20	72,685.30	3.79	29.00	9.15	279.01	31.45	53.85	0.00	12,261.91
7/3/07 22:42	861.65	351,907.50	253,989.41	71,783.70	4.58	29.81	9.06	278.32	31.55	54.20	0.00	12,077.83
7/3/07 22:43	857.60	357,737.81	257,582.59	73,550.37	5.32	29.38	8.99	278.32	31.35	53.95	0.00	11,841.49
7/3/07 22:44	852.78	354,697.81	255,786.70	72,168.93	3.66	28.63	8.92	279.01	34.05	59.95	0.00	11,657.77
7/3/07 22:45	851.94	356,723.19	255,341.80	73,220.95	3.66	28.63	8.86	279.01	34.95	59.95	0.00	11,090.85
7/3/07 22:46	852.76	346,389.19	255,178.20	72,803.68	3.66	28.75	8.79	279.01	35.40	60.00	0.00	11,038.18
7/3/07 22:47	855.21	377,354.31	267,328.31	73,158.88	3.66	28.97	8.72	279.01	35.85	60.05	0.00	10,918.75
7/3/07 22:48	856.59	351,866.91	259,074.20	73,138.11	8.35	29.59	8.65	279.01	34.70	59.50	0.00	10,842.76
7/3/07 22:49	857.41	329,406.31	257,183.00	73,093.36	3.93	29.88	8.59	279.35	34.20	58.40	0.00	9,065.93
7/3/07 22:50	855.45	355,701.31	259,805.00	73,383.96	4.78	29.13	8.52	279.68	33.40	57.15	0.00	9,527.72
7/3/07 22:51	853.85	356,464.09	258,939.00	72,899.84	5.80	29.63	8.45	280.35	33.05	57.10	0.00	9,428.28
7/3/07 22:52	853.70	348,106.09	255,202.09	72,825.11	5.22	29.97	8.38	281.03	33.95	57.50	0.00	9,036.29
7/3/07 22:53	852.18	361,455.31	260,483.41	73,184.00	3.48	30.75	8.32	281.68	33.65	57.00	0.00	9,508.70
7/3/07 22:54	850.63	343,199.59	258,191.20	72,476.93	7.15	30.28	8.25	281.68	32.25	56.05	0.00	11,973.21
7/3/07 22:55	851.56	349,064.91	257,839.59	72,514.38	3.82	30.97	8.18	281.68	31.40	55.65	0.00	10,572.85
7/3/07 22:56	854.28	357,468.09	257,582.41	73,200.45	3.03	30.13	8.11	282.19	32.05	54.90	0.00	10,460.02
7/3/07 22:57	855.70	348,738.91	257,660.20	72,971.48	6.15	31.59	8.05	282.64	31.70	53.95	0.00	10,452.58

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/3/07 22:58	857.41	354,998.69	257,228.59	72,188.38	4.53	32.00	8.01	282.35	32.20	54.00	0.00	10,327.22
7/3/07 22:59	857.97	351,112.69	258,183.20	72,882.92	3.81	31.00	8.01	282.34	31.55	54.10	0.00	8,967.18
7/3/07 23:00	857.89	353,915.00	258,397.20	73,665.02	7.17	30.97	8.01	282.49	31.00	53.95	0.00	9,143.74
7/3/07 23:01	857.28	352,120.81	257,955.20	72,338.84	6.57	31.98	8.01	282.35	31.35	53.65	0.00	9,059.61
7/3/07 23:02	857.45	353,756.41	257,637.91	72,749.28	3.39	31.27	8.00	282.35	31.00	54.25	0.00	8,670.04
7/3/07 23:03	855.84	338,297.59	255,420.09	72,423.00	5.87	31.72	8.00	283.03	31.40	54.05	0.00	8,983.24
7/3/07 23:04	855.68	371,942.41	269,845.41	74,629.64	5.53	32.00	8.00	283.04	35.25	59.80	0.00	10,922.25
7/3/07 23:05	854.78	344,531.00	256,265.50	72,067.55	5.53	32.00	7.99	282.65	34.50	60.15	0.00	10,406.80
7/3/07 23:06	855.14	354,545.41	256,992.50	71,740.05	5.53	32.00	7.91	282.64	33.90	59.80	0.00	10,451.25
7/3/07 23:07	856.20	351,578.00	257,796.80	72,424.59	5.53	32.75	7.84	283.33	35.05	59.90	0.00	10,474.67
7/3/07 23:08	856.92	362,470.00	259,378.00	72,724.78	3.59	32.94	7.76	283.68	34.65	59.70	0.00	4,875.95
7/3/07 23:09	856.78	351,848.31	259,653.20	72,961.31	5.41	32.75	7.68	283.68	34.35	58.50	0.00	9,101.60
7/3/07 23:10	855.63	376,504.41	258,951.09	73,589.42	5.50	33.75	7.69	283.33	33.75	58.35	0.00	8,383.61
7/3/07 23:11	855.19	350,965.69	256,455.50	72,466.50	7.01	33.50	7.71	283.68	33.35	57.50	0.00	8,853.52
7/3/07 23:12	855.08	354,587.31	257,974.91	72,489.80	3.39	33.00	7.72	283.70	32.90	57.25	0.00	8,510.59
7/3/07 23:13	852.95	345,709.81	255,995.70	72,337.66	4.96	32.94	7.73	283.68	32.83	56.08	0.00	3,894.89
7/3/07 23:14	852.55	359,277.59	260,404.50	72,458.15	5.85	32.81	7.72	283.33	33.38	55.67	0.00	12,560.37
7/3/07 23:15	854.18	368,166.50	261,286.80	72,497.33	4.73	32.75	7.67	283.33	32.65	54.90	0.00	12,511.52
7/3/07 23:16	857.10	353,407.09	260,965.70	72,464.00	5.12	32.56	7.63	283.31	31.45	54.60	0.00	12,741.26
7/3/07 23:17	859.56	351,628.31	259,542.09	73,248.19	4.01	32.75	7.68	283.70	32.15	54.70	0.00	12,732.54
7/3/07 23:18	861.44	364,652.91	262,899.81	72,665.85	5.17	32.94	7.69	283.68	31.25	54.90	0.00	3,634.17
7/3/07 23:19	860.32	361,157.81	262,000.59	72,541.80	5.44	31.89	7.69	283.70	32.00	54.55	0.00	11,814.91
7/3/07 23:20	857.21	349,761.81	260,175.09	72,486.66	3.94	32.00	7.70	283.68	31.65	53.80	0.00	12,088.38
7/3/07 23:21	856.47	364,363.59	263,705.09	72,287.44	3.60	31.83	7.71	283.70	31.35	54.25	0.00	10,684.83
7/3/07 23:22	855.43	354,169.31	260,802.59	72,292.05	5.58	32.75	7.71	284.23	31.40	54.35	0.00	11,280.25
7/3/07 23:23	853.69	357,763.19	260,931.80	72,118.59	3.63	33.00	7.87	284.36	33.10	54.45	0.00	11,190.78
7/3/07 23:24	855.01	367,667.00	263,517.41	73,023.27	5.11	32.25	7.84	284.38	34.60	60.10	0.00	11,220.87
7/3/07 23:25	856.24	357,218.59	262,081.70	72,753.39	5.11	32.94	7.81	284.38	35.55	59.90	0.00	11,075.90
7/3/07 23:26	858.70	358,424.31	264,453.69	73,100.66	5.11	32.75	7.77	284.66	35.15	59.85	0.00	10,923.00
7/3/07 23:27	861.93	361,605.41	265,231.19	73,459.30	5.11	32.25	7.74	285.04	34.55	60.05	0.00	11,218.77
7/3/07 23:28	863.49	355,629.69	260,204.09	72,907.10	7.29	32.25	7.71	285.06	34.90	59.85	0.00	8,875.70
7/3/07 23:29	861.98	359,564.41	261,341.00	72,660.59	4.18	32.75	7.68	285.04	34.75	59.65	0.00	8,916.27
7/3/07 23:30	859.30	360,895.41	265,612.69	73,001.38	4.95	32.31	7.65	285.04	34.60	59.35	0.00	8,977.98
7/3/07 23:31	858.63	356,520.41	264,342.50	73,185.78	8.02	32.44	7.61	285.06	34.15	58.45	0.00	9,228.13
7/3/07 23:32	857.86	354,114.00	261,686.09	72,363.67	6.03	32.81	7.58	285.71	34.35	58.10	0.00	9,579.52
7/3/07 23:33	857.34	353,178.81	261,536.70	73,114.13	5.07	33.94	7.55	286.01	34.20	58.20	0.00	10,679.48
7/3/07 23:34	859.46	349,877.41	261,053.09	72,685.40	6.08	33.00	7.52	286.01	33.85	58.75	0.00	9,684.92
7/3/07 23:35	862.05	361,765.81	264,236.81	72,292.79	4.12	33.00	7.49	285.71	34.15	58.35	0.00	9,435.51
7/3/07 23:36	865.26	359,997.81	265,055.81	72,444.39	4.75	32.75	7.46	285.72	34.70	58.40	0.00	9,237.38
7/3/07 23:37	868.65	350,797.50	261,036.30	73,198.66	4.28	32.75	7.42	285.71	34.10	58.40	0.00	9,590.34
7/3/07 23:38	870.05	355,050.31	261,087.00	71,871.30	4.40	34.00	7.39	285.71	34.05	58.95	0.00	8,618.45
7/3/07 23:39	868.64	365,193.69	263,210.81	72,759.44	3.69	32.81	7.36	285.71	34.15	58.75	0.00	8,601.56
7/3/07 23:40	866.48	354,128.91	262,183.91	72,073.30	6.06	34.00	7.33	286.01	33.80	58.55	0.00	8,397.85
7/3/07 23:41	865.02	370,604.00	265,437.69	72,326.69	3.66	33.81	7.30	286.69	34.15	58.60	0.00	8,616.69
7/3/07 23:42	862.64	362,338.91	264,619.69	72,376.28	5.09	33.50	7.26	286.40	33.40	58.35	0.00	8,608.03
7/3/07 23:43	861.91	361,963.91	264,648.69	72,512.42	5.09	33.50	7.23	286.39	33.55	58.20	0.00	11,586.93
7/3/07 23:44	863.63	361,588.41	266,853.09	73,044.59	6.27	33.56	7.20	286.01	34.45	59.90	0.00	11,498.71
7/3/07 23:45	865.62	361,527.19	266,971.59	72,813.23	6.27	33.00	7.17	286.40	34.40	59.95	0.00	11,215.88
7/3/07 23:46	868.33	366,043.19	264,762.00	72,740.17	6.27	32.75	7.14	286.39	35.15	59.80	0.00	11,165.59
7/3/07 23:47	870.40	362,366.41	266,603.81	73,104.90	6.27	33.56	7.11	287.00	34.45	60.20	0.00	8,676.66

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/3/07 23:48	869.61	354,666.69	265,206.00	72,944.52	5.65	34.00	7.20	287.00	35.40	60.15	0.00	10,062.95
7/3/07 23:49	865.89	370,706.31	263,585.69	72,201.77	4.77	34.00	7.23	287.00	35.40	60.20	0.00	10,297.44
7/3/07 23:50	862.63	359,485.81	266,018.31	72,347.30	4.79	33.75	7.26	286.69	34.45	60.50	0.00	10,186.74
7/3/07 23:51	860.27	354,577.31	262,356.91	72,785.32	4.36	33.75	7.30	287.02	35.80	60.55	0.00	10,385.67
7/3/07 23:52	858.39	367,862.09	266,893.41	72,317.13	4.24	33.75	7.33	287.33	35.65	60.60	0.00	4,980.66
7/3/07 23:53	858.20	355,205.59	264,896.81	72,228.13	6.61	34.06	7.36	287.33	35.15	60.75	0.00	10,377.55
7/3/07 23:54	860.84	366,826.41	266,691.09	72,360.61	4.78	33.75	7.39	287.33	35.30	60.75	0.00	10,398.52
7/3/07 23:55	863.64	359,898.69	264,616.91	72,844.64	4.40	33.75	7.43	287.33	35.50	60.75	0.00	10,336.56
7/3/07 23:56	865.39	363,595.09	265,581.81	72,056.77	5.12	34.50	7.46	287.63	35.00	61.05	0.00	10,343.42
7/3/07 23:57	866.89	359,735.31	265,545.81	72,546.34	4.16	33.94	7.49	287.64	35.95	61.25	0.00	0.00
7/3/07 23:58	866.58	369,707.41	267,602.31	72,753.49	4.64	33.81	7.52	287.33	36.05	61.15	0.00	8,960.62
7/3/07 23:59	863.79	338,840.81	264,914.69	72,336.91	7.47	34.25	7.56	287.33	35.75	60.90	0.00	8,428.90
7/4/07 0:00	861.18	356,764.31	264,894.81	72,071.16	4.51	34.50	7.49	287.33	34.90	60.60	0.00	8,639.42
7/4/07 0:01	858.76	365,248.81	265,037.31	73,006.31	4.05	34.50	7.42	287.64	35.20	60.90	0.00	8,988.17
7/4/07 0:02	856.79	360,886.41	263,320.91	72,453.66	6.12	34.50	7.34	287.33	36.00	60.85	0.00	8,667.37
7/4/07 0:03	858.04	364,671.59	265,550.09	72,923.29	6.09	34.75	7.27	288.36	34.95	61.05	0.00	10,375.29
7/4/07 0:04	860.13	357,820.81	265,635.91	73,141.01	6.96	34.50	7.20	288.36	34.55	60.05	0.00	10,344.92
7/4/07 0:05	862.59	351,182.09	263,204.31	72,162.41	6.96	34.00	7.12	288.36	34.60	59.95	0.00	10,377.42
7/4/07 0:06	865.35	364,049.81	262,881.69	72,632.98	6.96	34.75	7.05	288.74	34.90	59.95	0.00	10,378.46
7/4/07 0:07	868.82	365,549.00	260,730.00	72,390.13	6.96	34.75	6.98	288.36	35.05	60.00	0.00	8,134.07
7/4/07 0:08	868.45	352,768.00	264,132.69	72,947.58	6.94	34.75	6.91	288.36	34.90	60.25	0.00	9,137.98
7/4/07 0:09	865.39	363,220.31	266,767.81	74,032.60	5.40	34.94	6.74	288.02	35.45	60.40	0.00	8,670.95
7/4/07 0:10	862.59	349,854.69	265,639.31	73,422.14	8.30	34.81	6.70	288.01	35.75	60.40	0.00	9,034.65
7/4/07 0:11	859.41	357,329.59	261,360.30	73,434.81	5.70	35.00	6.65	288.00	35.25	60.15	0.00	8,807.74
7/4/07 0:12	857.00	354,775.31	259,810.30	72,450.48	6.52	35.50	6.61	288.00	35.25	60.45	0.00	12,631.65
7/4/07 0:13	857.56	354,832.19	260,958.50	72,287.88	5.51	35.27	6.57	288.00	34.45	60.20	0.00	11,392.43
7/4/07 0:14	860.53	355,400.91	260,041.41	73,430.87	4.11	35.69	6.52	288.00	35.10	60.50	0.00	11,419.37
7/4/07 0:15	862.58	354,266.50	259,641.30	72,967.59	5.76	35.75	6.48	288.33	35.60	60.60	0.00	11,294.67
7/4/07 0:16	865.45	353,934.00	257,778.59	72,601.58	3.47	35.81	6.37	288.74	34.95	61.00	0.00	11,261.92
7/4/07 0:17	867.55	353,846.91	256,941.59	72,538.59	2.46	35.94	6.44	288.69	34.70	61.55	0.00	12,295.45
7/4/07 0:18	870.01	364,476.00	261,735.20	73,175.42	3.99	35.50	6.52	288.71	35.60	60.85	0.00	10,968.17
7/4/07 0:19	871.74	356,397.19	263,346.00	73,432.18	6.07	36.56	6.59	288.71	35.50	60.95	0.00	10,699.79
7/4/07 0:20	873.10	364,531.09	256,134.00	72,869.98	4.98	36.69	6.67	288.71	35.95	61.10	0.00	10,646.63
7/4/07 0:21	873.98	351,658.41	258,105.80	72,455.62	4.36	36.50	6.74	288.36	35.90	61.35	0.00	10,681.96
7/4/07 0:22	874.68	365,749.91	260,425.50	72,736.70	3.06	36.25	6.82	288.36	35.53	60.85	0.00	9,317.69
7/4/07 0:23	871.27	367,721.31	265,971.19	73,473.98	6.74	36.00	6.89	288.71	36.25	61.10	0.00	8,984.29
7/4/07 0:24	866.07	356,133.31	259,774.41	72,513.70	5.53	36.00	6.97	288.71	35.10	60.05	0.00	8,972.06
7/4/07 0:25	862.07	371,333.31	259,770.09	72,372.12	5.53	35.50	7.04	288.71	34.90	60.05	0.00	9,314.24
7/4/07 0:26	858.53	367,867.41	262,621.69	74,147.36	5.54	35.44	7.12	289.02	34.95	60.05	0.00	9,027.54
7/4/07 0:27	856.19	333,608.00	257,196.30	72,690.86	5.53	35.75	7.19	288.02	34.90	59.95	0.00	11,764.95
7/4/07 0:28	856.32	356,027.19	258,822.41	72,226.43	2.71	35.56	7.27	288.01	34.85	59.85	0.00	11,481.17
7/4/07 0:29	857.14	352,854.50	258,832.80	72,443.95	2.90	34.25	7.34	288.00	35.10	59.90	0.00	11,326.82
7/4/07 0:30	857.95	347,444.91	259,954.00	72,989.13	3.25	33.75	7.11	288.01	34.80	59.75	0.00	11,159.23
7/4/07 0:31	858.77	353,152.19	259,575.91	72,891.52	4.81	35.50	6.87	287.98	34.70	60.00	0.00	4,395.28
7/4/07 0:32	857.88	359,155.91	262,495.59	72,924.52	4.37	36.25	6.90	287.64	35.25	59.95	0.00	10,303.04
7/4/07 0:33	853.85	354,999.31	259,970.09	72,994.89	5.11	35.50	6.93	286.69	35.00	60.30	0.00	10,322.17
7/4/07 0:34	848.27	357,341.91	259,536.20	72,130.15	3.72	35.50	6.95	286.69	35.00	60.45	0.00	10,374.12
7/4/07 0:35	843.79	362,130.41	261,632.09	72,817.78	3.74	34.50	6.98	286.69	35.25	60.95	0.00	10,127.61
7/4/07 0:36	840.75	344,052.91	260,997.09	72,559.46	5.72	34.50	7.08	286.71	36.80	61.55	0.00	5,384.37
7/4/07 0:37	840.62	341,664.31	263,617.41	73,164.38	4.30	34.44	7.19	286.69	37.25	62.05	0.00	10,436.33

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/4/07 0:38	841.49	352,559.31	260,675.09	72,372.16	6.93	33.44	7.30	286.69	36.05	62.20	0.00	10,383.39
7/4/07 0:39	843.01	359,778.50	260,354.20	72,038.38	3.50	33.69	7.41	286.69	36.35	62.15	0.00	10,412.62
7/4/07 0:40	844.86	360,628.50	264,981.19	73,756.11	4.55	33.75	7.52	287.64	35.85	62.60	0.00	10,345.59
7/4/07 0:41	846.70	355,372.69	263,020.31	73,021.78	6.16	33.75	7.17	287.33	37.05	62.85	0.00	8,544.38
7/4/07 0:42	846.54	346,009.50	258,688.50	72,077.65	6.11	33.50	7.33	287.00	37.00	63.60	0.00	9,464.98
7/4/07 0:43	843.94	355,122.69	260,910.91	72,835.71	4.20	33.25	7.42	287.00	36.65	64.40	0.00	9,532.68
7/4/07 0:44	842.55	351,971.91	260,242.80	73,134.86	4.72	32.75	7.91	287.02	36.05	59.95	0.00	9,066.60
7/4/07 0:45	840.38	362,561.59	264,908.19	73,482.72	4.72	33.06	7.65	287.02	34.80	60.00	0.00	9,054.37
7/4/07 0:46	840.26	352,839.81	259,307.91	73,111.98	4.72	32.00	8.11	287.02	35.35	60.10	0.00	12,187.04
7/4/07 0:47	840.97	353,544.69	261,488.30	72,827.98	4.72	32.00	7.99	287.00	35.40	59.95	0.00	11,218.63
7/4/07 0:48	842.13	359,678.31	260,177.00	72,882.70	5.25	31.78	7.89	287.00	33.70	60.60	0.00	10,739.14
7/4/07 0:49	842.12	356,945.41	262,891.09	73,537.56	6.25	32.19	8.00	287.00	35.40	61.30	0.00	10,741.44
7/4/07 0:50	842.83	362,221.41	262,393.50	74,006.49	6.81	32.00	8.09	287.00	36.50	61.90	0.00	10,833.18
7/4/07 0:51	843.28	351,846.91	262,128.30	73,322.88	7.06	31.75	8.12	287.00	36.75	61.85	0.00	9,961.47
7/4/07 0:52	842.16	351,081.09	258,489.59	72,502.11	6.17	30.88	8.21	287.00	36.80	62.60	0.00	10,190.46
7/4/07 0:53	840.55	358,541.09	258,810.50	73,289.66	3.59	31.09	8.38	287.00	35.95	63.15	0.00	10,113.28
7/4/07 0:54	838.74	364,399.31	261,926.41	73,991.90	5.47	31.63	8.21	287.33	37.15	63.50	0.00	10,141.56
7/4/07 0:55	837.06	357,046.31	260,007.50	72,611.08	7.25	31.91	8.24	286.66	37.75	63.75	0.00	9,644.99
7/4/07 0:56	837.57	354,589.31	258,681.70	73,317.92	5.53	31.50	8.27	286.69	37.20	63.90	0.00	8,921.76
7/4/07 0:57	839.18	371,155.59	256,867.50	73,539.13	3.74	32.00	8.24	287.02	37.50	64.40	0.00	8,835.05
7/4/07 0:58	839.59	323,765.81	255,048.59	73,019.35	5.12	31.88	8.22	286.40	37.50	64.60	0.00	8,675.69
7/4/07 0:59	838.88	353,333.41	256,734.30	73,395.41	6.05	32.00	8.20	286.00	37.80	64.50	0.00	8,611.05
7/4/07 1:00	839.10	373,381.59	263,149.81	74,364.55	5.80	31.72	8.31	285.73	37.75	64.15	0.00	0.00
7/4/07 1:01	839.10	350,104.00	258,957.41	73,271.81	8.35	31.63	8.30	285.71	37.15	64.25	0.00	9,496.84
7/4/07 1:02	838.63	347,133.81	257,040.09	73,356.73	5.25	31.91	8.30	285.73	36.85	64.15	0.00	9,452.95
7/4/07 1:03	838.92	362,548.09	257,454.59	73,218.52	3.87	31.50	8.17	285.71	37.15	64.20	0.00	9,253.55
7/4/07 1:04	838.65	348,600.69	257,022.91	73,188.98	5.89	31.57	8.21	286.00	35.95	60.15	0.00	9,488.46
7/4/07 1:05	838.78	359,372.81	256,886.41	73,378.34	5.89	31.91	8.28	286.40	34.55	59.90	0.00	9,279.95
7/4/07 1:06	839.73	340,354.09	254,536.30	72,497.32	5.89	31.73	8.24	285.69	35.15	59.95	0.00	10,452.42
7/4/07 1:07	840.87	337,750.81	253,212.00	72,930.84	5.89	31.19	8.32	285.71	34.15	59.90	0.00	10,565.56
7/4/07 1:08	841.47	356,011.59	256,100.50	72,958.19	2.29	30.71	8.54	286.00	34.70	59.25	0.00	10,450.71
7/4/07 1:09	842.32	352,118.09	253,041.09	72,381.07	5.01	30.63	8.54	286.00	33.90	58.65	0.00	10,556.26
7/4/07 1:10	843.95	347,798.81	253,971.70	72,813.23	2.84	31.00	8.51	285.69	33.80	58.35	0.00	8,976.78
7/4/07 1:11	842.62	366,806.81	254,398.80	72,851.63	5.22	31.05	8.74	285.71	34.00	57.85	0.00	9,535.20
7/4/07 1:12	839.38	348,420.81	255,569.70	73,350.33	6.03	30.13	8.97	285.33	34.50	57.20	0.00	9,462.25
7/4/07 1:13	836.74	347,748.50	250,390.41	72,687.61	3.09	28.97	9.20	285.04	32.80	56.45	0.00	9,986.96
7/4/07 1:14	832.87	349,426.19	252,943.20	72,973.71	4.01	30.00	9.18	284.66	31.50	55.30	0.00	10,005.96
7/4/07 1:15	829.63	360,900.31	260,498.30	74,212.60	5.45	28.88	9.23	284.66	32.25	53.95	0.00	0.00
7/4/07 1:16	828.19	362,857.19	259,354.91	73,866.23	6.98	29.03	9.28	284.38	32.10	53.85	0.00	0.00
7/4/07 1:17	828.00	343,807.41	253,671.00	72,692.98	7.10	28.64	9.26	284.38	31.20	53.75	0.00	0.00
7/4/07 1:18	829.40	348,321.69	257,273.70	72,607.82	4.46	29.09	9.17	284.02	31.65	53.75	0.00	0.00
7/4/07 1:19	831.03	358,059.41	257,048.41	73,848.30	4.84	29.03	9.05	284.02	30.95	53.70	0.00	0.00
7/4/07 1:20	832.21	353,326.41	257,222.50	74,211.54	6.37	29.00	9.13	283.68	31.90	54.70	0.00	0.00
7/4/07 1:21	832.93	347,091.81	252,862.50	73,725.59	5.69	28.88	9.22	283.04	31.70	54.70	0.00	0.00
7/4/07 1:22	833.78	355,040.69	258,380.30	74,040.56	4.42	28.13	9.31	283.04	31.33	54.80	0.00	0.00
7/4/07 1:23	834.76	347,499.09	253,808.20	72,964.04	5.71	28.00	9.39	283.04	32.15	54.40	0.00	0.00
7/4/07 1:24	835.37	347,109.00	255,135.80	74,248.91	6.83	28.00	9.44	283.02	35.20	59.90	0.00	0.00
7/4/07 1:25	835.90	364,886.00	261,259.80	74,223.58	6.83	27.97	9.57	283.04	34.50	60.00	0.00	0.00
7/4/07 1:26	835.96	354,556.50	260,982.09	73,192.44	6.83	27.75	9.52	283.04	34.35	60.05	0.00	0.00
7/4/07 1:27	836.41	353,515.50	255,259.70	73,250.78	6.83	27.75	9.47	283.02	35.35	60.00	0.00	0.00

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/4/07 1:28	837.57	354,938.59	257,232.00	73,816.58	3.68	28.28	9.51	282.64	34.95	59.95	0.00	0.00
7/4/07 1:29	837.71	358,732.50	259,203.41	73,061.42	6.21	26.88	9.56	282.35	35.45	59.75	0.00	0.00
7/4/07 1:30	837.99	354,603.91	255,181.80	73,732.76	5.48	26.88	9.61	282.35	35.65	60.20	0.00	0.00
7/4/07 1:31	837.93	357,259.59	257,331.20	74,132.82	4.49	27.34	9.66	282.35	35.00	59.95	0.00	0.00
7/4/07 1:32	838.21	343,813.59	255,687.50	73,669.75	5.60	27.85	9.71	282.04	35.35	60.00	0.00	0.00
7/4/07 1:33	837.85	350,798.50	257,396.50	73,649.04	6.08	27.91	9.76	282.04	34.85	59.75	0.00	0.00
7/4/07 1:34	837.40	355,923.69	253,647.41	73,163.95	5.09	28.20	9.81	282.35	35.25	59.95	0.00	5,446.04
7/4/07 1:35	835.97	350,936.41	255,646.59	73,083.59	4.93	26.88	9.86	282.37	35.25	59.90	0.00	6,674.35
7/4/07 1:36	835.61	343,316.00	253,598.59	73,158.94	4.75	27.09	9.91	282.35	34.85	59.75	0.00	8,260.52
7/4/07 1:37	835.60	355,305.41	256,439.91	72,968.32	5.00	26.99	9.98	282.02	34.50	59.65	0.00	9,175.73
7/4/07 1:38	835.67	350,107.41	253,620.41	72,308.66	5.50	26.86	9.91	282.04	34.10	59.60	0.00	8,480.89
7/4/07 1:39	835.29	353,187.41	254,740.80	73,412.41	5.42	27.23	9.85	282.04	34.45	59.05	0.00	8,184.04
7/4/07 1:40	835.47	350,320.91	257,283.09	73,396.94	5.75	27.00	9.98	282.04	32.35	58.95	0.00	6,875.02
7/4/07 1:41	834.48	352,410.50	261,961.59	73,268.98	7.38	27.00	9.98	281.66	30.75	58.60	0.00	5,952.58
7/4/07 1:42	834.57	365,746.69	261,116.00	72,556.09	4.74	26.91	9.85	282.04	31.75	58.30	0.00	5,090.55
7/4/07 1:43	835.29	362,002.91	260,466.00	72,583.41	5.17	27.03	9.73	282.02	33.10	58.78	0.00	5,275.63
7/4/07 1:44	836.50	367,329.19	264,171.81	73,489.81	4.99	26.66	9.61	282.02	34.95	59.95	0.00	7,247.46
7/4/07 1:45	836.22	361,356.19	260,447.50	73,327.53	4.99	27.91	9.49	281.37	34.60	60.15	0.00	6,891.96
7/4/07 1:46	836.41	363,148.50	260,499.09	73,117.02	4.99	27.03	9.37	281.37	35.45	59.95	0.00	7,211.01
7/4/07 1:47	836.97	363,013.69	263,758.31	72,572.11	4.99	27.24	9.25	281.04	34.95	59.95	0.00	7,839.17
7/4/07 1:48	837.89	365,678.69	264,643.50	73,563.48	5.03	29.13	9.10	281.01	35.60	60.05	0.00	8,039.50
7/4/07 1:49	838.68	359,429.91	264,582.31	72,979.23	6.37	28.59	9.10	279.65	35.05	60.10	0.00	7,479.42
7/4/07 1:50	839.49	360,351.59	259,548.59	72,696.08	5.36	29.07	9.11	279.35	35.25	60.35	0.00	0.00
7/4/07 1:51	839.98	354,075.31	261,823.30	73,347.56	5.28	29.04	9.12	278.32	34.45	60.30	0.00	0.00
7/4/07 1:52	840.93	369,300.19	265,026.00	73,142.19	4.90	28.91	9.12	277.68	34.90	60.30	0.00	0.00
7/4/07 1:53	841.31	363,877.09	262,897.69	71,935.48	6.99	28.78	9.13	276.65	34.85	60.35	0.00	0.00
7/4/07 1:54	841.89	357,453.09	261,297.09	72,742.88	4.93	28.97	9.14	276.67	35.35	60.05	0.00	0.00
7/4/07 1:55	842.14	365,714.50	262,458.59	71,960.98	4.65	29.13	9.15	276.67	34.90	59.95	0.00	0.00
7/4/07 1:56	842.22	350,008.91	259,887.20	72,355.55	5.94	28.80	9.00	276.67	34.95	59.90	0.00	5,736.27
7/4/07 1:57	840.73	363,702.81	263,316.31	72,264.21	4.49	29.78	8.99	276.65	35.50	59.80	0.00	0.00
7/4/07 1:58	840.62	337,717.50	256,885.41	71,938.21	4.84	29.00	8.98	276.67	34.30	59.35	0.00	6,683.90
7/4/07 1:59	840.12	346,313.59	260,043.70	72,793.42	3.67	29.78	8.97	276.65	34.20	59.30	0.00	0.00
7/4/07 2:00	840.37	347,851.00	259,814.41	72,021.28	6.23	29.00	8.96	276.34	34.05	58.10	0.00	8,195.45
7/4/07 2:01	841.21	364,078.50	259,650.59	72,128.41	3.19	28.63	8.94	276.32	33.75	57.75	0.00	0.00
7/4/07 2:02	842.48	353,732.41	258,450.00	72,440.98	4.39	28.94	8.93	276.65	33.20	57.35	0.00	4,151.93
7/4/07 2:03	842.81	358,982.31	262,521.81	72,265.96	6.00	29.84	8.92	276.65	34.10	56.50	0.00	0.00
7/4/07 2:04	842.81	335,101.00	258,435.50	71,675.98	3.58	29.00	8.92	276.65	35.60	60.05	0.00	0.00
7/4/07 2:05	842.01	349,062.50	261,830.41	72,176.67	3.58	29.63	8.94	277.03	35.05	60.00	0.00	0.00
7/4/07 2:06	842.36	354,017.31	260,192.00	73,177.44	3.58	29.88	8.96	277.34	34.90	60.20	0.00	0.00
7/4/07 2:07	843.25	358,929.91	262,877.09	72,659.28	3.58	29.00	8.97	277.34	35.30	60.05	0.00	4,690.08
7/4/07 2:08	842.49	344,010.91	257,310.00	72,395.24	6.65	29.75	9.05	277.34	34.35	59.40	0.00	0.00
7/4/07 2:09	842.11	354,837.31	260,575.50	72,499.86	4.34	30.00	9.06	277.34	34.55	58.95	0.00	6,802.64
7/4/07 2:10	841.90	380,884.31	261,549.09	72,258.76	5.90	29.38	9.07	277.34	34.20	58.80	0.00	0.00
7/4/07 2:11	842.46	349,262.50	256,510.30	72,118.72	6.09	29.50	9.08	277.03	33.55	57.80	0.00	6,679.93
7/4/07 2:12	841.29	348,333.31	255,373.80	72,026.59	6.38	29.75	9.09	277.03	33.15	57.25	0.00	0.00
7/4/07 2:13	840.43	358,406.81	259,248.91	71,807.98	4.46	29.34	9.10	276.34	32.80	56.40	0.00	9,963.60
7/4/07 2:14	839.01	336,796.09	256,881.30	71,642.94	5.77	28.63	9.11	276.34	32.60	56.30	0.00	0.00
7/4/07 2:15	840.02	360,589.41	256,231.91	72,449.54	3.33	28.75	9.12	277.03	32.40	55.20	0.00	3,065.90
7/4/07 2:16	840.03	347,026.59	255,521.30	72,380.88	7.01	28.75	9.13	277.34	33.20	54.80	0.00	0.00
7/4/07 2:17	839.57	347,467.00	252,090.20	71,966.10	6.38	29.44	9.14	277.34	31.55	54.10	0.00	0.00

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/4/07 2:18	839.47	350,150.00	256,074.00	73,167.34	4.03	28.18	9.15	277.34	31.05	53.70	0.00	4,129.76
7/4/07 2:19	840.15	349,290.50	257,982.20	72,763.56	3.82	27.88	9.16	278.32	31.90	54.25	0.00	0.00
7/4/07 2:20	839.20	347,151.19	253,946.30	73,082.22	7.02	28.56	9.17	278.32	30.75	53.80	0.00	6,352.82
7/4/07 2:21	838.22	345,233.81	253,748.80	72,193.89	6.02	28.66	9.18	278.01	31.85	53.95	0.00	0.00
7/4/07 2:22	838.64	355,156.91	255,959.70	72,455.04	4.61	28.50	9.32	278.01	32.17	54.30	0.00	5,833.90
7/4/07 2:23	837.99	354,314.19	255,643.70	73,179.17	6.50	27.82	9.53	278.34	31.88	54.20	0.00	0.00
7/4/07 2:24	837.74	352,603.31	253,383.50	72,266.36	5.70	28.13	9.62	278.70	35.35	59.75	0.00	6,996.02
7/4/07 2:25	837.48	337,684.00	251,841.70	72,214.41	5.70	27.25	9.71	278.32	35.15	59.90	0.00	0.00
7/4/07 2:26	837.60	354,751.69	254,901.80	73,632.52	5.70	26.80	9.81	278.30	35.45	60.00	0.00	0.00
7/4/07 2:27	837.37	342,296.19	250,311.80	73,254.73	5.70	27.39	10.00	278.32	34.55	59.95	0.00	0.00
7/4/07 2:28	837.22	337,932.31	248,878.00	72,215.57	5.30	27.97	9.96	278.03	34.55	59.30	0.00	0.00
7/4/07 2:29	837.80	350,858.41	250,877.09	72,714.51	4.11	27.84	9.92	277.99	34.15	58.65	0.00	4,020.36
7/4/07 2:30	838.32	357,574.59	254,375.91	73,891.40	5.81	27.78	9.88	277.68	33.90	57.60	0.00	0.00
7/4/07 2:31	837.36	337,254.91	247,062.91	72,811.53	9.11	28.09	9.83	277.03	32.80	56.80	0.00	6,244.66
7/4/07 2:32	836.66	352,685.31	256,680.30	71,820.13	4.43	28.00	9.79	277.03	32.45	56.40	0.00	0.00
7/4/07 2:33	837.95	368,131.59	265,869.09	72,914.41	4.05	27.00	9.71	277.01	32.35	55.25	0.00	6,941.21
7/4/07 2:34	839.59	368,502.59	265,126.50	71,882.73	6.35	26.97	9.69	277.68	32.25	54.65	0.00	0.00
7/4/07 2:35	841.20	351,835.41	263,506.31	73,202.45	6.33	27.97	9.67	278.32	31.55	54.55	0.00	8,821.45
7/4/07 2:36	842.87	363,990.81	262,313.41	72,514.89	4.33	28.12	9.64	279.01	31.25	54.10	0.00	0.00
7/4/07 2:37	844.63	361,068.59	261,414.70	72,057.88	4.74	27.88	9.55	278.68	31.15	53.85	0.00	8,641.88
7/4/07 2:38	845.09	357,292.59	260,813.50	72,880.70	4.77	27.97	9.55	278.70	30.95	54.00	0.00	0.00
7/4/07 2:39	845.53	364,269.00	262,329.69	73,273.38	6.38	28.00	9.55	279.32	31.35	54.10	0.00	0.00
7/4/07 2:40	845.77	363,529.41	260,079.30	73,277.54	6.79	27.88	9.55	279.01	31.50	54.00	0.00	1,789.28
7/4/07 2:41	846.37	367,383.19	264,751.69	73,760.23	5.10	28.13	9.59	279.35	30.75	53.95	0.00	0.00
7/4/07 2:42	846.61	362,743.59	262,918.09	73,871.93	7.47	27.95	9.57	279.65	31.30	54.00	0.00	6,136.54
7/4/07 2:43	846.65	359,774.19	260,505.09	73,150.33	6.33	27.97	9.55	279.65	31.90	54.35	0.00	0.00
7/4/07 2:44	847.56	349,696.09	258,461.50	73,010.11	4.99	28.00	9.53	279.65	35.70	59.80	0.00	8,262.50
7/4/07 2:45	847.82	363,181.41	261,193.09	73,872.46	4.99	27.75	9.50	279.65	35.05	59.85	0.00	0.00
7/4/07 2:46	848.31	341,482.59	255,996.09	73,327.34	4.99	27.97	9.48	279.65	34.25	59.85	0.00	9,902.83
7/4/07 2:47	848.05	347,235.19	260,610.59	73,810.43	4.99	27.97	9.46	279.65	35.50	60.05	0.00	0.00
7/4/07 2:48	848.60	356,189.09	257,119.20	73,427.13	7.04	27.88	9.45	280.01	34.75	59.35	0.00	0.00
7/4/07 2:49	848.91	357,111.59	255,824.70	73,555.33	5.24	27.51	9.47	280.01	34.50	58.40	0.00	2,090.09
7/4/07 2:50	847.93	357,472.91	262,338.81	73,463.73	6.70	28.00	9.49	280.35	32.80	58.30	0.00	0.00
7/4/07 2:51	847.59	345,254.00	255,479.59	72,831.34	6.27	27.55	9.51	280.04	33.10	57.65	0.00	5,665.46
7/4/07 2:52	847.39	359,315.59	257,867.70	73,627.56	3.73	27.03	9.53	280.04	33.00	57.30	0.00	0.00
7/4/07 2:53	846.82	341,823.31	255,239.80	73,090.02	6.79	27.00	9.55	280.04	32.60	56.95	0.00	5,811.95
7/4/07 2:54	846.51	355,064.31	254,695.59	73,088.30	4.66	26.97	9.57	280.35	32.30	56.15	0.00	0.00
7/4/07 2:55	847.26	350,383.09	255,381.50	72,956.12	3.38	27.00	9.59	280.37	32.75	55.45	0.00	6,384.56
7/4/07 2:56	847.82	345,946.31	252,878.59	73,120.63	5.77	26.88	9.61	280.35	32.40	55.30	0.00	0.00
7/4/07 2:57	848.58	343,032.50	255,627.59	73,884.37	5.31	27.03	9.63	280.35	32.65	54.95	0.00	10,558.78
7/4/07 2:58	849.29	349,855.59	256,655.70	74,017.63	4.73	27.09	9.65	280.73	31.40	54.40	0.00	0.00
7/4/07 2:59	849.32	350,137.00	253,087.30	73,242.30	6.04	27.00	9.67	280.35	31.50	54.05	0.00	1,076.75
7/4/07 3:00	848.97	352,188.59	253,816.80	73,106.85	4.83	27.00	9.69	280.35	31.25	53.80	0.00	0.00
7/4/07 3:01	849.49	353,051.91	255,522.00	73,560.62	3.64	26.00	9.71	280.35	31.35	54.20	0.00	0.00
7/4/07 3:02	850.02	348,625.59	250,950.00	72,945.36	5.27	26.88	9.73	280.70	31.60	54.05	0.00	2,963.45
7/4/07 3:03	850.60	351,446.19	254,410.50	73,550.00	4.52	27.46	9.75	280.70	31.65	53.75	0.00	0.00
7/4/07 3:04	850.98	349,150.00	254,800.09	73,941.43	5.86	26.78	9.77	280.73	35.10	60.10	0.00	6,366.35
7/4/07 3:05	850.81	343,475.19	252,454.41	73,255.66	5.86	27.09	9.79	280.73	35.00	60.10	0.00	0.00
7/4/07 3:06	851.59	339,399.41	250,246.70	73,265.50	5.86	27.05	9.81	281.04	34.80	60.40	0.00	8,937.12
7/4/07 3:07	851.34	360,989.50	257,464.59	73,765.06	5.86	26.88	9.83	281.04	35.40	60.10	0.00	0.00

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/4/07 3:08	851.61	340,757.50	250,208.70	73,167.67	6.56	26.75	9.83	281.37	35.10	59.10	0.00	10,459.47
7/4/07 3:09	851.30	347,413.31	253,016.80	74,112.63	4.76	27.00	9.87	281.37	35.30	58.50	0.00	0.00
7/4/07 3:10	850.35	354,741.00	252,691.80	72,699.20	4.69	26.69	9.90	281.37	35.00	57.50	0.00	0.00
7/4/07 3:11	848.81	368,310.19	254,915.41	73,370.92	6.09	27.00	9.93	281.04	33.45	57.30	0.00	1,246.47
7/4/07 3:12	847.22	349,386.41	249,377.41	72,670.34	7.86	26.25	9.97	281.06	33.20	56.30	0.00	0.00
7/4/07 3:13	846.57	350,757.31	251,872.09	72,864.80	4.89	26.38	10.00	280.73	33.00	56.50	0.00	6,418.07
7/4/07 3:14	846.63	341,866.81	248,400.09	72,902.98	4.44	26.38	10.03	281.04	32.10	55.10	0.00	0.00
7/4/07 3:15	845.73	343,364.59	252,333.20	73,134.73	5.15	26.25	10.03	281.04	31.60	54.20	0.00	8,239.42
7/4/07 3:16	845.00	359,089.50	254,821.20	73,686.54	5.43	26.22	10.10	281.37	31.50	53.80	0.00	0.00
7/4/07 3:17	845.34	340,500.31	252,847.91	72,802.31	7.71	25.50	10.16	281.37	32.80	53.60	0.00	8,558.19
7/4/07 3:18	846.11	363,781.59	258,101.09	73,452.89	4.43	25.14	10.23	282.35	33.30	54.20	0.00	0.00
7/4/07 3:19	847.23	372,320.81	266,017.50	73,219.76	6.72	25.38	10.30	282.64	31.70	53.90	0.00	3,988.81
7/4/07 3:20	847.54	351,703.09	256,581.91	72,856.39	8.82	25.16	10.36	282.64	30.00	53.90	0.00	0.00
7/4/07 3:21	848.94	359,447.81	256,457.09	72,737.25	4.45	25.38	10.43	282.64	31.60	54.30	0.00	0.00
7/4/07 3:22	850.29	358,329.00	254,126.50	73,368.55	5.29	25.25	10.49	282.64	31.90	53.80	0.00	3,491.56
7/4/07 3:23	850.16	346,806.19	253,374.50	72,839.13	6.13	25.50	10.56	282.02	32.10	53.70	0.00	0.00
7/4/07 3:24	850.35	357,908.09	261,025.41	73,729.61	4.76	24.78	10.63	282.02	34.70	60.05	0.00	8,167.94
7/4/07 3:25	850.74	345,443.50	252,437.91	73,037.28	4.76	24.63	10.75	282.35	35.20	59.90	0.00	0.00
7/4/07 3:26	851.18	347,782.41	256,047.70	73,870.36	4.76	25.04	10.72	282.64	35.70	60.00	0.00	8,792.12
7/4/07 3:27	850.51	358,382.41	258,159.20	73,158.61	4.76	24.91	10.69	283.33	35.70	60.00	0.00	0.00
7/4/07 3:28	850.80	360,593.00	256,637.50	72,654.04	6.05	24.29	10.65	283.33	35.40	59.10	0.00	2,759.18
7/4/07 3:29	850.25	352,828.69	255,395.00	72,721.52	6.61	23.72	10.62	282.64	34.50	59.40	0.00	0.00
7/4/07 3:30	850.63	352,052.09	252,942.91	72,585.35	6.21	24.50	10.59	283.04	34.10	58.10	0.00	0.00
7/4/07 3:31	851.19	352,202.69	255,547.70	73,313.69	3.57	24.81	10.56	283.04	34.30	58.40	0.00	4,812.95
7/4/07 3:32	850.92	345,989.91	253,694.41	72,068.70	7.24	25.50	10.52	283.04	33.30	57.80	0.00	0.00
7/4/07 3:33	850.84	337,435.69	250,155.59	71,873.59	5.13	26.00	10.49	283.04	35.60	57.60	0.00	5,988.31
7/4/07 3:34	851.27	351,369.81	253,485.50	72,772.70	4.35	25.03	10.46	283.04	33.30	57.90	0.00	0.00
7/4/07 3:35	851.83	349,734.50	254,525.00	73,347.13	7.09	24.75	10.43	283.02	32.50	56.60	0.00	8,635.39
7/4/07 3:36	851.20	352,099.00	252,678.50	72,823.57	7.32	25.22	10.39	283.33	34.10	57.20	0.00	0.00
7/4/07 3:37	851.40	350,868.31	256,158.50	73,872.02	6.61	24.88	10.36	283.68	32.20	55.40	0.00	0.00
7/4/07 3:38	852.54	355,819.19	250,286.41	72,700.20	4.83	24.88	10.33	283.68	33.30	54.90	0.00	0.00
7/4/07 3:39	852.69	342,950.69	250,276.59	73,236.20	5.68	25.75	10.29	283.33	33.40	54.80	0.00	0.00
7/4/07 3:40	852.51	336,796.41	249,708.20	72,799.49	5.55	25.02	10.41	283.30	31.50	54.90	0.00	0.00
7/4/07 3:41	853.23	345,475.31	250,149.50	72,170.71	4.39	25.00	10.56	283.04	31.90	54.20	0.00	0.00
7/4/07 3:42	854.38	356,723.91	254,071.20	73,934.34	4.60	24.88	10.52	283.33	31.80	54.40	0.00	0.00
7/4/07 3:43	855.37	344,130.31	250,417.59	72,992.59	6.76	24.88	10.49	283.33	32.20	53.60	0.00	0.00
7/4/07 3:44	855.77	353,767.59	249,074.30	74,028.55	3.96	25.67	10.45	283.02	35.20	59.90	0.00	0.00
7/4/07 3:45	854.75	341,785.31	250,000.00	73,266.17	3.96	25.75	10.42	283.33	35.60	60.00	0.00	6,761.52
7/4/07 3:46	854.06	357,095.91	250,555.30	73,262.02	3.96	25.65	10.38	283.33	33.20	60.10	0.00	9,380.16
7/4/07 3:47	853.76	343,511.19	249,092.30	73,028.20	3.96	24.92	10.35	283.71	35.30	59.80	0.00	8,327.99
7/4/07 3:48	854.72	346,000.00	249,248.91	73,237.88	5.52	25.00	10.31	283.68	34.40	59.20	0.00	8,299.78
7/4/07 3:49	855.36	337,510.09	249,981.00	73,261.52	4.92	26.03	10.28	283.68	34.40	59.40	0.00	7,287.89
7/4/07 3:50	856.11	342,770.19	250,682.09	72,706.19	4.15	25.70	10.24	283.99	34.50	58.70	0.00	6,569.72
7/4/07 3:51	856.87	350,653.09	256,004.00	73,847.27	5.14	24.75	10.20	284.02	35.60	58.70	0.00	6,076.29
7/4/07 3:52	857.02	348,578.69	250,802.00	73,396.52	6.91	25.88	10.17	284.61	35.70	58.00	0.00	5,973.88
7/4/07 3:53	856.93	339,354.69	250,239.41	73,518.66	6.52	26.00	10.13	284.66	34.90	58.40	0.00	5,821.92
7/4/07 3:54	857.13	357,027.31	251,382.30	73,035.33	3.97	25.88	10.10	284.02	32.90	57.80	0.00	6,302.77
7/4/07 3:55	857.04	341,973.09	249,491.70	72,746.42	5.51	25.88	9.94	284.02	33.20	57.80	0.00	7,484.90
7/4/07 3:56	857.00	339,825.41	251,016.80	72,596.00	4.17	27.00	9.77	283.68	32.90	57.00	0.00	7,190.48
7/4/07 3:57	857.25	344,057.59	249,336.91	72,533.82	4.22	27.00	9.76	283.68	32.60	56.60	0.00	8,172.77

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/4/07 3:58	857.25	336,024.41	248,660.80	72,092.84	5.09	27.13	9.73	282.64	32.50	56.70	0.00	7,783.55
7/4/07 3:59	857.09	336,205.91	249,563.00	72,785.66	4.65	27.97	9.69	282.64	33.10	56.50	0.00	6,006.63
7/4/07 4:00	857.29	352,767.41	254,247.50	73,395.60	3.86	27.00	9.63	282.02	32.20	56.00	0.00	4,144.16
7/4/07 4:01	857.59	342,452.59	249,890.91	73,363.34	5.93	28.03	9.56	281.68	32.50	54.60	0.00	0.00
7/4/07 4:02	857.78	355,391.91	250,045.50	72,324.65	5.61	27.94	9.48	280.70	33.90	55.40	0.00	0.00
7/4/07 4:03	857.50	337,428.09	249,409.80	72,098.78	5.37	27.34	9.41	280.70	31.90	54.40	0.00	0.00
7/4/07 4:04	857.30	342,661.81	250,046.20	72,408.94	4.28	28.25	9.42	280.70	34.70	60.00	0.00	0.00
7/4/07 4:05	857.08	344,535.31	248,782.50	72,039.07	4.28	27.41	9.40	280.04	34.80	60.20	0.00	0.00
7/4/07 4:06	857.10	340,216.81	249,087.50	72,699.98	4.28	27.88	9.37	279.68	35.00	60.00	0.00	0.00
7/4/07 4:07	857.78	341,622.09	248,275.20	72,296.81	4.28	27.00	12.32	278.89	34.50	59.70	0.00	0.00
7/4/07 4:08	858.75	337,136.41	247,857.09	72,260.31	3.90	27.18	12.42	278.34	35.00	59.90	0.00	0.00
7/4/07 4:09	859.19	346,698.41	249,469.00	71,995.35	4.84	27.88	12.52	276.67	35.30	59.80	0.00	0.00
7/4/07 4:10	860.12	352,304.59	249,529.30	72,726.79	4.08	27.97	12.62	276.01	34.90	59.90	0.00	0.00
7/4/07 4:11	860.97	348,710.50	247,403.41	72,400.13	6.92	26.88	12.72	275.34	34.70	59.70	0.00	0.00
7/4/07 4:12	860.99	342,633.59	246,738.91	72,371.52	4.84	27.88	12.83	275.34	35.10	59.50	0.00	0.00
7/4/07 4:13	860.90	341,225.50	244,648.59	72,541.12	3.69	26.97	12.93	274.65	34.30	59.50	0.00	0.00
7/4/07 4:14	860.94	342,305.81	248,860.20	73,074.69	3.63	26.88	13.03	275.01	34.10	59.20	0.00	0.00
7/4/07 4:15	861.39	337,107.81	244,865.50	72,094.42	6.51	26.88	13.13	274.31	34.90	59.10	0.00	0.00
7/4/07 4:16	861.02	333,444.91	247,252.20	72,904.65	3.33	26.75	13.23	274.31	34.70	58.60	0.00	0.00
7/4/07 4:17	861.12	344,755.09	247,246.91	72,854.52	6.01	27.00	13.33	274.65	33.60	57.90	0.00	0.00
7/4/07 4:18	862.40	352,716.00	254,000.41	73,597.98	4.25	25.74	13.48	274.31	33.80	58.20	0.00	0.00
7/4/07 4:19	863.07	340,896.59	244,498.70	72,181.94	7.03	26.23	13.59	274.31	33.90	58.00	0.00	0.00
7/4/07 4:20	863.26	344,927.69	246,912.20	73,116.74	3.80	27.01	13.58	274.34	33.90	57.40	0.00	0.00
7/4/07 4:21	863.98	340,846.09	241,436.20	72,820.03	4.29	26.00	13.58	274.62	32.70	57.90	0.00	0.00
7/4/07 4:22	864.50	336,537.91	244,429.30	72,890.97	3.53	25.88	13.57	274.62	35.50	57.50	0.00	0.00
7/4/07 4:23	865.34	343,769.09	243,710.20	72,585.98	3.60	25.81	13.57	274.62	33.80	57.00	0.00	0.00
7/4/07 4:24	865.34	331,904.81	242,502.00	72,474.02	7.17	27.00	13.56	274.62	35.40	59.90	0.00	0.00
7/4/07 4:25	865.34	335,151.41	244,309.70	72,877.02	7.17	26.30	13.56	274.31	34.30	59.90	0.00	0.00
7/4/07 4:26	865.87	349,114.81	246,900.41	73,202.06	7.17	25.88	13.55	274.31	34.90	60.10	0.00	0.00
7/4/07 4:27	865.82	343,399.81	245,424.30	72,559.58	7.17	25.88	13.59	274.31	35.80	59.90	0.00	0.00
7/4/07 4:28	865.82	339,777.59	243,839.20	72,467.95	5.68	26.47	13.63	275.01	34.70	59.50	0.00	0.00
7/4/07 4:29	866.32	345,725.81	245,059.09	72,736.93	3.83	26.88	13.67	275.34	36.10	59.60	0.00	0.00
7/4/07 4:30	865.43	333,046.69	241,438.20	72,973.80	5.82	26.75	13.71	275.34	36.10	59.70	0.00	0.00
7/4/07 4:31	865.17	347,867.69	250,869.91	73,033.79	3.70	26.63	13.75	275.36	35.40	59.60	0.00	0.00
7/4/07 4:32	864.47	334,529.50	241,507.41	72,276.97	7.14	26.59	13.79	275.34	35.10	60.10	0.00	0.00
7/4/07 4:33	864.07	334,436.59	243,437.00	71,887.56	4.38	26.57	13.83	275.34	34.70	59.40	0.00	0.00
7/4/07 4:34	863.98	336,888.69	243,377.50	72,542.51	3.74	26.31	13.87	275.70	34.20	59.30	0.00	0.00
7/4/07 4:35	864.58	338,349.41	241,290.00	72,598.83	6.15	25.51	13.91	276.32	34.10	59.40	0.00	0.00
7/4/07 4:36	865.09	344,834.91	243,506.91	72,859.67	5.05	25.56	13.95	276.34	35.80	59.40	0.00	0.00
7/4/07 4:37	864.19	339,884.19	241,783.00	72,246.27	8.51	26.00	13.99	277.01	34.70	59.40	0.00	0.00
7/4/07 4:38	863.59	351,534.69	240,291.80	71,913.00	5.79	25.22	14.03	276.65	34.90	59.20	0.00	0.00
7/4/07 4:39	863.83	334,344.69	238,878.30	71,916.87	4.87	24.88	14.07	276.67	35.10	58.60	0.00	0.00
7/4/07 4:40	863.39	330,335.09	240,688.80	72,586.98	5.23	25.00	14.11	276.65	34.00	58.70	0.00	0.00
7/4/07 4:41	862.36	341,455.31	240,776.59	72,473.44	5.02	24.75	14.15	277.34	35.10	58.80	0.00	0.00
7/4/07 4:42	862.30	334,842.19	240,529.70	72,303.38	4.56	24.50	14.20	277.34	34.60	58.30	0.00	0.00
7/4/07 4:43	862.39	333,176.50	243,841.70	72,040.62	5.23	24.13	14.24	277.68	33.90	58.70	0.00	0.00
7/4/07 4:44	861.73	313,411.69	238,169.80	72,221.75	4.67	23.97	14.28	277.70	35.80	59.70	0.00	0.00
7/4/07 4:45	861.56	343,467.00	243,521.50	73,180.35	4.67	23.85	14.32	278.01	35.10	60.00	0.00	0.00
7/4/07 4:46	861.35	339,822.31	238,425.41	71,492.56	4.67	24.00	14.36	277.99	34.80	60.00	0.00	0.00
7/4/07 4:47	861.79	341,334.31	240,017.80	71,706.35	4.67	23.75	14.40	278.01	34.80	59.90	0.00	0.00

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/4/07 4:48	861.84	331,052.09	235,752.70	71,639.49	5.27	23.89	14.44	278.32	34.90	60.40	0.00	0.00
7/4/07 4:49	861.59	350,272.81	247,597.80	72,789.88	4.06	23.03	14.48	278.70	34.60	59.80	0.00	0.00
7/4/07 4:50	861.71	332,193.59	234,311.50	71,740.15	6.14	22.88	14.52	278.68	35.30	59.50	0.00	0.00
7/4/07 4:51	862.03	332,383.50	237,316.00	72,423.27	3.53	22.66	14.56	279.01	35.10	59.60	0.00	0.00
7/4/07 4:52	861.75	328,402.69	237,133.41	71,982.49	5.76	22.92	14.60	279.01	34.10	59.20	0.00	0.00
7/4/07 4:53	861.35	335,935.91	240,349.80	72,230.42	5.04	22.81	14.64	279.01	33.50	58.80	0.00	0.00
7/4/07 4:54	860.75	337,070.00	239,615.50	72,755.80	7.77	23.00	14.68	278.68	34.50	58.80	0.00	0.00
7/4/07 4:55	860.85	341,308.19	238,730.09	71,883.41	6.92	22.00	14.72	278.68	32.60	57.30	0.00	0.00
7/4/07 4:56	860.81	330,634.31	237,776.30	72,303.28	6.51	22.86	14.76	278.68	32.30	57.50	0.00	0.00
7/4/07 4:57	860.48	335,266.09	238,904.50	72,130.93	4.82	22.78	14.80	278.68	33.50	57.20	0.00	0.00
7/4/07 4:58	860.57	332,084.91	237,321.59	72,446.49	4.35	22.22	14.84	278.70	33.10	56.10	0.00	0.00
7/4/07 4:59	860.96	334,389.31	238,473.91	72,809.00	4.20	22.00	14.88	278.61	33.70	56.50	0.00	0.00
7/4/07 5:00	860.66	331,726.19	239,933.30	72,627.03	6.41	21.88	14.92	278.01	32.20	55.30	0.00	0.00
7/4/07 5:01	860.53	356,851.91	241,573.91	72,516.37	4.94	21.88	14.96	278.32	32.00	55.60	0.00	0.00
7/4/07 5:02	860.56	331,060.19	238,118.50	73,148.45	5.54	21.09	15.00	278.32	31.50	55.10	0.00	0.00
7/4/07 5:03	860.23	337,172.69	239,053.41	73,109.47	6.02	22.00	15.04	278.32	32.10	54.90	0.00	0.00
7/4/07 5:04	859.72	337,469.31	238,249.30	73,040.83	4.48	21.83	15.08	278.01	35.30	60.10	0.00	0.00
7/4/07 5:05	860.07	332,849.09	238,507.41	73,678.19	4.48	20.91	15.12	278.32	33.50	59.80	0.00	0.00
7/4/07 5:06	860.30	334,705.41	236,590.09	72,977.36	4.48	22.62	15.16	278.32	35.90	59.80	0.00	0.00
7/4/07 5:07	860.40	331,354.69	239,253.59	73,520.41	4.48	22.88	15.05	278.70	34.60	60.00	0.00	0.00
7/4/07 5:08	860.94	343,604.69	243,383.91	74,213.80	5.62	22.13	14.93	278.01	34.90	59.50	0.00	0.00
7/4/07 5:09	861.38	351,052.59	248,110.20	74,256.75	6.41	21.75	14.82	278.01	36.00	59.20	0.00	0.00
7/4/07 5:10	861.41	342,563.19	238,294.20	73,620.96	7.25	22.78	14.71	277.70	32.90	58.10	0.00	0.00
7/4/07 5:11	861.39	335,774.81	239,871.80	73,403.64	4.03	22.86	14.60	277.70	33.20	58.00	0.00	0.00
7/4/07 5:12	861.33	334,931.59	239,194.59	73,218.34	4.69	23.00	14.48	276.67	33.20	56.90	0.00	0.00
7/4/07 5:13	860.48	332,001.41	239,597.30	74,791.39	4.43	22.72	14.37	276.03	33.20	56.90	0.00	0.00
7/4/07 5:14	859.80	327,968.00	231,844.00	73,776.91	5.54	23.13	14.25	275.70	32.10	56.60	0.00	0.00
7/4/07 5:15	859.89	330,027.91	232,405.50	74,935.46	2.50	22.47	14.02	276.01	33.20	54.80	0.00	0.00
7/4/07 5:16	859.28	326,878.91	233,559.80	74,221.88	5.23	22.63	13.79	275.70	31.10	55.30	0.00	0.00
7/4/07 5:17	857.90	324,560.00	234,023.00	74,464.80	6.10	23.13	13.68	275.70	31.00	54.50	0.00	0.00
7/4/07 5:18	856.86	335,059.50	239,279.41	73,702.63	4.30	22.03	13.65	275.70	31.00	54.40	0.00	0.00
7/4/07 5:19	857.16	366,371.19	255,904.30	74,380.01	4.02	21.97	13.61	276.56	31.60	54.00	0.00	0.00
7/4/07 5:20	857.60	341,399.31	245,305.41	73,522.76	8.11	21.97	13.58	276.67	32.10	53.80	0.00	14,480.33
7/4/07 5:21	858.43	342,153.91	245,415.91	73,465.34	5.20	22.88	13.55	276.67	30.60	54.40	0.00	13,709.46
7/4/07 5:22	861.22	346,134.50	248,296.30	73,565.05	2.79	22.72	13.52	277.34	31.10	54.10	0.00	13,750.21
7/4/07 5:23	863.95	334,052.69	247,825.80	74,718.38	3.64	22.65	13.49	277.37	31.60	53.80	0.00	13,742.06
7/4/07 5:24	865.27	317,227.69	249,010.30	74,530.78	4.39	23.86	13.45	277.68	34.50	59.80	0.00	10,918.24
7/4/07 5:25	865.50	355,558.91	251,106.41	74,056.98	4.39	23.03	13.80	277.70	34.60	60.10	0.00	11,802.88
7/4/07 5:26	861.97	361,129.50	249,678.91	73,595.92	4.39	23.41	13.71	278.15	35.00	60.00	0.00	11,288.29
7/4/07 5:27	859.25	350,045.91	249,742.80	74,033.80	4.39	23.88	13.65	278.70	34.50	59.90	0.00	11,192.44
7/4/07 5:28	857.42	345,883.00	247,948.91	73,325.20	5.21	24.13	13.60	278.68	36.10	59.70	0.00	11,582.59
7/4/07 5:29	853.45	352,370.59	257,600.59	74,796.40	3.99	22.91	13.54	279.01	34.50	59.20	0.00	5,961.27
7/4/07 5:30	852.03	340,030.00	250,463.80	73,345.43	6.30	23.13	13.49	278.70	33.70	58.40	0.00	11,398.78
7/4/07 5:31	853.64	351,121.81	253,618.09	74,485.55	4.03	23.86	13.43	278.32	35.20	58.20	0.00	11,155.14
7/4/07 5:32	855.87	345,663.19	251,808.20	73,761.07	7.02	25.02	13.37	278.70	34.00	58.00	0.00	10,727.70
7/4/07 5:33	859.19	360,652.41	254,856.41	73,132.91	4.84	25.50	13.32	278.70	34.30	57.40	0.00	10,666.34
7/4/07 5:34	862.42	358,019.41	251,644.59	74,110.64	5.21	26.00	13.26	278.68	33.40	57.40	0.00	574.97
7/4/07 5:35	861.94	332,256.81	252,177.30	73,856.67	4.79	26.13	13.20	278.32	33.90	57.50	0.00	9,111.12
7/4/07 5:36	859.06	346,817.81	249,999.00	73,050.30	4.97	25.72	13.15	278.01	34.30	57.00	0.00	8,513.52
7/4/07 5:37	857.35	346,667.19	252,651.80	73,119.88	3.10	25.72	13.09	278.01	33.20	56.10	0.00	9,071.05

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/4/07 5:38	856.16	357,370.59	253,247.80	73,500.49	4.70	26.00	13.04	278.32	32.00	56.50	0.00	9,035.96
7/4/07 5:39	854.78	349,955.59	257,786.30	74,651.39	5.00	27.13	12.98	278.30	33.90	56.80	0.00	10,032.88
7/4/07 5:40	855.43	348,402.41	255,070.30	74,086.20	7.40	26.88	12.92	278.32	32.60	57.00	0.00	10,628.08
7/4/07 5:41	856.78	363,468.81	256,910.59	74,312.80	5.09	26.88	12.87	278.32	33.60	57.10	0.00	10,427.71
7/4/07 5:42	857.87	351,673.31	253,815.41	73,570.05	7.78	27.03	12.81	278.30	33.20	55.80	0.00	10,386.17
7/4/07 5:43	861.00	380,291.19	264,710.81	74,509.66	4.32	27.16	12.76	278.32	32.90	55.70	0.00	10,485.51
7/4/07 5:44	862.86	344,611.69	251,064.41	73,557.80	6.04	27.26	12.70	278.32	34.10	60.10	0.00	9,061.53
7/4/07 5:45	861.16	340,925.41	254,425.70	74,136.02	6.04	27.47	12.68	278.01	35.30	60.10	0.00	8,799.06
7/4/07 5:46	859.32	354,768.09	256,521.09	73,548.37	6.04	26.84	12.67	277.37	34.70	60.00	0.00	8,912.32
7/4/07 5:47	858.75	358,493.09	261,819.30	73,821.12	6.04	27.76	12.66	277.01	34.70	60.00	0.00	9,070.90
7/4/07 5:48	857.60	371,553.50	262,736.31	74,411.95	5.04	28.13	12.64	277.03	35.10	60.20	0.00	8,999.23
7/4/07 5:49	856.22	350,413.59	254,809.41	73,640.22	6.69	27.86	12.63	276.01	35.50	59.70	0.00	11,846.56
7/4/07 5:50	856.00	340,975.31	256,337.30	73,806.49	3.78	27.78	12.61	276.36	35.30	59.40	0.00	10,531.93
7/4/07 5:51	856.63	367,140.81	255,836.30	73,135.77	2.96	27.88	12.60	276.34	35.50	58.90	0.00	10,473.53
7/4/07 5:52	857.54	365,503.09	263,522.50	74,221.17	4.13	28.70	12.58	277.03	34.90	58.80	0.00	10,462.52
7/4/07 5:53	858.17	360,485.09	260,790.91	73,670.93	5.90	28.77	12.57	277.32	34.10	58.00	0.00	10,511.88
7/4/07 5:54	858.08	361,864.31	265,749.41	74,107.56	5.60	28.13	12.65	277.68	33.50	58.10	0.00	9,110.98
7/4/07 5:55	857.44	384,198.00	261,046.20	74,526.15	6.83	27.84	12.65	277.34	33.50	58.00	0.00	8,201.13
7/4/07 5:56	856.46	355,890.50	260,530.09	74,639.13	6.60	28.75	12.64	277.34	34.90	58.40	0.00	8,950.34
7/4/07 5:57	855.70	357,782.91	260,247.50	73,902.30	4.47	28.25	12.64	277.03	34.10	58.20	0.00	8,861.09
7/4/07 5:58	854.67	342,749.09	258,049.70	73,261.25	4.11	28.00	12.64	277.01	32.80	57.70	0.00	8,582.78
7/4/07 5:59	854.99	361,146.91	261,231.91	73,851.43	4.45	28.53	12.37	276.67	34.10	58.30	0.00	12,733.96
7/4/07 6:00	858.55	360,748.69	262,100.91	73,715.28	4.42	28.75	12.38	276.67	33.40	57.70	0.00	12,765.62
7/4/07 6:01	862.18	365,302.19	268,487.00	74,267.39	5.45	28.91	12.39	276.67	33.40	57.50	0.00	12,521.54
7/4/07 6:02	864.32	352,585.81	260,557.00	73,895.68	6.72	29.00	12.40	276.67	32.70	57.40	0.00	12,621.75
7/4/07 6:03	867.26	362,323.69	263,506.31	73,621.52	3.20	28.88	12.41	277.03	34.10	58.00	0.00	9,745.44
7/4/07 6:04	867.31	361,459.09	264,925.81	74,030.41	4.95	28.78	12.42	277.03	35.10	59.80	0.00	11,348.15
7/4/07 6:05	863.73	368,674.81	264,832.81	73,659.44	4.95	29.00	12.43	277.01	34.60	60.20	0.00	11,348.22
7/4/07 6:06	861.20	368,310.19	264,871.41	74,096.24	4.96	28.63	12.44	276.67	34.80	59.70	0.00	11,864.25
7/4/07 6:07	859.51	371,033.69	265,411.91	74,149.09	4.95	28.91	12.45	276.34	35.00	59.90	0.00	11,672.13
7/4/07 6:08	856.72	362,263.19	262,516.00	73,616.03	6.28	29.09	12.46	276.34	35.10	60.30	0.00	5,763.47
7/4/07 6:09	855.93	350,739.69	265,966.81	74,588.98	4.87	28.91	12.47	276.34	36.20	60.40	0.00	11,414.18
7/4/07 6:10	857.95	364,838.41	266,680.59	73,427.39	5.89	28.68	12.48	276.34	33.60	60.30	0.00	11,211.38
7/4/07 6:11	861.21	374,971.81	270,302.09	75,533.53	3.43	27.91	12.49	276.65	36.10	60.00	0.00	11,256.21
7/4/07 6:12	863.53	367,160.41	266,420.31	73,467.67	7.57	28.16	12.50	277.03	34.60	60.30	0.00	11,049.06
7/4/07 6:13	865.52	373,736.59	273,451.00	74,118.66	4.30	28.81	12.51	277.03	35.00	60.40	0.00	0.00
7/4/07 6:14	865.98	360,762.09	264,033.00	73,832.43	4.67	27.95	12.52	277.70	35.80	60.40	0.00	9,393.57
7/4/07 6:15	863.79	373,193.31	268,086.91	73,583.78	4.88	28.63	12.53	278.01	35.10	60.50	0.00	8,980.57
7/4/07 6:16	861.57	358,052.00	267,719.31	72,800.13	5.19	29.24	12.55	278.32	34.40	60.50	0.00	9,124.12
7/4/07 6:17	859.66	382,291.19	279,384.31	74,541.03	3.00	28.25	12.54	278.32	35.40	60.50	0.00	9,598.86
7/4/07 6:18	857.22	365,352.31	266,292.31	72,949.15	8.47	28.63	12.54	278.32	33.40	60.80	0.00	8,742.64
7/4/07 6:19	857.81	369,554.31	266,470.69	72,621.42	3.68	28.88	12.53	278.32	35.20	60.60	0.00	9,673.93
7/4/07 6:20	859.37	377,088.81	271,018.50	74,155.62	5.52	28.75	12.52	277.72	35.20	60.90	0.00	9,238.68
7/4/07 6:21	861.04	357,576.81	268,371.09	73,684.35	6.44	28.88	12.51	278.01	36.40	60.40	0.00	9,430.39
7/4/07 6:22	862.96	367,827.31	269,815.00	73,395.90	4.86	29.75	12.50	278.01	35.80	59.80	0.00	9,390.50
7/4/07 6:23	865.32	370,550.69	269,730.41	73,980.05	5.43	28.75	12.49	278.01	35.50	60.40	0.00	7,563.33
7/4/07 6:24	865.14	373,502.09	269,547.50	73,790.39	4.86	29.13	12.48	278.32	35.10	59.90	0.00	8,595.03
7/4/07 6:25	862.52	351,256.09	270,091.81	73,678.87	4.85	28.88	12.48	278.01	35.60	60.30	0.00	8,297.04
7/4/07 6:26	860.78	379,289.41	272,579.41	73,171.13	4.86	28.50	12.49	278.32	36.50	60.10	0.00	8,415.63
7/4/07 6:27	858.45	374,882.69	270,036.09	74,152.07	4.85	28.50	12.49	278.70	33.80	60.10	0.00	8,438.98

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/4/07 6:28	857.24	354,135.81	266,686.31	74,483.96	5.38	29.00	12.50	278.68	35.20	60.60	0.00	12,608.04
7/4/07 6:29	859.49	361,292.81	268,893.41	73,293.56	5.28	28.99	12.51	278.70	34.60	59.90	0.00	11,325.42
7/4/07 6:30	863.53	372,889.31	273,361.31	74,415.62	6.00	28.63	12.47	279.01	36.70	60.90	0.00	11,437.41
7/4/07 6:31	867.35	393,638.81	276,829.50	74,729.26	6.39	29.67	12.34	279.65	36.40	61.40	0.00	11,170.20
7/4/07 6:32	869.48	366,697.31	270,657.91	73,164.95	9.37	30.00	12.22	279.68	36.40	62.90	0.00	11,241.45
7/4/07 6:33	871.50	370,796.31	267,756.81	73,427.44	4.68	30.38	12.09	279.35	36.40	62.80	0.00	10,185.69
7/4/07 6:34	869.64	367,324.50	269,440.31	73,978.73	4.93	29.63	11.96	279.35	37.00	62.60	0.00	10,083.51
7/4/07 6:35	866.18	359,913.91	264,392.00	74,171.13	5.44	29.97	11.83	279.35	37.10	63.20	0.00	10,223.75
7/4/07 6:36	862.97	368,316.31	271,940.50	74,515.62	5.17	30.02	11.70	279.35	37.60	64.30	0.00	10,066.12
7/4/07 6:37	859.85	366,460.59	264,723.50	74,091.98	7.32	29.74	11.70	279.37	36.20	64.70	0.00	10,032.35
7/4/07 6:38	858.95	361,614.31	267,560.19	75,996.60	3.33	29.98	11.71	279.35	37.00	65.10	0.00	10,932.26
7/4/07 6:39	860.24	356,445.59	268,831.59	73,697.48	8.41	30.00	11.73	279.68	37.80	65.30	0.00	10,373.23
7/4/07 6:40	861.90	378,606.19	270,156.81	74,076.02	3.99	30.13	11.74	280.01	39.00	65.40	0.00	10,368.24
7/4/07 6:41	863.48	372,954.50	271,299.59	76,310.91	6.28	29.89	11.76	280.01	39.80	66.20	0.00	10,313.33
7/4/07 6:42	865.52	358,064.00	269,049.31	73,966.22	7.81	29.69	11.77	280.01	38.10	65.90	0.00	10,025.42
7/4/07 6:43	867.41	373,450.81	270,033.09	74,681.91	4.60	30.00	11.79	280.73	38.40	65.90	0.00	8,702.08
7/4/07 6:44	865.71	352,750.31	261,272.91	73,922.10	4.66	29.91	11.80	280.70	35.20	59.60	0.00	8,487.08
7/4/07 6:45	862.80	367,212.91	264,699.31	74,163.47	4.66	30.66	11.82	280.37	34.90	59.90	0.00	8,811.04
7/4/07 6:46	860.32	360,076.59	266,014.00	74,618.13	4.66	30.42	11.83	280.04	35.70	60.20	0.00	8,692.77
7/4/07 6:47	858.06	382,815.59	260,386.00	73,720.35	4.66	29.75	11.85	280.70	36.10	59.80	0.00	5,801.69
7/4/07 6:48	857.38	353,732.09	267,455.31	74,591.93	6.49	30.63	11.86	280.35	36.40	60.40	0.00	10,407.62
7/4/07 6:49	859.70	354,805.19	271,099.00	74,318.98	4.83	30.44	11.88	280.01	35.00	60.10	0.00	10,402.19
7/4/07 6:50	862.36	358,691.50	262,018.30	73,015.52	5.55	29.88	11.90	279.65	34.90	60.90	0.00	10,239.33
7/4/07 6:51	865.04	364,034.00	261,469.70	73,833.82	4.88	30.00	11.91	279.35	35.30	60.70	0.00	10,135.87
7/4/07 6:52	867.40	361,409.81	262,167.69	73,487.75	4.74	30.03	11.93	279.65	36.90	61.70	0.00	1,485.55
7/4/07 6:53	868.09	358,628.41	261,441.59	73,529.85	4.73	29.88	11.94	280.01	35.50	62.10	0.00	8,722.01
7/4/07 6:54	865.29	372,078.81	269,501.00	74,567.79	4.38	30.16	11.96	280.35	37.50	62.80	0.00	8,633.34
7/4/07 6:55	862.44	354,193.19	261,484.91	73,806.70	6.98	29.90	11.97	280.35	38.20	64.00	0.00	8,824.07
7/4/07 6:56	858.75	368,224.00	263,304.09	74,023.70	5.07	30.09	11.99	280.04	36.80	64.10	0.00	9,121.07
7/4/07 6:57	855.67	362,655.91	270,303.50	74,677.14	6.94	29.89	12.00	280.70	38.40	64.70	0.00	8,437.50
7/4/07 6:58	855.61	358,288.59	260,941.41	72,757.22	7.20	29.88	12.02	280.73	37.40	65.50	0.00	11,286.15
7/4/07 6:59	856.96	361,399.91	266,806.81	73,291.38	3.89	30.09	12.03	280.35	38.00	65.70	0.00	11,567.39
7/4/07 7:00	858.15	373,762.00	262,694.09	74,095.50	6.84	29.75	12.05	280.35	37.90	66.20	0.00	11,232.05
7/4/07 7:01	859.35	358,174.09	263,846.81	74,068.24	5.27	29.91	12.06	280.01	37.90	66.20	0.00	11,434.97
7/4/07 7:02	860.66	363,270.00	264,403.91	73,529.71	6.17	29.66	12.08	279.65	38.10	65.80	0.00	7,120.27
7/4/07 7:03	862.07	352,011.41	258,751.91	73,864.80	4.23	29.59	12.09	280.04	39.00	66.20	0.00	10,620.76
7/4/07 7:04	862.91	360,243.31	264,921.50	73,760.89	6.18	29.88	12.11	279.37	35.30	59.90	0.00	10,964.75
7/4/07 7:05	863.01	361,293.69	263,442.50	73,998.93	6.18	29.63	12.12	278.99	34.90	60.00	0.00	10,932.50
7/4/07 7:06	864.36	342,594.81	263,560.31	73,439.03	6.18	29.50	12.18	279.01	35.40	60.00	0.00	10,635.99
7/4/07 7:07	865.43	356,102.19	263,277.91	73,445.30	6.18	29.72	12.13	279.65	34.70	60.30	0.00	8,246.51
7/4/07 7:08	863.55	370,844.59	261,221.30	72,385.53	6.83	29.50	12.19	280.04	35.50	60.20	0.00	8,717.53
7/4/07 7:09	859.56	368,078.59	264,414.00	74,782.11	4.61	29.59	12.25	280.35	35.00	60.60	0.00	8,815.53
7/4/07 7:10	856.14	360,768.41	260,860.70	72,821.71	7.03	28.84	12.27	280.35	35.30	61.20	0.00	9,079.88
7/4/07 7:11	852.02	341,409.00	259,299.30	73,756.22	4.49	29.03	12.39	280.35	36.10	62.10	0.00	8,870.35
7/4/07 7:12	849.96	360,859.50	260,953.00	74,096.04	2.46	28.75	12.50	280.37	37.20	62.80	0.00	12,659.27
7/4/07 7:13	850.65	351,907.09	260,566.20	73,815.60	7.29	28.68	12.62	280.35	36.30	62.20	0.00	11,393.96
7/4/07 7:14	852.59	362,928.31	267,000.41	74,612.49	5.16	29.13	12.74	281.04	37.00	63.20	0.00	11,334.91
7/4/07 7:15	854.66	364,231.50	262,874.50	74,026.41	6.36	27.97	12.81	281.04	37.20	63.30	0.00	11,348.37
7/4/07 7:16	856.50	355,621.41	260,793.59	73,738.39	4.88	28.70	12.79	281.04	36.80	63.90	0.00	11,428.14
7/4/07 7:17	857.47	345,263.81	259,464.41	73,486.53	4.85	28.75	12.76	281.04	37.30	64.60	0.00	10,419.69

	3223-TI-015C SH OUTLET FLUE GAS TEMP (DEGF)	3222-FI-002 SECONDARY AIR FLOW (LB/HR)	3221-FI-002 PRIMARY AIR FLOW (LB/HR)	3221-FI-052 DISTRIBUTION AIR FLOW (LB/HR)	3591-FI-011 CEMS STACK FLOW (SCFM)	LS_FLOW SDA TOTAL SLURRY FLOW (GPM)	QW_FLOW SDA QUENCH WATER FLOW (GPM)	3521-TI-005 SDA OUTLET TEMP (DEGF)	3561-FI-501A UREA INJECTION PUMP 1	3561-FI-501B UREA INJECTION PUMP 2	3561-FI-501C UREA INJECTION PUMP 3	3241-FI-005 SOOTBLOWER STEAM FLOW (LB/HR)
7/4/07 7:18	855.50	352,825.41	261,128.59	73,810.16	4.53	28.99	12.73	280.70	37.00	64.60	0.00	10,404.94
7/4/07 7:19	851.02	353,245.00	258,221.00	73,941.80	4.35	29.07	12.71	281.04	38.40	65.50	0.00	10,377.51
7/4/07 7:20	846.51	352,689.81	260,706.91	74,371.53	4.96	28.78	12.68	281.04	38.80	65.50	0.00	10,132.13
7/4/07 7:21	843.48	351,996.81	259,711.50	74,047.88	4.47	28.88	12.66	281.01	39.20	65.70	0.00	9,971.98
7/4/07 7:22	844.16	354,029.50	264,280.91	75,617.13	4.25	29.09	12.63	281.01	36.60	65.70	0.00	10,785.36
7/4/07 7:23	845.27	347,509.50	257,472.50	73,807.11	8.97	28.78	12.61	280.70	38.00	65.80	0.00	10,404.97
7/4/07 7:24	846.48	367,728.59	260,060.50	73,837.80	5.20	28.84	12.58	280.35	34.90	59.80	0.00	10,394.67
7/4/07 7:25	848.43	358,726.09	260,222.00	74,513.89	5.20	29.00	12.56	280.35	34.60	60.20	0.00	10,373.64
7/4/07 7:26	850.82	355,217.31	262,250.81	74,231.32	5.20	28.89	12.53	280.35	35.20	59.90	0.00	2,151.91
7/4/07 7:27	850.92	367,511.31	257,613.91	73,842.88	5.20	28.88	12.50	280.35	33.70	60.00	0.00	9,539.21
7/4/07 7:28	847.78	351,637.00	258,856.00	73,858.00	4.61	28.75	12.23	280.01	35.80	60.20	0.00	9,423.67
7/4/07 7:29	845.34	354,354.59	262,032.09	75,865.21	3.50	29.03	12.25	279.70	35.10	60.90	0.00	9,029.61
7/4/07 7:30	841.80	350,143.19	260,192.70	73,781.48	7.23	28.44	12.26	279.32	36.30	61.50	0.00	9,451.30
7/4/07 7:31	839.63	353,209.50	258,113.59	73,524.02	5.25	28.84	12.28	279.01	35.20	60.90	0.00	9,383.88
7/4/07 7:32	840.92	375,771.19	261,589.80	74,134.66	3.09	28.86	12.30	278.68	36.00	61.40	0.00	10,759.27
7/4/07 7:33	842.38	351,377.09	257,578.59	72,950.48	6.46	28.69	12.32	278.68	36.60	61.70	0.00	10,811.26
7/4/07 7:34	842.99	354,508.31	259,785.09	73,732.55	3.17	28.88	12.34	278.68	36.00	62.10	0.00	10,920.01
7/4/07 7:35	843.86	360,288.19	259,438.59	73,334.47	5.33	28.75	12.35	278.68	36.30	62.70	0.00	10,940.55
7/4/07 7:36	845.31	358,974.09	261,036.91	73,964.29	5.11	28.59	12.37	277.99	36.90	62.50	0.00	9,317.67
7/4/07 7:37	844.10	355,785.09	258,904.00	73,115.61	6.88	28.69	12.39	278.01	37.50	62.60	0.00	9,486.93
7/4/07 7:38	842.78	358,299.59	261,385.50	73,896.80	3.52	27.78	12.41	277.68	37.10	63.00	0.00	10,081.37
7/4/07 7:39	841.60	364,024.31	263,577.69	74,628.86	4.96	27.88	12.42	277.70	36.50	63.30	0.00	9,521.84
7/4/07 7:40	840.27	350,995.19	259,580.20	73,610.97	6.67	28.09	12.44	278.32	37.10	64.00	0.00	9,701.28
7/4/07 7:41	839.72	351,075.50	261,917.50	73,076.18	5.29	27.88	12.46	278.32	38.20	63.90	0.00	9,714.08
7/4/07 7:42	841.42	354,255.69	261,615.00	72,950.39	5.13	27.65	12.48	278.32	38.20	64.20	0.00	8,708.97
7/4/07 7:43	842.90	381,304.50	264,612.91	72,108.40	4.08	27.94	12.50	278.68	37.90	64.60	0.00	8,465.66
7/4/07 7:44	842.78	360,889.09	262,141.91	73,016.83	8.51	28.00	12.51	278.68	36.10	60.00	0.00	8,650.83
7/4/07 7:45	843.46	331,713.31	260,966.09	73,292.67	8.50	27.97	12.53	278.68	34.60	60.10	0.00	8,580.26
7/4/07 7:46	844.51	360,928.00	260,163.70	72,042.68	8.50	28.01	12.55	278.70	35.80	59.70	0.00	9,015.54
7/4/07 7:47	844.14	349,494.00	262,769.09	73,716.90	8.50	28.06	12.57	279.01	35.80	60.40	0.00	9,022.08
7/4/07 7:48	843.56	373,524.91	268,353.91	73,294.63	6.22	29.81	12.59	279.35	34.90	59.50	0.00	8,948.62
7/4/07 7:49	842.86	358,493.69	264,485.59	73,493.73	7.66	28.94	12.60	280.01	34.00	60.30	0.00	9,541.28
7/4/07 7:50	843.29	374,251.41	262,849.59	73,258.48	6.02	29.16	12.62	280.01	35.80	60.90	0.00	5,125.43
7/4/07 7:51	843.12	355,439.00	262,404.69	72,667.82	7.68	28.75	12.64	279.35	35.20	61.50	0.00	10,613.27
7/4/07 7:52	844.32	365,704.41	264,241.69	73,612.53	4.86	29.00	12.66	279.35	36.20	61.30	0.00	10,529.12
7/4/07 7:53	845.40	358,294.91	263,602.81	73,020.13	6.46	28.75	12.67	279.37	36.40	61.10	0.00	10,330.79
7/4/07 7:54	846.88	357,579.59	263,141.69	73,525.81	5.56	28.59	12.69	279.68	36.60	61.10	0.00	10,379.91
7/4/07 7:55	848.39	363,341.41	264,227.31	74,546.53	6.58	29.00	12.71	279.65	36.00	61.00	0.00	2,110.27
7/4/07 7:56	848.56	358,871.09	261,470.80	72,742.57	6.29	28.72	12.73	280.04	34.60	60.70	0.00	9,807.79
7/4/07 7:57	846.51	360,200.09	262,820.00	73,378.04	4.74	28.25	12.75	279.37	35.00	60.60	0.00	9,466.66
7/4/07 7:58	843.74	371,236.50	264,115.31	74,358.33	6.20	28.34	12.76	279.37	34.30	60.10	0.00	9,553.43

PM-10 TEST DATA FROM THE DCS

Test High Load
Run - 3-1

Date and Time	Leak Detection 1	Leak Detection 2	Leak Detection 3	Leak Detection 4	Leak Detection 5	Leak Detection 6	Leak Detection 7	Leak Detection 8	Baghouse DP
7/3/07 11:42 PM	7.351	6.960	7.838	7.055	7.619	19.407	7.991	7.433	9.439
7/3/07 11:47 PM	6.586	6.513	7.993	6.710	8.312	19.656	7.968	6.518	9.414
7/3/07 11:52 PM	6.075	6.562	6.920	6.525	8.757	18.669	8.049	6.810	9.273
7/3/07 11:57 PM	6.555	8.002	6.360	6.812	8.297	19.012	7.248	7.036	9.353
7/4/07 12:02 AM	5.825	5.691	6.670	6.655	7.888	19.204	7.396	6.942	9.856
7/4/07 12:07 AM	7.416	5.757	8.801	6.607	8.181	15.866	7.724	6.239	9.775
7/4/07 12:12 AM	6.443	6.006	6.775	6.364	8.113	15.007	7.492	6.257	9.742
7/4/07 12:17 AM	5.962	7.001	5.795	6.827	8.363	13.687	7.331	8.394	9.581
7/4/07 12:22 AM	5.944	7.321	6.938	6.507	7.330	11.123	8.283	7.176	9.660
7/4/07 12:27 AM	5.884	5.526	7.008	6.998	7.820	18.488	7.906	7.140	8.917
7/4/07 12:32 AM	6.389	6.698	7.478	6.165	8.311	14.373	7.159	6.308	8.999
7/4/07 12:37 AM	6.248	6.220	6.054	6.467	7.394	12.032	7.411	6.686	8.914
7/4/07 12:42 AM	6.121	7.644	6.370	7.082	7.934	12.608	7.162	7.417	9.311
7/4/07 12:47 AM	6.456	6.472	6.881	6.316	7.787	18.043	7.203	6.655	9.406
7/4/07 12:52 AM	6.281	6.979	7.932	6.897	8.433	19.994	7.305	6.690	9.311
7/4/07 12:57 AM	6.460	7.155	6.480	6.293	8.019	17.922	7.703	6.885	9.034
7/4/07 1:02 AM	5.901	5.895	10.003	5.986	7.288	17.064	7.205	6.983	9.215
7/4/07 1:07 AM	6.513	6.086	6.666	6.758	8.377	20.825	7.815	6.632	9.165
7/4/07 1:12 AM	6.433	5.942	6.792	6.523	8.078	20.821	7.281	6.276	8.965
7/4/07 1:17 AM	6.399	7.041	6.260	7.176	8.335	20.273	7.244	8.573	8.566
7/4/07 1:22 AM	6.177	6.907	6.586	6.239	7.889	20.183	7.481	6.693	8.504
7/4/07 1:27 AM	6.124	5.858	8.716	6.305	7.072	20.122	7.301	7.071	8.478
7/4/07 1:32 AM	6.160	6.372	7.087	6.259	7.859	19.179	7.078	6.424	8.396
7/4/07 1:37 AM	5.886	6.003	6.757	6.444	7.344	18.188	7.546	6.876	8.502
7/4/07 1:42 AM	6.157	7.322	6.252	6.205	7.975	19.073	6.821	7.553	8.609
7/4/07 1:47 AM	6.010	6.939	6.480	6.337	7.404	21.645	7.785	6.734	8.637
7/4/07 1:52 AM	6.065	5.651	7.698	6.026	8.538	18.848	7.539	6.341	8.343
7/4/07 1:57 AM	6.605	7.019	9.515	6.822	8.297	17.708	6.833	6.496	8.580
7/4/07 2:02 AM	5.938	5.640	6.807	6.374	7.597	15.918	7.197	6.669	8.428
7/4/07 2:07 AM	6.832	6.081	8.120	6.266	8.773	14.864	7.634	6.612	8.783
7/4/07 2:12 AM	5.806	5.913	9.112	6.963	8.385	13.485	7.223	6.397	8.100
7/4/07 2:17 AM	6.764	5.784	6.610	6.929	8.562	13.115	7.277	7.694	8.659
7/4/07 2:22 AM	5.977	8.194	6.571	6.634	8.576	13.657	6.993	6.632	8.796
7/4/07 2:27 AM	6.091	5.549	6.229	5.944	7.469	11.759	7.322	6.919	8.531
7/4/07 2:32 AM	6.557	5.617	7.263	6.017	8.876	11.180	7.377	6.303	8.611
7/4/07 2:37 AM	6.483	6.362	6.742	6.349	7.762	10.805	6.918	6.359	8.995
7/4/07 2:42 AM	5.717	7.083	6.641	6.153	8.409	14.200	6.880	7.105	8.953

PM-10 TEST DATA FROM THE DCS

Test High Load
Run - 3-2

Date and Time	Leak Detection 1	Leak Detection 2	Leak Detection 3	Leak Detection 4	Leak Detection 5	Leak Detection 6	Leak Detection 7	Leak Detection 8	Baghouse DP
7/4/07 2:44 AM	6.583	5.828	6.789	5.906	8.961	13.331	7.053	6.755	9.086
7/4/07 2:49 AM	6.321	6.668	7.191	6.093	8.234	13.281	6.941	6.377	8.954
7/4/07 2:54 AM	5.993	7.298	6.389	6.486	8.012	11.329	7.492	7.522	8.860
7/4/07 2:59 AM	5.733	6.725	6.261	6.356	7.646	12.776	9.141	7.283	8.761
7/4/07 3:04 AM	5.850	5.585	6.158	6.655	7.430	13.380	7.119	7.141	8.852
7/4/07 3:09 AM	6.729	5.957	6.813	6.271	8.219	22.011	6.894	6.169	8.714
7/4/07 3:14 AM	6.044	5.767	6.882	6.260	7.792	19.046	7.398	7.074	8.719
7/4/07 3:19 AM	6.822	6.572	8.813	6.486	8.078	17.382	7.522	7.305	8.651
7/4/07 3:24 AM	6.095	6.068	6.654	6.096	8.480	20.586	7.203	6.149	8.879
7/4/07 3:29 AM	7.229	5.997	8.290	6.263	8.493	20.402	7.763	6.653	8.747
7/4/07 3:34 AM	6.262	7.613	6.348	6.029	8.437	20.551	7.285	7.160	8.956
7/4/07 3:39 AM	5.871	5.768	6.573	6.568	7.554	13.901	7.310	6.965	8.678
7/4/07 3:44 AM	7.037	5.945	9.007	6.058	7.921	13.237	7.544	6.228	8.685
7/4/07 3:49 AM	6.406	5.929	6.001	6.097	8.492	11.924	7.264	5.890	8.938
7/4/07 3:54 AM	5.845	6.506	6.497	6.109	8.505	11.946	7.499	8.121	8.799
7/4/07 3:59 AM	5.507	7.429	6.167	6.581	7.295	12.435	8.823	7.090	8.961
7/4/07 4:04 AM	5.989	5.773	6.982	5.886	7.733	12.526	7.556	6.685	8.649
7/4/07 4:09 AM	6.532	6.614	7.312	6.382	8.008	12.260	6.768	6.408	8.814
7/4/07 4:14 AM	5.906	5.545	6.218	6.566	7.494	18.771	7.012	6.571	8.819
7/4/07 4:19 AM	6.008	6.442	6.289	6.634	7.965	7.879	7.241	7.440	8.665
7/4/07 4:24 AM	6.048	6.577	7.198	6.355	8.268	7.451	7.404	6.559	8.756
7/4/07 4:29 AM	5.843	6.860	7.033	6.384	8.501	15.912	7.342	6.559	8.561
7/4/07 4:34 AM	5.936	6.483	6.904	6.200	8.370	13.808	7.297	6.926	9.004
7/4/07 4:39 AM	5.874	5.503	8.778	6.112	7.674	11.412	7.315	7.232	8.723
7/4/07 4:44 AM	6.508	5.574	6.105	6.519	8.282	12.482	7.406	6.620	8.452
7/4/07 4:49 AM	6.356	5.789	7.360	6.065	7.613	16.481	7.359	6.103	8.241
7/4/07 4:54 AM	6.141	7.018	6.257	6.215	8.460	19.010	7.008	8.532	8.218
7/4/07 4:59 AM	5.925	6.878	6.376	6.287	8.091	21.174	8.517	6.453	8.144
7/4/07 5:04 AM	5.866	5.584	7.812	5.895	7.290	16.916	7.499	7.121	8.155
7/4/07 5:09 AM	5.969	6.802	6.318	6.486	8.227	20.327	6.963	6.288	7.954
7/4/07 5:14 AM	6.156	5.830	6.556	6.312	7.120	21.593	7.003	6.724	7.842
7/4/07 5:19 AM	5.939	7.725	6.579	6.248	8.166	21.722	6.861	7.698	7.758
7/4/07 5:24 AM	5.695	6.815	6.600	6.741	8.175	19.846	7.823	7.028	8.520

PM-10 TEST DATA FROM THE DCS

Test High Load
Run - 3-3

Date and Time	Leak Detection 1	Leak Detection 2	Leak Detection 3	Leak Detection 4	Leak Detection 5	Leak Detection 6	Leak Detection 7	Leak Detection 8	Baghouse DP
7/4/07 5:27 AM	6.006	5.573	6.088	5.996	7.231	20.364	7.089	6.673	9.068
7/4/07 5:32 AM	6.764	5.981	9.745	6.419	9.051	20.330	7.407	7.406	9.168
7/4/07 5:37 AM	5.949	5.718	7.360	6.226	8.016	21.216	7.079	6.294	9.177
7/4/07 5:42 AM	6.558	6.106	6.045	6.711	9.209	26.226	7.645	7.806	9.201
7/4/07 5:47 AM	6.347	7.948	6.391	6.634	8.196	24.898	6.903	6.339	8.856
7/4/07 5:52 AM	6.155	5.581	6.785	6.291	7.875	24.042	8.053	7.158	9.197
7/4/07 5:57 AM	6.716	5.680	6.254	6.418	8.080	24.070	7.068	6.284	8.827
7/4/07 6:02 AM	6.334	5.953	7.050	7.025	7.505	22.478	7.086	6.335	9.041
7/4/07 6:07 AM	5.943	6.778	5.357	6.381	8.272	21.708	6.973	7.645	8.927
7/4/07 6:12 AM	6.017	7.283	7.427	6.534	7.822	21.055	7.413	7.308	8.879
7/4/07 6:17 AM	5.852	5.557	7.028	6.488	7.698	19.085	7.271	6.873	8.834
7/4/07 6:22 AM	6.858	6.197	7.406	6.361	8.749	18.262	6.678	6.591	9.082
7/4/07 6:27 AM	6.475	6.008	6.360	6.514	7.632	19.504	6.975	7.276	9.623
7/4/07 6:32 AM	6.642	5.968	5.957	6.090	9.104	19.377	8.033	6.699	9.381
7/4/07 6:37 AM	5.946	6.327	11.698	6.255	7.729	22.222	7.377	5.979	9.573
7/4/07 6:42 AM	7.462	5.957	7.478	6.516	8.720	18.751	7.688	6.103	9.325
7/4/07 6:47 AM	6.025	7.319	6.442	6.343	8.369	19.542	7.442	6.552	9.375
7/4/07 6:52 AM	6.495	5.635	6.658	6.431	7.476	22.174	6.829	7.007	9.378
7/4/07 6:57 AM	6.408	5.794	6.826	6.096	8.268	24.164	7.530	6.119	9.199
7/4/07 7:02 AM	6.057	5.914	6.982	6.074	7.616	25.104	7.196	6.161	8.835
7/4/07 7:07 AM	5.807	7.103	6.940	6.432	8.401	21.307	6.854	7.312	9.164
7/4/07 7:12 AM	5.792	6.922	6.296	6.581	7.352	20.868	8.223	7.289	9.424
7/4/07 7:17 AM	5.993	6.042	6.327	6.076	7.762	21.370	6.734	6.970	9.351
7/4/07 7:22 AM	6.513	5.745	6.595	6.352	7.885	20.240	6.933	6.671	9.216
7/4/07 7:27 AM	6.110	5.631	7.120	6.306	7.775	17.678	7.224	6.945	9.065
7/4/07 7:32 AM	6.943	6.079	8.675	6.521	8.384	17.776	8.197	7.176	8.687
7/4/07 7:37 AM	6.075	6.402	6.751	6.146	8.342	21.224	7.800	6.339	8.848
7/4/07 7:42 AM	7.356	6.259	9.553	6.324	9.031	19.982	7.595	6.194	9.016
7/4/07 7:47 AM	6.475	7.496	6.280	6.346	8.529	18.889	7.196	6.549	9.196
7/4/07 7:52 AM	6.022	5.623	7.316	6.000	7.628	20.187	7.120	7.317	9.192
7/4/07 7:57 AM	7.002	5.949	7.297	6.522	8.689	18.975	7.365	6.221	9.246
7/4/07 8:02 AM	5.974	5.898	7.521	6.320	8.576	15.366	7.537	6.069	8.919

APPENDIX C

CALIBRATION GAS CERTIFICATIONS

AIR LIQUIDE™

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cylinder Number: CC162006

Customer:	Air Hygiene	**Shipping Order #:**	24669211
P.O. Number:		**Transfer #:**	24669211
Item Number:	SGZCAH094	**LOT #:**	LPX218867
Notes:		**Valve:**	CGA590
		Cyl. Pressure:*	1900psig

*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 26-Mar-07 **Expiration Date: 25-Mar-10**

Component	Requested Concentration	Assay Concentration
Carbon Dioxide	**9 %**	**8.97 ±0.05 %**
Oxygen	**12 %**	**12.0 ±0.1 %**
Nitrogen	**Balance**	**Balance**

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS328	GMIS328	14.01	%	0.06	CO2	N2	CC203023	7/24/2008	N.A.
GMIS203	GMIS203	19.0	%	0.2	O2	N2	CC57985	5/12/2007	N.A.

Analysis Information:

Component 1: Carbon Dioxide

Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTiR
MPC Calibrated:	03/01/07

First Triad Analysis On: 3/26/2007

	Trial 1	Trial 2	Trial 3	Units
Zero	**0.27**	**0.28**	**0.28**	
Reference	**14.46**	**14.49**	**14.45**	
Candidate	**9.39**	**9.36**	**9.32**	
Result	**8.99**	**8.97**	**8.93**	%
		Mean Result:	8.97	%

Second Triad Analysis On:

	Trial 1	Trial 2	Trial 3	Units
Zero				
Reference				
Candidate				
Result				
		Mean Result:		

Component 2: Oxygen

Analyzer Information	
Manufacturer:	Servomex
Model Number:	4605C
Serial Number:	1101
Analytical Principle:	Paramag.
MPC Calibrated:	03/14/07

First Triad Analysis On: 3/26/2007

	Trial 1	Trial 2	Trial 3	Units
Zero	**-0.01**	**-0.01**	**-0.01**	
Reference	**18.70**	**18.69**	**18.70**	
Candidate	**11.82**	**11.82**	**11.82**	
Result	**12.02**	**12.02**	**12.02**	%
		Mean Result:	12.02	%

Second Triad Analysis On:

	Trial 1	Trial 2	Trial 3	Units
Zero				
Reference				
Candidate				
Result				
		Mean Result:		

Analyst Signature: _____ Warren Pereira **Calculated by:** _____ Warren Pereira

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

AIR LIQUIDE™

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cylinder Number: CC16039

Customer:	Air Hygiene	**Shipping Order #:**	18651280
P.O. Number:		**Transfer #:**	18651280
Item Number:	AH095	**LOT #:**	LPX129537
Notes:		**Valve:**	CGA590
		Cyl. Pressure:*	1900psig

*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 23-Nov-05 **Expiration Date: 22-Nov-08**

Component	Requested Concentration	Assay Concentration
Carbon Dioxide	**19 %**	**19.0 ±0.2 %**
Oxygen	**21 %**	**21.0 ±0.2 %**
Nitrogen	**Balance**	**Balance**

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS301	GMIS301	14.0	%	0.1	CO2	N2	CC71493	8/24/2007	N.A.
GMIS204	GMIS204	19.0	%	0.2	O2	N2	CC115413	5/12/2007	N.A.

Analysis Information:

Component 1:	Carbon Dioxide
Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTIR
MPC Calibrated:	11/10/05

	First Triad Analysis On: 11/18/2005			
	Trial 1	Trial 2	Trial 3	Units
Zero	**0.19**	**0.29**	**0.27**	
Reference	**13.26**	**13.42**	**13.39**	
Candidate	**17.99**	**18.05**	**18.07**	
Result	**18.94**	**19.01**	**19.03**	%
		Mean Result:	19.00	%

	Second Triad Analysis On:			
	Trial 1	Trial 2	Trial 3	Units
Zero				
Reference				
Candidate				
Result				
		Mean Result:		

Component 2:	Oxygen
Analyzer Information	
Manufacturer:	Servomex
Model Number:	4605C
Serial Number:	1101
Analytical Principle:	Paramag.
MPC Calibrated:	11/03/05

	First Triad Analysis On: 11/23/2005			
	Trial 1	Trial 2	Trial 3	Units
Zero	**0.03**	**0.03**	**0.04**	
Reference	**18.61**	**18.61**	**18.62**	
Candidate	**20.56**	**20.57**	**20.57**	
Result	**20.99**	**21.00**	**21.00**	%
		Mean Result:	21.00	%

	Second Triad Analysis On:			
	Trial 1	Trial 2	Trial 3	Units
Zero				
Reference				
Candidate				
Result				
		Mean Result:		

Analyst Signature: Warren Pereira **Calculated by:** Warren Pereira

Mix Assayed At: Air Liquide America **11426 Fairmont Pkwy, La Porte, TX, 77571** **Phone:(281)474-8400 Fax:(281)474-8419**

AIR LIQUIDE

RECERTIFICATION

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cyl. Number: CC58443

Customer:	AIR HYGIENE	**Shipping Order #:**	23221670
P.O. Number:		**Transfer #:**	24017378
Item Number:	SGZCAH026	**LOT #:**	LPX216414
Notes:		**Valve**	CGA660
		Cyl. Pressure:*	<1900 psig

*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 15-Feb-07 **Expiration Date: 14-Feb-09**

Component	Requested Concentration	Assay Concentration
Nitric Oxide	**110 ppm**	**111 ±1 ppm**
Total NOX		**111 ppm**
Nitrogen	**Balance**	**Balance**

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS343	GMIS343	102.0	ppm	0.6	NO	N2	CC60015	11/30/2008	N.A.

Analysis Information:

Component 1:	Nitric Oxide
Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTIR
MPC Calibrated:	2/8/2007

	First Triad Analysis On: 2/15/2007			
	Trial 1	Trial 2	Trial 3	Units
Zero	**0.00**	**0.38**	**0.34**	
Reference	**100.08**	**99.43**	**99.17**	
Candidate	**107.00**	**107.53**	**109.08**	
Result	**109.64**	**110.19**	**111.78**	ppm
		Mean Result:	110.54	ppm

	Second Triad Analysis On:			
	Trial 1	Trial 2	Trial 3	Units
Zero				
Reference				
Candidate				
Result				
		Mean Result:		

Note: The recertification analysis of 111 ±1 ppm of NO has overlapped the original certification number of 111 ±1 ppm . Therefore, the original number has been used on this recertification.

Analyst Signature: Bryan Leger **Calculated by:** M. Adnane

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

AIR LIQUIDE

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cyl. Number: CC84458

Customer:	Air Hygiene	**Shipping Order #:**	19040311
P.O. Number:		**Transfer #:**	19040311
Item Number:	AH021	**LOT #:**	LPX130966
Notes:		**Valve**	CGA660
		Cyl. Pressure:*	1900psig

*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 30-Dec-05 **Expiration Date: 30-Dec-07**

Component	Requested Concentration	Assay Concentration
Nitric Oxide	**250 ppm**	**253 ±1 ppm**
Total NOX		**254 ppm**
Nitrogen	**Balance**	**Balance**

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS299	GMIS299	250.0	ppm	1.0	NO	N2	CC174946	8/11/2007	N.A.

Analysis Information:

Component 1:	Nitric Oxide
Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTIR
MPC Calibrated:	12/15/05

	First Triad Analysis On:		12/23/2005	
	Trial 1	Trial 2	Trial 3	Units
Zero	-0.30	0.16	0.18	
Reference	247.30	245.90	246.28	
Candidate	248.87	249.09	248.04	
Result	252.41	252.63	251.57	ppm
		Mean Result:	252.21	ppm

	Second Triad Analysis On:		12/30/2005	
	Trial 1	Trial 2	Trial 3	Units
Zero	0.50	-0.62	0.36	
Reference	245.71	246.27	245.50	
Candidate	249.05	249.73	247.49	
Result	253.28	253.97	251.70	ppm
		Mean Result:	252.98	ppm

Analyst Signature: W.P. Warren Pereira **Calculated by:** W.P. Warren Pereira

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

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CERTIFICATE OF ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section No. 2.2, Procedure . G-1

Cylinder Number: CC233344

Customer: AIR HYGIENE
TULSA, OK
P.O. Number: AIR HYGIENE CONSIGNMENT
Item Number: SGZCAH032

Shipping Order Number 24193970
Transfer Number: 24193970
Lot Number: SFS105098
Valve: CGA 660
Cyl. Pressure:* 2000PSIG
*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 19-Feb-07

Expiration Date: 19-Aug-07

Component	REQUESTED Concentration	ASSAY Concentration
Nitrogen Dioxide	**45-50 ppm**	**47.6 ± 0.8 ppm**
Nitrogen	**Balance**	**Balance**

Reference Standard Employed For Analysis:

Concentration				Component	Balance	Cyl. No.	SRM or GMIS NTRM No.	Exp. Date	Sample No.	Type
95.2	±	1.3	ppm	Nitrogen Dioxide	Air	CC247654	SFS99692	02/04/09	YO	GMIS

Analysis Information:

Component	Nitrogen Dioxide		First Triad Analysis 02/11/07				Second Triad Analysis 02/19/07			
Analyzer Information			Trial 1	Trial 2	Trial 3	Units	Trial 4	Trial 5	Trial 6	Units
Manufacturer:	MKS Instruments	Zero	-0.006	0.007	0.015	ppm	0.022	0.020	0.029	ppm
Model Number:	2031	Reference	93.719	93.776	93.887	ppm	94.728	94.816	94.714	ppm
Serial Number:	10387278	Candidate	47.057	47.170	47.133	ppm	46.966	47.264	47.279	ppm
MPR Last Calibrated:	02/17/07	Result	47.80	47.88	47.78	ppm	47.19	47.44	47.51	ppm
Analytical Principle:	FTIR	Evaluation	VALID	VALID	VALID		VALID	VALID	VALID	
			MEAN ANALYTICAL RESULT:			47.82 ppm	MEAN ANALYTICAL RESULT:			47.38 ppm

Analyst Signature: _____ Aidan Ifland

Approved by: _____ Thuen Tran

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AIR LIQUIDE

015900360

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cyl. Number: CC17607

Customer:	AIR HYGIENE	**Shipping Order #:**	24745990
P.O. Number:		**Transfer #:**	24745990
Item Number:	SGZCAH045	**LOT #:**	LPX219434
Notes:		**Valve**	CGA350
		Cyl. Pressure:*	1900psig

*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 17-Apr-07 **Expiration Date: 16-Apr-10**

Component	Requested Concentration	Assay Concentration
Carbon Monoxide	**210 ppm**	**220 ±2 ppm**
Nitrogen	**Balance**	**Balance**

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS339	GMIS339	99.44	ppm	0.48	CO	N2	CC82421	11/14/2008	N.A.

Analysis Information:

Component 1:	Carbon Monoxide										
Analyzer Information			First Triad Analysis On:		4/10/2007			Second Triad Analysis On:		4/17/2007	
Manufacturer:	KVB/Analect		Trial 1	Trial 2	Trial 3	Units		Trial 1	Trial 2	Trial 3	Units
Model Number:	EN3024	Zero	**-0.14**	**-0.01**	**0.17**		Zero	**-0.12**	**-0.05**	**-0.17**	
Serial Number:	3024	Reference	**105.21**	**104.57**	**103.96**		Reference	**105.44**	**105.12**	**104.85**	
Analytical Principle:	FTIR	Candidate	**230.54**	**231.66**	**231.12**		Candidate	**231.16**	**232.51**	**232.81**	
	03/15/07 &										
MPC Calibrated:	04/12/07	Result	**219.22**	**220.28**	**219.77**	ppm	Result	**218.50**	**219.77**	**220.06**	ppm
				Mean Result:	219.76	ppm			Mean Result:	219.44	ppm

Analyst Signature: Bryan Leger Bryan Leger **Calculated by:** M. Adnane

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

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CERTIFICATE of ANALYSIS

EPA Protocol Gases

Cyl. Number:	Cyl. Pressure:*	Lot Number:
CC148606	2000 PSIG	SFS75790
Assay Date:	**Expiration Date:**	**Document Number:**
01/14/05	01/14/08	14680051
Customer:	**P.O. Number:**	**Item Number:**
ALA-CSL-CENTENNIAL CENTENNIAL, CO	CONSIGNMENT	

*Mixture is valid only to 150 psig

COMPONENT Name	REQUESTED Concentration	ASSAY Concentration
Carbon Monoxide	450 ppm	457 ± 6 ppm
Nitrogen	Balance	Balance

EPA Protocol
Section No. 2.2, Procedure . G-1

Analyst: Eric Barron
Approved by: Thuan Tran

REFERENCE STANDARD EMPLOYED FOR ANALYSIS							SRM or GMIS			
Concentration				Component	Balance	Cyl. No.	NTRM No.	Exp. Date	Sample No.	Type
500	±	4	ppm	Carbon Monoxide	Nitrogen	CC 150327	SFS48669	04/02/05	LU	GMIS

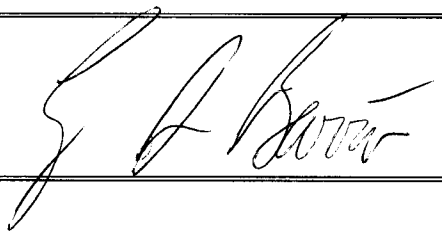
Carbon Monoxide
GAS ANALYZER EMPLOYED

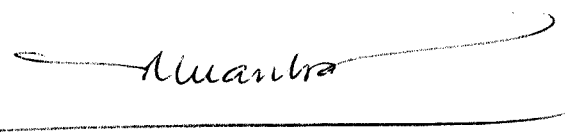
Manufacturer:	Varian(A)
Model Number:	3400
Serial Number:	2805
MPR Last Calibrated:	12/22/04
Analytical Principle:	FID & TCD

ANALYSIS SUMMARY

	01/07/05 Triad 1	01/07/05 Triad 2	01/07/05 Triad 3	Carbon Monoxide Units
Zero	0	0	0	Area
Reference	20715159	20739129	20771211	Area
Candidate	18925811	18984831	19018555	Area
Result	456.8	457.7	457.8	ppm
Evaluation	VALID	VALID	VALID	
MEAN ANALYTICAL RESULT:				457.4 ppm

	01/14/05 Triad 4	01/14/05 Triad 5	01/14/05 Triad 6	Carbon Monoxide Units
Zero	0	0	0	Area
Reference	21588952	21601768	21615114	Area
Candidate	19769458	19740611	19750175	Area
Result	457.9	456.9	456.9	ppm
Evaluation	VALID	VALID	VALID	
MEAN ANALYTICAL RESULT:				457.2 ppm

Analyst: 

Approved by: 

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CERTIFICATE OF ANALYSIS
Interference-Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section No. 2.2, Procedure . G-1

Cylinder Number: CC171920

Customer: AIR HYGIENE
HUMBLE, TX
P.O. Number: RECERTIFICATION
Item Number: AH043

Shipping Order Number 16169268
Transfer Number:
Lot Number: SFS85767
Valve: CGA 350
Cyl. Pressure:* 1667 PSIG
*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 25-Jul-05

Expiration Date: 25-Jul-08

Component	REQUESTED Concentration	ASSAY Concentration		
Carbon Monoxide	**4000 ppm**	**4010**	**± 60**	**ppm**
Nitrogen	**Balance**	**Balance**		

Reference Standard Employed For Analysis:

Concentration				Component	Balance	Cyl. No.	SRM or GMIS NTRM No.	Exp. Date	Sample No.	Type
4980	±	50	ppm	Carbon Monoxide	Nitrogen	AL-1927	12223	06/02/07	BY	GMIS

Analysis Information:

Component	Carbon Monoxide		First Triad Analysis 07/18/05					Second Triad Analysis 07/25/05			
Analyzer Information			Trial 1	Trial 2	Trial 3	Units		Trial 4	Trial 5	Trial 6	Units
Manufacturer:	Varian(B)	Zero	0	0	0	ppm	Zero	0	0	0	ppm
Model Number:	3400	Reference	5000	5008	5000	ppm	Reference	5004	5010	4994	ppm
Serial Number:	2806	Candidate	4024	4027	4025	ppm	Candidate	4023	4024	4018	ppm
MPR Last Calibrated:	06/27/05	Result	4008	4004	4009	ppm	Result	4004	4000	4007	ppm
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID		Evaluation	VALID	VALID	VALID	
		MEAN ANALYTICAL RESULT:				4007	ppm	MEAN ANALYTICAL RESULT:			4003 ppm

Analyst Signature: _____ Eric Barron

Approved by: _____ David Connolly

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CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cyl. Number: CC178135

Customer:	Air Hygiene	**Shipping Order #:**	15321147
P.O. Number:	5021102	**Transfer #:**	15321147
Item Number:	AH-042	**LOT #:**	LPX114669
Notes:		**Valve**	CGA350
		Cyl. Pressure:*	1900psig
Assay Date:	8-Mar-05	**Expiration Date: 7-Mar-08**	*Cylinder should not be used when gas pressure is below 150 psig

Component	Requested Concentration	Assay Concentration
Carbon Monoxide	**1800 ppm**	**1810 ±10 ppm**
Nitrogen	**Balance**	**Balance**

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS233	GMIS233	2452.0	ppm	10.0	CO	N2	CC108277	4/17/2005	N.A.

Analysis Information:

Component 1: Carbon Monoxide

Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTIR
MPC Calibrated:	02/21/05

	First Triad Analysis On:		3/1/2005	
	Trial 1	Trial 2	Trial 3	Units
Zero	**-0.54**	**0.50**	**0.17**	
Reference	**2359.69**	**2367.34**	**2371.32**	
Candidate	**1748.98**	**1748.03**	**1741.12**	
Result	**1812.45**	**1811.46**	**1804.30**	ppm
		Mean Result:	1809.40	ppm

	Second Triad Analysis On:		3/8/2005	
	Trial 1	Trial 2	Trial 3	Units
Zero	**-0.02**	**0.13**	**0.11**	
Reference	**2344.65**	**2347.36**	**2352.17**	
Candidate	**1737.56**	**1730.56**	**1734.16**	
Result	**1814.45**	**1807.14**	**1810.90**	ppm
		Mean Result:	1810.83	ppm

Analyst Signature: Bryan Leger

Calculated by: Yang Qin

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

AIR LIQUIDE

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cyl. Number: CC13526

Customer:	AIR HYGIENE	**Shipping Order #:**	16895569
P.O. Number:		**Transfer #:**	16895569
Item Number:	AH085	**LOT #:**	LPX121940
Notes:		**Valve**	CGA660
		Cyl. Pressure:*	1900psig
		*Cylinder should not be used when gas pressure is below 150 psig	
Assay Date:	6-Jul-05	**Expiration Date: 6-Jul-07**	

Component	Requested Concentration	Assay Concentration
Sulfur Dioxide	**45 ppm**	**45.9 ±0.6 ppm**
Nitrogen	**Balance**	**Balance**

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS263	GMIS263	103.0	ppm	0.4	SO2	N2	CC28420	3/15/2006	N.A.

ysis Information:

Component 1:	Sulfur Dioxide
Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTIR
MPC Calibrated:	06/16/05

	First Triad Analysis On:		6/29/2005	
	Trial 1	Trial 2	Trial 3	Units
Zero	**0.02**	**0.03**	**0.02**	
Reference	**100.63**	**100.63**	**99.99**	
Candidate	**45.43**	**45.47**	**45.00**	
Result	**46.59**	**46.63**	**46.14**	ppm
		Mean Result:	46.45	ppm

	Second Triad Analysis On:		7/6/2005	
	Trial 1	Trial 2	Trial 3	Units
Zero	**-0.34**	**-0.27**	**0.10**	
Reference	**100.02**	**100.17**	**100.21**	
Candidate	**43.66**	**43.96**	**44.50**	
Result	**45.00**	**45.31**	**45.87**	ppm
		Mean Result:	45.40	ppm

Analyst Signature: Bryan Leger **Calculated by:** M. Adnane

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

AIR LIQUIDE

West

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cyl. Number: CC2463

Customer:	AIR HYGIENE	**Shipping Order #:**	16910596
P.O. Number:		**Transfer #:**	16910596
Item Number:	AH086	**LOT #:**	LPX121970
Notes:		**Valve**	CGA660
		Cyl. Pressure:*	1900psig
Assay Date:	6-Jul-05	**Expiration Date: 6-Jul-07**	

*Cylinder should not be used when gas pressure is below 150 psig

Component	Requested Concentration	Assay Concentration
Sulfur Dioxide	**85 ppm**	**84.7 ±0.5 ppm**
Nitrogen	**Balance**	**Balance**

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS263	GMIS263	103.0	ppm	0.4	SO2	N2	CC28420	3/15/2006	N.A.

Analysis Information:

Component 1:	**Sulfur Dioxide**
Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTIR
MPC Calibrated:	06/16/05

	First Triad Analysis On:		6/29/2005	
	Trial 1	Trial 2	Trial 3	Units
Zero	**0.02**	**0.03**	**0.02**	
Reference	**100.63**	**100.63**	**99.99**	
Candidate	**82.43**	**82.41**	**82.30**	
Result	**84.55**	**84.53**	**84.42**	ppm
		Mean Result:	84.50	ppm

	Second Triad Analysis On:		7/6/2005	
	Trial 1	Trial 2	Trial 3	Units
Zero	**-0.34**	**-0.27**	**0.10**	
Reference	**100.02**	**100.17**	**100.21**	
Candidate	**82.61**	**81.89**	**83.31**	
Result	**85.01**	**84.25**	**85.72**	ppm
		Mean Result:	85.00	ppm

Analyst Signature: Bryan Leger

Calculated by: M. Adnane

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET,TROY,MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 55302-71-65000
Project No.: 05-49082-025

Customer

CLEAN AIR ENGINEERING
DON ALLEN
500 W. WOOD STREET
PALATINE IL 60067

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM019950 **Certification Date:** 01Dec2006 **Exp. Date:** 30Nov2008
Cylinder Pressure*:** 1900 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
SULFUR DIOXIDE *	197.0	PPM	+/- 1%	Direct NIST and NMi
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

* This Protocol has been certified using corrected NIST SO2 standard values, per EPA guidance dated 7/24/96 and will not correlate with uncorrected Prot

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1661	15Aug2009	ALM037811	506.4 PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
/2030/0928621	01Nov2006	

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis | **Second Triad Analysis** | **Calibration Curve**

SULFUR DIOXIDE *

Date: 23Nov2006	Response Unit:PPM	
Z1 = 0.04000	R1 = 252.3100	T1 = 197.4700
R2 = 252.4000	Z2 = 0.02000	T2 = 197.6600
Z3 = 0.01000	T3 = 197.8300	R3 = 252.8800
Avg. Concentration:	197.7	PPM

Date: 01Dec2006	Response Unit: PPM	
Z1 = 0.04700	R1 = 505.9789	T1 = 196.5231
R2 = 505.9500	Z2 = 0.00100	T2 = 196.1193
Z3 = 0.25900	T3 = 196.4214	R3 = 507.2711
Avg. Concentration:	196.3	PPM

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999999	
Constants:	A = 0
B = 1	C = 0
D = 0	E = 0

APPROVED BY: _____

AIR LIQUIDE

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cyl. Number: SC022886B

Customer:	AIR HYGIENE	**Shipping Order #:**	16895569
P.O. Number:		**Transfer #:**	16895569
Item Number:	AH087	**LOT #:**	LPX121941
Notes:		**Valve**	CGA660
		Cyl. Pressure:*	1900psig
Assay Date:	6-Jul-05	**Expiration Date: 6-Jul-07**	

*Cylinder should not be used when gas pressure is below 150 psig

Component	Requested Concentration	Assay Concentration
Sulfur Dioxide	250 ppm	252 ±2 ppm
Nitrogen	Balance	Balance

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS263	GMIS263	103.0	ppm	0.4	SO2	N2	CC28420	3/15/2006	N.A.

Analysis Information:

Component 1: Sulfur Dioxide

Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTIR
MPC Calibrated:	06/16/05

	First Triad Analysis On: 6/29/2005			
	Trial 1	Trial 2	Trial 3	Units
Zero	0.02	0.03	0.02	
Reference	100.63	100.63	99.99	
Candidate	245.67	248.15	246.60	
Result	252.01	254.56	252.87	ppm
		Mean Result:	253.15	ppm

	Second Triad Analysis On: 7/6/2005			
	Trial 1	Trial 2	Trial 3	Units
Zero	-0.34	-0.27	0.10	
Reference	100.02	100.17	100.21	
Candidate	243.44	248.13	243.61	
Result	250.16	254.98	250.33	ppm
		Mean Result:	251.82	ppm

Analyst Signature: _____ Bryan Leger

Calculated by: _____ M. Adnane

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX 77571 Phone:(281)474-8400 Fax:(281)474-8444

SC022886B (252).max

AIR LIQUIDE

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section 2.2 Procedure: G-1

Cyl. Number: CC192242

Customer:	AIR HYGIENE	**Shipping Order #:**	18651280
P.O. Number:		**Transfer #:**	18651280
Item Number:	AH088	**LOT #:**	LPX129533
Notes:		**Valve**	CGA660
		Cyl. Pressure:*	1900psig

*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 28-Nov-05 **Expiration Date: 28-Nov-07**

Component	Requested Concentration	Assay Concentration
Sulfur Dioxide	**425 ppm**	**428 ±3 ppm**
Nitrogen	**Balance**	**Balance**

Reference Standard(s) Employed For Analysis:

Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
GMIS173	GMIS173	753.0	ppm	4.0	SO2	N2	AL-2738	5/16/2007	N.A.

Analysis Information:

Component 1:	Sulfur Dioxide
Analyzer Information	
Manufacturer:	KVB/Analect
Model Number:	EN3024
Serial Number:	3024
Analytical Principle:	FTIR
MPC Calibrated:	11/03/05

	First Triad Analysis On: 11/17/2005			
	Trial 1	Trial 2	Trial 3	Units
Zero	**-0.23**	**0.16**	**0.26**	
Reference	**747.28**	**742.68**	**745.53**	
Candidate	**423.08**	**422.60**	**423.40**	
Result	**427.50**	**427.02**	**427.82**	ppm
		Mean Result:	427.45	ppm

	Second Triad Analysis On: 11/28/2005			
	Trial 1	Trial 2	Trial 3	Units
Zero	**0.11**	**-0.01**	**0.22**	
Reference	**746.65**	**750.96**	**741.90**	
Candidate	**424.31**	**424.08**	**426.21**	
Result	**427.96**	**427.72**	**429.87**	ppm
		Mean Result:	428.52	ppm

Analyst Signature: Bryan Leger Bryan Leger **Calculated by:** M. Adnane

Mix Assayed At: Air Liquide America 11426 Fairmont Pkwy, La Porte, TX, 77571 Phone:(281)474-8400 Fax:(281)474-8419

APPENDIX D

QUALITY ASSURANCE AND QUALITY CONTROL DATA

QA/QC PROGRAM

Air Hygiene ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by an internal QA team and encompasses five major areas:

1. QA reviews of reports, laboratory work, and field testing
2. Equipment calibration and maintenance
3. Chain-of-custody
4. Training
5. Knowledge of current test methods

Each of these areas is discussed individually below.

QA Reviews

Air Hygiene's review procedure includes review of each source test report, along with laboratory and fieldwork, by the QA Team. The most important review is the one that takes place before a test program begins. The QA Team works closely with technical division personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance

The equipment used to conduct the emission measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined by the Environmental Protection Agency. Quality control checks are also conducted in the field for each test program.

Chain-of-Custody

Air Hygiene maintains full chain-of-custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, Air Hygiene documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.). Samples are stored in a locked area to which only Air Hygiene personnel have access. Field data sheets are secured at Air Hygiene's offices upon return from the field.

Training

Personnel's training is essential to ensure quality testing. Air Hygiene has formal and informal training programs, which include:

1. Attendance at EPA-sponsored training courses
2. Enrollment in EPA correspondence courses
3 A requirement for all technicians to read and understand Air Hygiene's QA manual
4. In-house training and QA meetings on a regular basis
5. Maintenance of training records

Knowledge of Current Test Methods

With the constant updating of standard test methods and the wide variety of emerging test procedures, it is essential that any qualified source tester keep abreast of new developments. Air Hygiene subscribes to services, which provide updates on EPA reference methods, rules, and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences. Air Hygiene personnel maintain membership in the Air and Waste Management Association and the American Industrial Hygiene Association.

COMBUSTION TESTING QUALITY ASSURANCE ACTIVITIES

A number of quality assurance activities were undertaken before, during, and after this testing project. This section of the report combined with the documentation in Appendix C describe each of those activities.

Each instrument's response was checked and adjusted in the field prior to the collection of data via multi-point calibration. The instrument's linearity was checked by adjusting its zero and span responses to zero nitrogen and an upscale calibration gas in the range of the expected concentrations. The instrument response was then challenged with other calibration gases of known concentration and accepted as being linear if the response of the other calibration gases agreed within ± two percent of the range of predicted values. NO_2 to NO conversion was checked via direct connect with an EPA Protocol certified concentration of NO_2 in a balance of nitrogen. Conversion was verified to be between 90 and 110 percent.

After each test run, the analyzers were checked for zero and span drift. This allowed each test run to be bracketed by calibrations and documents the precision of the data just collected. The criterion for acceptable data is that the instrument drift is no more than three percent of the full-scale response. The quality assurance worksheets in the following pages summarize all multipoint calibration checks and zero to span checks performed during the tests. These worksheets (as prepared from the data records of Appendix A) show that no drifts in excess of three percent occurred in the zero to span checks following each test run.

The sampling systems were leak checked by demonstrating that a vacuum greater than 10 in Hg could be held for at least one minute with a decline of less than one in. Hg. A leak test was conducted after the sample system was set up and before the system was dismantled. This test was conducted to ensure that ambient air had not diluted the sample. Any leakage detected prior to the tests would be repaired and another leak check conducted before testing commenced. No leaks were found during the pre or post-test leak checks.

The absence of leaks in the sampling system was also verified by a sampling system bias check. The sampling system's integrity was tested by comparing the responses of the analyzers to the calibration gases introduced via two paths. The first path was directly into the analyzer and the second path via the sample system at the sample probe. Any difference in the instrument responses by these two methods was attributed to sampling system bias or leakage. The criterion for acceptance is agreement within five percent of the span of the analyzer.

The control gases used to calibrate the instruments were analyzed and certified by the compressed gas vendors to plus or minus one percent accuracy for all gases. EPA Protocol No. 1 was used, where applicable to assign the concentration values traceable to the National Institute of Standards and Technology (NIST), Standard Reference Materials (SRM's). The gas calibration sheets as prepared by the vendor are contained in Appendix C.

Air Hygiene collected and reported the enclosed test data in accordance with the procedures and quality assurance activities described in this test report. Air Hygiene makes no warranty as to the suitability of the test methods. Air Hygiene also assumes no liability relating to the interpretation and use of the test data.

INSTRUMENTAL ANALYSIS
QUALITY ASSURANCE DATA

Date: July 2-4, 2007
Company: Fibrominn, LLC
Location: Benson, Minnesota
Techs: TKG

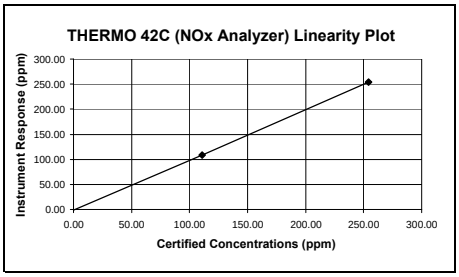
Sample System Leak Check

Date	Sample System	Leak Rate (l/min)
July 2-4, 2007	1	0
July 2-4, 2007	2	0

Calibration Date: July 2, 2007
Client: Fibrominn, LLC
Location: Stack Oulet

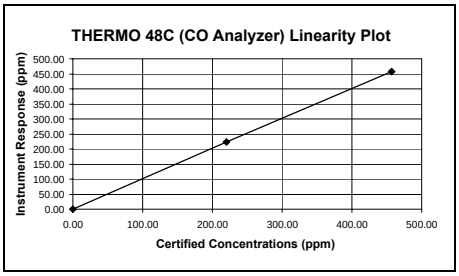
NOx Span (ppm) = 254.00

THERMO 42C (NOx Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	-0.67	-0.26	0.67	YES (%)
111.00	108.66	-0.92	2.34	YES (%)
254.00	253.55	-0.18	0.45	YES (%)
Linearity = 0.998				



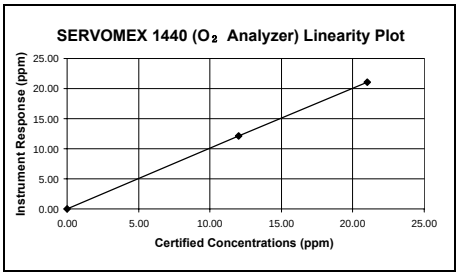
CO Span (ppm) = 457.00

THERMO 48C (CO Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	0.43	0.09	0.43	YES (%)
220.00	222.91	0.64	2.91	YES (%)
457.00	458.23	0.27	1.23	YES (%)
Linearity = 0.998				



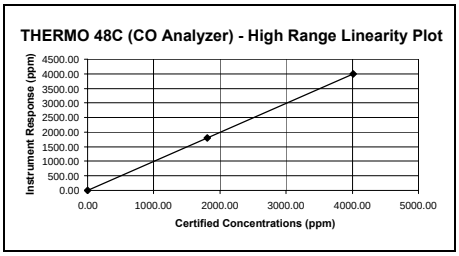
O2 Span (%) = 21.00

SERVOMEX 1440 (O_2 Analyzer)				
Certified Concentration (%)	Instrument Response (%)	Calibration Error (%)	Absolute Conc. (%)	Pass or Fail (±2%, ≤0.5%)
0.00	0.04	0.19	0.04	YES (%)
12.00	12.13	0.62	0.13	YES (%)
21.00	21.03	0.14	0.03	YES (%)
Linearity = 1.000				



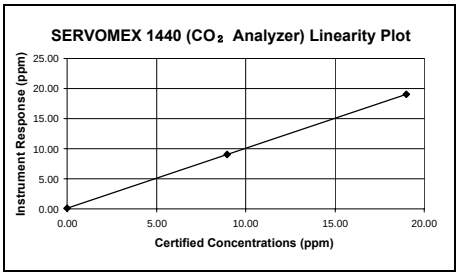
CO Span (ppm) = 4010.00

THERMO 48C (CO Analyzer) - High Range				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	0.43	0.01	0.43	YES (%)
1810.00	1804.47	-0.14	5.53	YES (%)
4010.00	4000.09	-0.25	9.91	YES (%)
Linearity = 1.003				



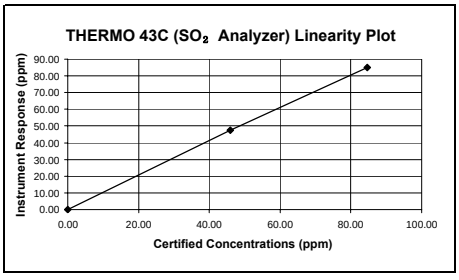
CO2 Span (%) = 19.00

SERVOMEX 1440 (CO_2 Analyzer)				
Certified Concentration (%)	Instrument Response (%)	Calibration Error (%)	Absolute Conc. (%)	Pass or Fail (±2%, ≤0.5%)
0.00	0.07	0.37	0.07	YES (%)
8.97	9.04	0.37	0.07	YES (%)
19.00	19.07	0.37	0.07	YES (%)
Linearity = 1.000				



SO2 Span (ppm) = 84.70

THERMO 43C (SO_2 Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	0.04	0.05	0.04	YES (%)
45.90	47.56	1.96	1.66	YES (%)
84.70	85.14	0.52	0.44	YES (%)
Linearity = 0.994				



NOx Converter Efficiency

Date: July 2, 2007

Analyzer: INST-NX-0012

RM 7E, (08-15-06), 8.2.4.1 Introduce a concentration of 40 to 60 ppmv NO_2 to the analyzer in direct calibration mode and record the NOx concentration displayed by the analyzer. ... Calculate the converter efficiency using Equation 7E-7 in Section 12.7. The specification for converter efficiency in Section 13.5 must be met. ... The NO_2 must be prepared according to the EPA Traceability Protocol and have an accuracy within 2.0 percent.

Audit Gas:	NO_2 Concentration (C_V), ppmvd	**47.60**
Converter Efficiency Calculations:		
	Analyzer Reading, NO Channel, ppmvd	**2.73**
	Analyzer Reading, NOx Channel, ppmvd	**47.58**
	Analyzer Reading, NO_2 Channel ($C_{Dir(NO2)}$), ppmvd	**44.85**
	Converter Efficiency, %	**94.22**

RM 7E, (08-15-06), 13.5 NO2 to NO Conversion Efficiency Test (as applicable). The NO2 to NO conversion efficiency, calculated according to Equation 7E-7 or Equation 7E-9, must be greater than or equal to 90 percent.

$$Eff_{NO2} = \left(\frac{C_{Dir}}{C_V} \right) \times 100$$

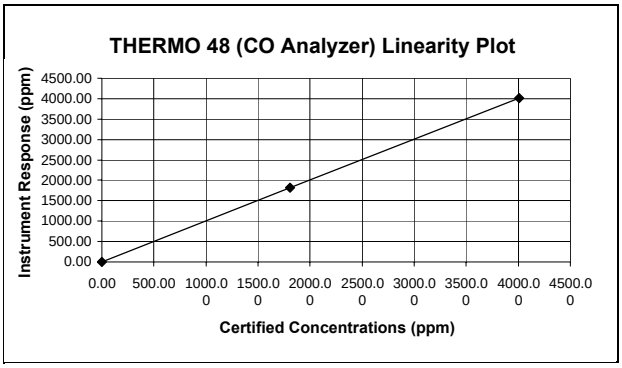
Eq. 7E-7 = $\frac{44.85 \text{ ppmvd}}{47.60 \text{ ppmvd}}$ x 100 = 94.22%

Date/Time	Elapsed Time	NOx	NO
mm/dd/yy hh:mm:ss	Seconds	ppmvd	ppmvd
07/02/07 06:36:11	1680	8.88	0.63
07/02/07 06:36:41	1710	41.91	2.49
07/02/07 06:37:11	1740	45.22	2.57
07/02/07 06:37:41	1770	46.54	2.62
07/02/07 06:38:11	1800	47.58	2.73
07/02/07 06:38:41	1830	47.56	2.82
07/02/07 06:39:11	1860	36.48	2.03
07/02/07 06:39:41	1890	10.59	-0.34

Calibration Date: July 2, 2007
Client: Fibrominn, LLC
Location: SDA Inlet

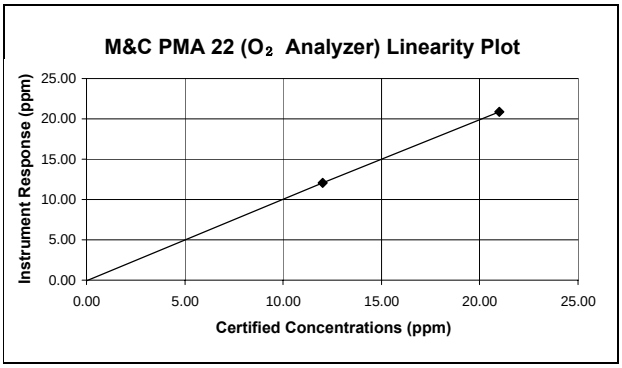
CO Span (ppm) = 4010.00

THERMO 48 (CO Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	0.00	0.00	0.00	YES (%)
1810.00	1821.47	0.29	11.47	YES (%)
4010.00	4007.25	-0.07	2.75	YES (%)
Linearity = 1.001				



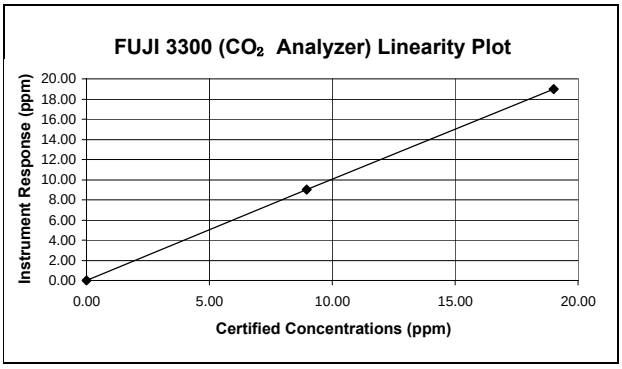
O2 Span (%) = 21.00

M&C PMA 22 (O_2 Analyzer)				
Certified Concentration (%)	Instrument Response (%)	Calibration Error (%)	Absolute Conc. (%)	Pass or Fail (±2%, ≤0.5%)
0.00	-0.06	-0.29	0.06	YES (%)
12.00	12.06	0.29	0.06	YES (%)
21.00	20.88	-0.57	0.12	YES (%)
Linearity = 1.002				



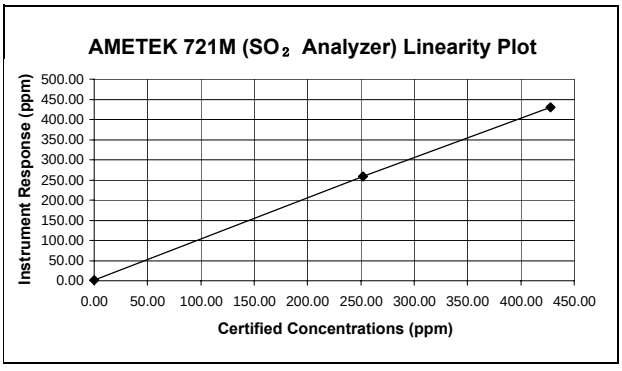
CO2 Span (%) = 19.00

FUJI 3300 (CO_2 Analyzer)				
Certified Concentration (%)	Instrument Response (%)	Calibration Error (%)	Absolute Conc. (%)	Pass or Fail (±2%, ≤0.5%)
0.00	-0.02	-0.11	0.02	YES (%)
8.97	9.01	0.21	0.04	YES (%)
19.00	19.00	0.00	0.00	YES (%)
Linearity = 0.999				



SO2 Span (ppm) = 428.00

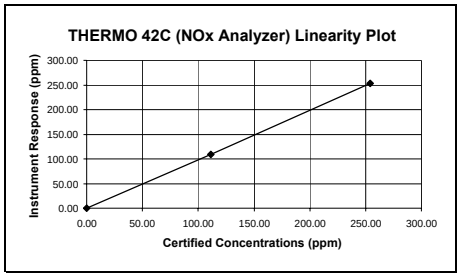
AMETEK 721M (SO_2 Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	0.87	0.20	0.87	YES (%)
252.00	258.28	1.47	6.28	YES (%)
428.00	430.79	0.65	2.79	YES (%)
Linearity = 0.994				



Calibration Date: July 3, 2007
Client: Fibrominn, LLC
Location: Stack Oulet

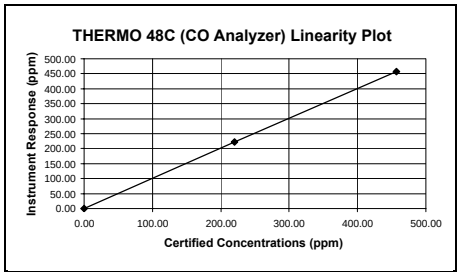
NOx Span (ppm) = 254.00

THERMO 42C (NOx Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	-0.48	-0.19	0.48	YES (%)
111.00	109.64	-0.54	1.36	YES (%)
254.00	253.66	-0.13	0.34	YES (%)
Linearity = 0.999				



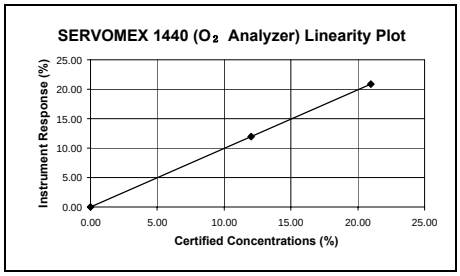
CO Span (ppm) = 457.00

THERMO 48C (CO Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	0.42	0.09	0.42	YES (%)
220.00	221.91	0.42	1.91	YES (%)
457.00	457.22	0.05	0.22	YES (%)
Linearity = 1.001				



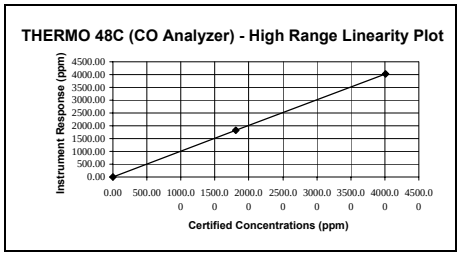
O2 Span (%) = 21.00

SERVOMEX 1440 (O_2 Analyzer)				
Certified Concentration (%)	Instrument Response (%)	Calibration Error (%)	Absolute Conc. (%)	Pass or Fail (±2%, ≤0.5%)
0.00	-0.03	-0.14	0.03	YES (%)
12.00	12.01	0.05	0.01	YES (%)
21.00	20.89	-0.52	0.11	YES (%)
Linearity = 1.003				



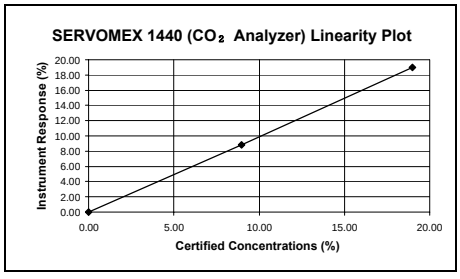
CO Span (ppm) = 4010.00

THERMO 48C (CO Analyzer) - High Range				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	0.42	0.01	0.42	YES (%)
1810.00	1820.33	0.26	10.33	YES (%)
4010.00	4037.25	0.68	27.25	YES (%)
Linearity = 0.993				



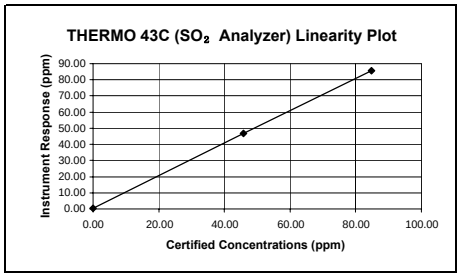
CO2 Span (%) = 19.00

SERVOMEX 1440 (CO_2 Analyzer)				
Certified Concentration (%)	Instrument Response (%)	Calibration Error (%)	Absolute Conc. (%)	Pass or Fail (±2%, ≤0.5%)
0.00	0.01	0.05	0.01	YES (%)
8.97	8.82	-0.79	0.15	YES (%)
19.00	19.00	0.00	0.00	YES (%)
Linearity = 1.000				



SO2 Span (ppm) = 84.70

THERMO 43C (SO_2 Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	0.35	0.41	0.35	YES (%)
45.90	46.62	0.85	0.72	YES (%)
84.70	85.45	0.89	0.75	YES (%)
Linearity = 0.995				



NOx Converter Efficiency

Date: July 3, 2007

Analyzer: INST-NX-0012

RM 7E, (08-15-06), 8.2.4.1 Introduce a concentration of 40 to 60 ppmv NO_2 to the analyzer in direct calibration mode and record the NOx concentration displayed by the analyzer. ... Calculate the converter efficiency using Equation 7E-7 in Section 12.7. The specification for converter efficiency in Section 13.5 must be met. ... The NO_2 must be prepared according to the EPA Traceability Protocol and have an accuracy within 2.0 percent.

Audit Gas:	NO_2 Concentration (C_V), ppmvd	**47.60**
Converter Efficiency Calculations:		
	Analyzer Reading, NO Channel, ppmvd	**2.55**
	Analyzer Reading, NOx Channel, ppmvd	**48.34**
	Analyzer Reading, NO_2 Channel ($C_{Dir(NO2)}$), ppmvd	**45.79**
	Converter Efficiency, %	**96.20**

RM 7E, (08-15-06), 13.5 NO2 to NO Conversion Efficiency Test (as applicable). The NO2 to NO conversion efficiency, calculated according to Equation 7E-7 or Equation 7E-9, must be greater than or equal to 90 percent.

$$Eff_{NO2} = \left(\frac{C_{Dir}}{C_V} \right) \times 100$$

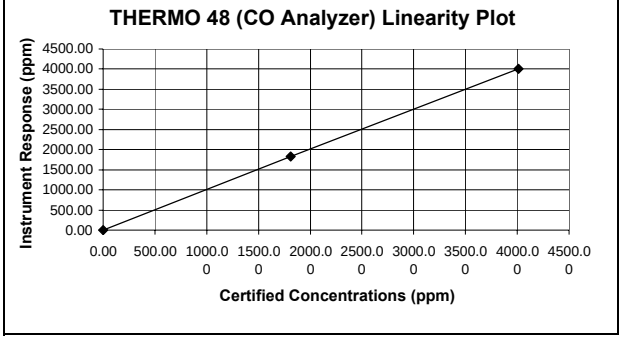
Eq. 7E-7 = $\frac{45.79 \text{ ppmvd}}{47.60 \text{ ppmvd}}$ x 100 = 96.2%

Date/Time	Elapsed Time	NOx	NO
mm/dd/yy hh:mm:ss	Seconds	ppmvd	ppmvd
07/03/07 06:24:56	1440	60.87	23.11
07/03/07 06:25:26	1470	45.75	3.55
07/03/07 06:25:56	1500	47.04	2.96
07/03/07 06:26:26	1530	48.20	2.57
07/03/07 06:26:56	1560	48.34	2.55
07/03/07 06:27:26	1590	31.29	2.09
07/03/07 06:27:56	1620	3.06	-0.24
07/03/07 06:28:26	1650	-0.33	-0.15

Calibration Date: July 3, 2007
Client: Fibrominn, LLC
Location: SDA Inlet

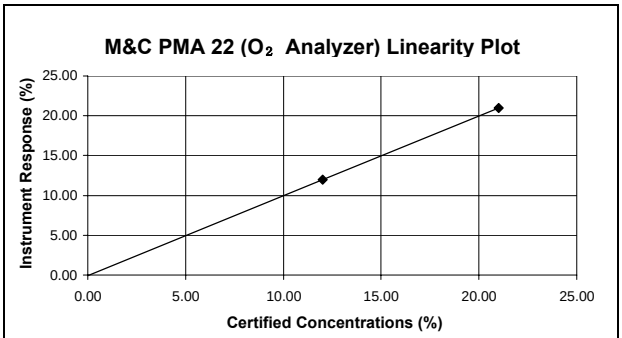
CO Span (ppm) = 4010.00

THERMO 48 (CO Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	-0.24	-0.01	0.24	YES (%)
1810.00	1821.54	0.29	11.54	YES (%)
4010.00	4007.88	-0.05	2.12	YES (%)
Linearity = 1.001				



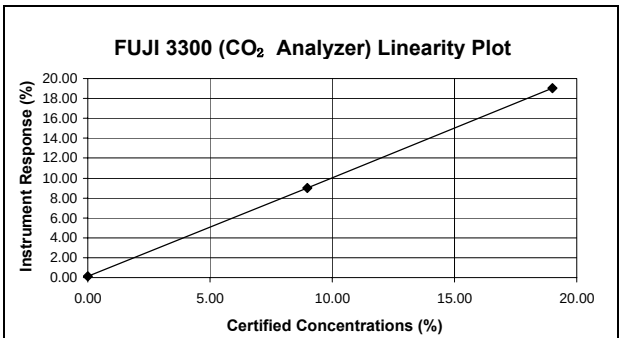
O2 Span (%) = 21.00

M&C PMA 22 (O_2 Analyzer)				
Certified Concentration (%)	Instrument Response (%)	Calibration Error (%)	Absolute Conc. (%)	Pass or Fail (±2%, ≤0.5%)
0.00	-0.08	-0.38	0.08	YES (%)
12.00	11.99	-0.05	0.01	YES (%)
21.00	20.98	-0.10	0.02	YES (%)
Linearity = 0.997				



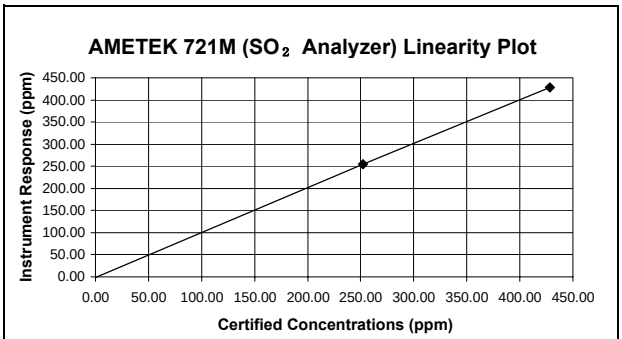
CO2 Span (%) = 19.00

FUJI 3300 (CO_2 Analyzer)				
Certified Concentration (%)	Instrument Response (%)	Calibration Error (%)	Absolute Conc. (%)	Pass or Fail (±2%, ≤0.5%)
0.00	0.12	0.63	0.12	YES (%)
8.97	9.02	0.26	0.05	YES (%)
19.00	19.01	0.05	0.01	YES (%)
Linearity = 1.006				



SO2 Span (ppm) = 428.00

AMETEK 721M (SO_2 Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
0.00	-0.89	-0.21	0.89	YES (%)
252.00	255.25	0.76	3.25	YES (%)
428.00	427.85	-0.04	0.15	YES (%)
Linearity = 0.997				



DRIFT AND BIAS CHECK			
Strat Test Pre and Post QA/QC Check	**O2**	**NOx**	**CO**
Initial Zero	0.22	-0.64	0.45
Final Zero	0.01	-0.21	0.67
Avg. Zero	0.12	-0.43	0.56
Initial UpScale	12.14	105.86	220.13
Final UpScale	12.04	108.07	221.77
Avg. UpScale	12.09	106.97	220.95
Sys Resp (Zero)	0.04	-0.67	0.43
Sys Resp (Upscale)	12.13	108.66	222.91
Upscale Cal Gas	12.00	111.00	220.00
Initial Zero Bias	0.86%	0.01%	0.00%
Final Zero Bias	-0.14%	0.18%	0.05%
Zero Drift	1.00%	0.17%	0.05%
Initial Upscale Bias	0.05%	-1.10%	-0.61%
Final Upscale Bias	-0.43%	-0.23%	-0.25%
Upscale Drift	0.48%	0.87%	0.36%
Initial Zero	0.18	0.03	0.02
Final Zero	0.03	0.46	0.24
Initial Upscale	0.01	2.80	2.78
Final Upscale	0.09	0.59	1.14
Calibration Span	21.00	254.00	457.00
3% of Range (drift)	0.63	7.62	13.71
5% of Range (bias)	1.05	12.70	22.85

Respone Time (min)	0.3	0.8	0.7
Sys. Response (min)		0.8	

Date/Time	O2-10	NOx-10	CO-10
mm/dd/yy hh:mm:ss	%	ppm	ppm
07/02/07 06:48:11	20.89	**-0.46**	**2.30**
07/02/07 06:48:21	17.13	**-0.46**	14.50
07/02/07 06:48:31	**12.54**	**-0.40**	54.63
07/02/07 06:48:41	**12.20**	**-0.35**	54.58
07/02/07 06:48:51	**12.17**	**-0.49**	36.40
07/02/07 06:49:01	**12.16**	**-0.26**	13.62
07/02/07 06:49:11	**12.14**	**-0.35**	**4.00**
07/02/07 06:49:21	**12.15**	**-0.65**	**1.53**
07/02/07 06:49:31	**12.14**	**-0.62**	**1.22**
07/02/07 06:49:41	**12.15**	**-0.68**	**0.54**
07/02/07 06:49:51	**12.13**	**-0.70**	**0.45**
07/02/07 06:50:01	**12.15**	**-0.65**	**0.62**
07/02/07 06:50:11	**12.15**	**-0.48**	**0.76**
07/02/07 06:50:21	**12.13**	**-0.32**	**0.81**
07/02/07 06:50:31	**12.13**	**-0.29**	**0.73**
07/02/07 06:50:41	**12.12**	**-0.35**	**0.62**
07/02/07 06:50:51	**12.13**	**-0.40**	**0.59**
07/02/07 06:51:01	**12.14**	**-0.57**	**0.54**
07/02/07 06:51:11	13.00	**-0.48**	**0.70**
07/02/07 06:51:21	**11.72**	**-0.40**	**0.64**
07/02/07 06:51:31	1.20	**-1.01**	**0.45**
07/02/07 06:51:41	**0.33**	**-0.51**	**0.48**
07/02/07 06:51:51	**0.28**	49.84	**0.78**
07/02/07 06:52:01	**0.25**	98.84	**1.58**
07/02/07 06:52:11	**0.26**	**101.81**	**1.42**
07/02/07 06:52:21	**0.24**	**104.52**	**1.42**
07/02/07 06:52:31	**0.26**	**105.68**	**1.50**
07/02/07 06:52:41	**0.24**	**105.46**	**1.28**
07/02/07 06:52:51	**0.25**	**105.43**	**1.31**
07/02/07 06:53:01	**0.24**	**105.57**	**1.53**
07/02/07 06:53:11	**0.23**	**105.40**	**1.31**
07/02/07 06:53:21	**0.24**	**105.84**	**1.80**
07/02/07 06:53:31	**0.22**	**105.86**	**1.80**
07/02/07 06:53:41	**0.23**	**105.78**	**1.72**
07/02/07 06:53:51	**0.23**	**105.95**	**1.83**
07/02/07 06:54:01	**0.25**	**105.86**	**1.64**
07/02/07 06:54:11	6.04	**106.17**	**2.05**
07/02/07 06:54:21	**0.79**	**103.58**	**11.22**
07/02/07 06:54:31	**0.26**	83.08	60.47
07/02/07 06:54:41	**0.23**	61.38	135.78
07/02/07 06:54:51	**0.24**	28.96	192.85
07/02/07 06:55:01	**0.21**	**1.55**	**214.64**
07/02/07 06:55:11	**0.22**	**0.75**	**218.82**
07/02/07 06:55:21	**0.22**	**0.40**	**219.05**
07/02/07 06:55:31	**0.20**	**0.23**	**220.38**

DRIFT AND BIAS CHECK		
Strat Test Pre and Post QA/QC Check	**O2**	**SO2**
Initial Zero	-0.02	2.16
Final Zero	-0.06	1.07
Avg. Zero	-0.04	1.62
Initial UpScale	11.99	250.61
Final UpScale	11.92	248.41
Avg. UpScale	11.96	249.51
Sys Resp (Zero)	-0.06	0.87
Sys Resp (Upscale)	12.06	258.28
Upscale Cal Gas	12.00	252.00
Initial Zero Bias	0.19%	0.30%
Final Zero Bias	0.00%	0.05%
Zero Drift	0.19%	0.25%
Initial Upscale Bias	-0.33%	-1.79%
Final Upscale Bias	-0.67%	-2.31%
Upscale Drift	0.33%	0.51%
Initial Zero	0.04	1.29
Final Zero	0.00	0.20
Initial Upscale	0.07	7.67
Final Upscale	0.14	9.87
Calibration Span	21.00	428.00
3% of Range (drift)	0.63	12.84
5% of Range (bias)	1.05	21.40

Respone Time (min)	0.5	1.3
Sys. Response (min)	1.3	

Date/Time	O2IN-10	SO2IN-10
mm/dd/yy hh:mm:ss	%	ppm
07/02/07 06:46:11	20.87	**1.59**
07/02/07 06:46:21	16.50	**1.56**
07/02/07 06:46:31	**12.39**	**2.20**
07/02/07 06:46:41	**11.99**	**2.36**
07/02/07 06:46:51	**11.97**	**2.39**
07/02/07 06:47:01	**11.97**	**2.17**
07/02/07 06:47:11	**11.98**	**2.17**
07/02/07 06:47:21	**11.99**	**1.67**
07/02/07 06:47:31	**11.99**	**1.84**
07/02/07 06:47:41	**11.99**	**1.34**
07/02/07 06:47:51	**11.99**	**1.51**
07/02/07 06:48:01	**12.00**	**1.40**
07/02/07 06:48:11	8.44	**11.31**
07/02/07 06:48:21	**0.10**	150.10
07/02/07 06:48:31	**-0.05**	202.36
07/02/07 06:48:41	**-0.20**	219.02
07/02/07 06:48:51	**-0.14**	228.87
07/02/07 06:49:01	**-0.08**	234.89
07/02/07 06:49:11	**-0.27**	236.13
07/02/07 06:49:21	**-0.02**	**240.95**
07/02/07 06:49:31	**-0.02**	**243.02**
07/02/07 06:49:41	**-0.02**	**244.43**
07/02/07 06:49:51	**-0.04**	**245.78**
07/02/07 06:50:01	**-0.04**	**246.75**
07/02/07 06:50:11	**-0.03**	**247.16**
07/02/07 06:50:21	**-0.03**	**249.04**
07/02/07 06:50:31	**-0.02**	**248.85**
07/02/07 06:50:41	**-0.02**	**249.76**
07/02/07 06:50:51	**-0.02**	**250.61**
07/02/07 06:51:01	3.09	**248.96**
07/02/07 06:51:11	19.74	171.83

DRIFT AND BIAS CHECK					
High Load, Run - Out-1	**O2**	**NOx**	**CO**	**CO2**	**SO2**
Raw Average	5.30	86.21	230.77	14.09	64.96
Corrected Average	5.35	90.31	229.25	14.46	64.35
Initial Zero	0.02	-0.49	0.59	0.08	0.91
Final Zero	-0.02	0.53	1.51	0.05	0.83
Avg. Zero	0.00	0.02	1.05	0.07	0.87
Initial UpScale	11.94	106.88	221.78	8.75	47.44
Final UpScale	11.85	105.04	221.23	8.79	45.74
Avg. UpScale	11.90	105.96	221.51	8.77	46.59
Sys Resp (Zero)	-0.03	-0.48	0.42	0.01	0.35
Sys Resp (Upscale)	12.01	109.64	221.91	8.82	46.62
Upscale Cal Gas	12.00	111.00	220.00	8.97	45.90
Initial Zero Bias	0.24%	0.00%	0.04%	0.37%	0.66%
Final Zero Bias	0.05%	0.40%	0.24%	0.21%	0.57%
Zero Drift	0.19%	0.40%	0.20%	0.16%	0.09%
Initial Upscale Bias	-0.33%	-1.09%	-0.03%	-0.37%	0.97%
Final Upscale Bias	-0.76%	-1.81%	-0.15%	-0.16%	-1.04%
Upscale Drift	0.43%	0.72%	0.12%	0.21%	2.01%
Alternative Specification Abs Diff **Initial Zero**	0.05	0.01	0.17	0.07	0.56
Alternative Specification Abs Diff **Final Zero**	0.01	1.01	1.09	0.04	0.48
Alternative Specification Abs Diff **Initial Upscale**	0.07	2.76	0.13	0.07	0.82
Alternative Specification Abs Diff **Final Upscale**	0.16	4.60	0.68	0.03	0.88
Calibration Span	21.00	254.00	457.00	19.00	84.70
3% of Range (drift)	0.63	7.62	13.71	0.57	2.54
5% of Range (bias)	1.05	12.70	22.85	0.95	4.24

DRIFT AND BIAS CHECK					
High Load, Run - Out-2	**O2**	**NOx**	**CO**	**CO2**	**SO2**
Raw Average	4.81	73.92	261.72	14.52	64.60
Corrected Average	4.88	77.80	260.13	14.86	65.95
Initial Zero	-0.02	0.53	1.51	0.05	0.83
Final Zero	-0.02	1.00	0.91	0.12	0.24
Avg. Zero	-0.02	0.77	1.21	0.09	0.54
Initial UpScale	11.85	105.04	221.23	8.79	45.74
Final UpScale	11.86	105.25	221.82	8.81	44.51
Avg. UpScale	11.86	105.15	221.53	8.80	45.13
Sys Resp (Zero)	-0.03	-0.48	0.42	0.01	0.35
Sys Resp (Upscale)	12.01	109.64	221.91	8.82	46.62
Upscale Cal Gas	12.00	111.00	220.00	8.97	45.90
Initial Zero Bias	0.05%	0.40%	0.24%	0.21%	0.57%
Final Zero Bias	0.05%	0.58%	0.11%	0.58%	-0.13%
Zero Drift	0.00%	0.19%	0.13%	0.37%	0.70%
Initial Upscale Bias	-0.76%	-1.81%	-0.15%	-0.16%	-1.04%
Final Upscale Bias	-0.71%	-1.73%	-0.02%	-0.05%	-2.49%
Upscale Drift	0.05%	0.08%	0.13%	0.11%	1.45%
Alternative Specification Abs Diff **Initial Zero**	0.01	1.01	1.09	0.04	0.48
Alternative Specification Abs Diff **Final Zero**	0.01	1.48	0.49	0.11	0.11
Alternative Specification Abs Diff **Initial Upscale**	0.16	4.60	0.68	0.03	0.88
Alternative Specification Abs Diff **Final Upscale**	0.15	4.39	0.09	0.01	2.11
Calibration Span	21.00	254.00	457.00	19.00	84.70
3% of Range (drift)	0.63	7.62	13.71	0.57	2.54
5% of Range (bias)	1.05	12.70	22.85	0.95	4.24

DRIFT AND BIAS CHECK					
High Load, Run - Out-3	**O2**	**NOx**	**CO**	**CO2**	**SO2**
Raw Average	5.43	95.74	166.75	13.94	65.88
Corrected Average	5.50	101.11	165.12	14.27	66.90
Initial Zero	-0.02	1.00	0.91	0.12	0.24
Final Zero	-0.01	0.67	1.52	0.13	0.87
Avg. Zero	-0.02	0.84	1.22	0.13	0.56
Initial UpScale	11.86	105.25	221.82	8.81	44.51
Final UpScale	11.87	104.79	221.71	8.81	46.23
Avg. UpScale	11.87	105.02	221.77	8.81	45.37
Sys Resp (Zero)	-0.03	-0.48	0.42	0.01	0.35
Sys Resp (Upscale)	12.01	109.64	221.91	8.82	46.62
Upscale Cal Gas	12.00	111.00	220.00	8.97	45.90
Initial Zero Bias	0.05%	0.58%	0.11%	0.58%	-0.13%
Final Zero Bias	0.10%	0.45%	0.24%	0.63%	0.61%
Zero Drift	0.05%	0.13%	0.13%	0.05%	0.74%
Initial Upscale Bias	-0.71%	-1.73%	-0.02%	-0.05%	-2.49%
Final Upscale Bias	-0.67%	-1.91%	-0.04%	-0.05%	-0.46%
Upscale Drift	0.05%	0.18%	0.02%	0.00%	2.03%
Alternative Specification Abs Diff **Initial Zero**	0.01	1.48	0.49	0.11	0.11
Alternative Specification Abs Diff **Final Zero**	0.02	1.15	1.10	0.12	0.52
Alternative Specification Abs Diff **Initial Upscale**	0.15	4.39	0.09	0.01	2.11
Alternative Specification Abs Diff **Final Upscale**	0.14	4.85	0.20	0.01	0.39
Calibration Span	21.00	254.00	457.00	19.00	84.70
3% of Range (drift)	0.63	7.62	13.71	0.57	2.54
5% of Range (bias)	1.05	12.70	22.85	0.95	4.24

DRIFT AND BIAS CHECK		
High Load, Run - In-1	**O2**	**SO2**
Raw Average	5.16	329.82
Corrected Average	5.24	337.80
Initial Zero	-0.09	3.08
Final Zero	-0.01	4.87
Avg. Zero	-0.05	3.98
Initial UpScale	11.94	249.73
Final UpScale	11.82	244.39
Avg. UpScale	11.88	247.06
Sys Resp (Zero)	-0.08	-0.89
Sys Resp (Upscale)	11.99	255.25
Upscale Cal Gas	12.00	252.00
Initial Zero Bias	-0.05%	0.93%
Final Zero Bias	0.33%	1.35%
Zero Drift	0.38%	0.42%
Initial Upscale Bias	-0.24%	-1.29%
Final Upscale Bias	-0.81%	-2.54%
Upscale Drift	0.57%	1.25%
Alternative Specification Abs Diff **Initial Zero**	0.01	3.97
Alternative Specification Abs Diff **Final Zero**	0.07	5.76
Alternative Specification Abs Diff **Initial Upscale**	0.05	5.52
Alternative Specification Abs Diff **Final Upscale**	0.17	10.86
Calibration Span	21.00	428.00
3% of Range (drift)	0.63	12.84
5% of Range (bias)	1.05	21.40

DRIFT AND BIAS CHECK			
High Load, Run - In-2		**O2**	**SO2**
	Raw Average	5.13	331.41
	Corrected Average	5.22	337.81
	Initial Zero	-0.01	4.87
	Final Zero	-0.01	5.26
	Avg. Zero	-0.01	5.07
	Initial UpScale	11.82	244.39
	Final UpScale	11.82	252.63
	Avg. UpScale	11.82	248.51
	Sys Resp (Zero)	-0.08	-0.89
	Sys Resp (Upscale)	11.99	255.25
	Upscale Cal Gas	12.00	252.00
	Initial Zero Bias	0.33%	1.35%
	Final Zero Bias	0.33%	1.44%
	Zero Drift	0.00%	0.09%
	Initial Upscale Bias	-0.81%	-2.54%
	Final Upscale Bias	-0.81%	-0.61%
	Upscale Drift	0.00%	1.93%
Alternative Specification Abs Diff	**Initial Zero**	0.07	5.76
	Final Zero	0.07	6.15
	Initial Upscale	0.17	10.86
	Final Upscale	0.17	2.62
	Calibration Span	21.00	428.00
	3% of Range (drift)	0.63	12.84
	5% of Range (bias)	1.05	21.40

DRIFT AND BIAS CHECK			
High Load, Run - In-3		**O2**	**SO2**
	Raw Average	4.80	338.12
	Corrected Average	4.89	334.51
	Initial Zero	-0.01	5.26
	Final Zero	-0.03	5.83
	Avg. Zero	-0.02	5.55
	Initial UpScale	11.82	252.63
	Final UpScale	11.82	259.55
	Avg. UpScale	11.82	256.09
	Sys Resp (Zero)	-0.08	-0.89
	Sys Resp (Upscale)	11.99	255.25
	Upscale Cal Gas	12.00	252.00
	Initial Zero Bias	0.33%	1.44%
	Final Zero Bias	0.24%	1.57%
	Zero Drift	0.10%	0.13%
	Initial Upscale Bias	-0.81%	-0.61%
	Final Upscale Bias	-0.81%	1.00%
	Upscale Drift	0.00%	1.62%
Alternative Specification Abs Diff	**Initial Zero**	0.07	6.15
	Final Zero	0.05	6.72
	Initial Upscale	0.17	2.62
	Final Upscale	0.17	4.30
	Calibration Span	21.00	428.00
	3% of Range (drift)	0.63	12.84
	5% of Range (bias)	1.05	21.40

SAMPLE DESCRIPTION AND CHAIN OF CUSTODY RECORD

Air Hygiene International, Inc.
5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
(888) 461-8778
www.airhygiene.com

Project Number:	snc-07-benson.mn-comp#1	Laboratory Analysis Requested:	
Person Taking Samples:	TP	RM 26a and Volume	

Sample Number	Location	Date	Volume	Analysis Method			
				RM 26a	Volume		
IN-HCl-1	Inlet, HCl, Run 1	7/3/2007	As Marked	X	455		
IN-HCl-2	Inlet, HCl, Run 2	7/3/2007	As Marked	X	430		
IN-HCl-3	Inlet, HCl, Run 3	7/3/2007	As Marked	X	390		
Blank	HCl Blank	7/3/2007	As Marked	X	100		

Sidd Kshirsagar	07/03/07	18:58		07/03/07	18:58
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

SAMPLE DESCRIPTION AND CHAIN OF CUSTODY RECORD

Air Hygiene International, Inc.
5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
(888) 461-8778
www.airhygiene.com

Project Number:	snc-07-benson.mn-comp#1	Laboratory Analysis Requested:	
Person Taking Samples:	TG	RM 26a and Volume	

Sample Number	Location	Date	Volume	Analysis Method			
				RM 26a	Volume		
IN-HCl-1	Inlet, HCl, Run 1	7/2/2007	As Marked	X	725		
IN-HCl-2	Inlet, HCl, Run 2	7/2/2007	As Marked	X	725		
IN-HCl-3	Inlet, HCl, Run 3	7/2/2007	As Marked	X	715		
Blank	HCl Blank	7/2/2007	As Marked	X	100		

Sidd Kshirsagar	07/03/07	18:58		07/03/07	18:58
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

SAMPLE DESCRIPTION AND CHAIN OF CUSTODY RECORD

Air Hygiene International, Inc.
5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
(888) 461-8778
www.airhygiene.com

Project Number:	snc-07-benson.mn-comp#1	Laboratory Analysis Requested:	
Person Taking Samples:	TKG	METHOD 5 (FRONTHALF) AND 202 (BACKHALF)	

Sample Number	Location	Date	Volume	Analysis Method			
				RM 5	RM 202		
OUT-PM-1-F	Stack Outlet, Run 1 Filter	7/3/2007	N/A	X			
OUT-PM-2-F	Stack Outlet, Run 2 Filter	7/4/2007	N/A	X			
OUT-PM-3-F	Stack Outlet, Run 3 Filter	7/4/2007	N/A	X			
OUT-PM-1-PW	Stack Outlet, Run 1 Probe Wash	7/3/2007	as marked	X			
OUT-PM-2-PW	Stack Outlet, Run 2 Probe Wash	7/4/2007	as marked	X			
OUT-PM-3-PW	Stack Outlet, Run 3 Probe Wash	7/4/2007	as marked	X			
OUT-PM-1-BH	Stack Outlet, Run 1 Back Half	7/3/2007	as marked		X		
OUT-PM-2-BH	Stack Outlet, Run 2 Back Half	7/4/2007	as marked		X		
OUT-PM-3-BH	Stack Outlet, Run 3 Back Half	7/4/2007	as marked		X		
OUT-PM-1-MC	Stack Outlet, Run 1 MeCl Rinse	7/3/2007	as marked		X		
OUT-PM-2-MC	Stack Outlet, Run 2 MeCl Rinse	7/4/2007	as marked		X		
OUT-PM-3-MC	Stack Outlet, Run 3 MeCl Rinse	7/4/2007	as marked		X		
AC-B	Stack Outlet, Acetone Blank	7/3/2007	as marked	X			
MC-B	Stack Outlet, MeCl Blank	7/3/2007	as marked		X		
DI-B	Stack Outlet, DI Water Blank	7/3/2007	as marked		X		

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
	07/05/07	19:00	pandu Sattvika	07/05/07	19:00

snc-07-benson.mn-comp#1-Outlet-PM

VISIBLE EMISSIONS EVALUATOR

This is to certify that

Rob White

met the specifications of Federal Reference Method 9 and qualified as a visible emissions evaluator. Maximum deviation on white and black smoke did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, North Carolina. This certificate is valid for six months from date of issue.

349751	*Oklahoma City, Oklahoma*	*March 28, 2007*
Certificate Number	Location	Date of Issue

Thomas Hoel
President

Michael W. Sunsford
Director of Training

METERING SYSTEM CALIBRATION SHEET
EPA Reference Method 5
Metering System Pre-Test Calibration
Air Hygiene Assett ID: samp-cp-0016

Filename: Z:\Shared\QAQC\Calibrations\PM-Equipment\M-5 Consoles\Calibration Sheet v4.0\Current\[SAMP-CP-0016 Calibration 06-06-07.xls]Original (5 point)
Make: Apex
Model #: XC-522
Serial #: 0705008

Date: 06/07/07
Barometric Pressure: 28.82 (in. Hg)
Theoretical Critical Vacuum: 13.59 (in. Hg)

DRY GAS METER READINGS

ΔH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)
0.30	17.00	205.030	210.240	5.210	81.0	81.0
0.65	12.00	210.240	215.790	5.550	82.0	82.0
1.10	10.00	215.790	221.730	5.940	82.0	82.0
1.80	10.00	221.730	229.400	7.670	83.0	83.0
3.30	10.00	229.400	239.860	10.460	83.0	83.0

Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Ambient Temperature Initial (deg F)	Ambient Temperature Final (deg F)	Ambient Temperature Average (deg F)
81.0	81.0	40	0.2354	16.0	82.0	82.0	82.0
82.0	82.0	48	0.3491	16.0	82.0	82.0	82.0
83.0	83.0	55	0.4530	16.0	82.0	82.0	82.0
83.0	83.0	63	0.5840	16.0	82.0	82.0	82.0
84.0	84.0	73	0.7945	16.0	82.0	83.0	82.5

RESULTS

DRY GAS METER VOLUME CORRECTED Vm(std) (cu ft)	DRY GAS METER VOLUME CORRECTED Vm(std) (liters)	ORIFICE VOLUME CORRECTED Vcr(std) (cu ft)	ORIFICE VOLUME CORRECTED Vcr(std) (liters)	ORIFICE VOLUME NOMINAL Vcr (cu ft)
4.900	138.76	4.954	140.3	5.281
5.214	147.67	5.186	146.9	5.529
5.582	158.08	5.608	158.8	5.979
7.214	204.30	7.229	204.7	7.708
9.867	279.42	9.831	278.4	10.490

DRY GAS METER CALIBRATION FACTOR Y Variation (number)	DRY GAS METER CALIBRATION FACTOR Y Value (number)	ORIFICE CALIBRATION FACTOR ΔH@ Value (in H2O)	ORIFICE CALIBRATION FACTOR ΔH@ Value (mm H2O)	ORIFICE CALIBRATION FACTOR ΔH@ Variation (in H2O)
0.009	1.011	1.868	47.45	0.036
-0.007	0.995	1.837	46.66	0.005
0.003	1.005	1.845	46.85	0.012
0.000	1.002	1.814	46.09	-0.018
-0.005	0.996	1.797	45.65	-0.035
AVERAGE:	**1.002**	**1.832**	46.54	**PASSED**

Notes: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter,acceptable tolerance of individual values from the average is +/- 0.02. For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H_20 that equates to 0.75 cfm of air at 68 ^oF and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/- 0.2. For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

SIGNATURE: Craig McCarty DATE: 06/07/07 06/07/07

METERING SYSTEM CALIBRATION SHEET
EPA Reference Method 5
Metering System Pre-Test Calibration
Air Hygiene Assett ID: samp-cp-0017

Filename: Z:\Shared\QAQC\Calibrations\PM-Equipment\M-5 Consoles\Calibration Sheet v4.0\Current\[SAMP-CP-0017 Calibration 06-06-07.xls]Original (5 point)
Make: Apex
Model #: XC-522
Serial #: 0705009

Date: 06/06/07
Barometric Pressure: 28.85 (in. Hg)
Theoretical Critical Vacuum: 13.61 (in. Hg)

DRY GAS METER READINGS

ΔH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)
0.30	17.00	222.500	227.910	5.410	97.0	97.0
0.65	12.00	227.910	233.430	5.520	94.0	94.0
1.10	10.00	233.430	239.410	5.980	93.0	93.0
1.80	10.00	239.410	247.160	7.750	93.0	93.0
3.30	10.00	247.160	257.700	10.540	93.0	93.0

Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Ambient Temperature Initial (deg F)	Ambient Temperature Final (deg F)	Ambient Temperature Average (deg F)
95.0	95.0	40	0.2354	16.0	87.0	88.0	87.5
94.0	94.0	48	0.3491	16.0	88.0	89.0	88.5
93.0	93.0	55	0.4530	16.0	89.0	89.0	89.0
93.0	93.0	63	0.5840	16.0	89.0	89.0	89.0
94.0	94.0	73	0.7945	16.0	89.0	89.0	89.0

RESULTS

DRY GAS METER VOLUME CORRECTED Vm(std) (cu ft)	DRY GAS METER VOLUME CORRECTED Vm(std) (liters)	ORIFICE VOLUME CORRECTED Vcr(std) (cu ft)	ORIFICE VOLUME CORRECTED Vcr(std) (liters)	ORIFICE VOLUME NOMINAL Vcr (cu ft)
4.956	140.34	4.934	139.7	5.308
5.079	143.84	5.160	146.1	5.562
5.519	156.29	5.578	158.0	6.017
7.165	202.91	7.191	203.6	7.757
9.772	276.76	9.783	277.0	10.553

DRY GAS METER CALIBRATION FACTOR Y Variation (number)	DRY GAS METER CALIBRATION FACTOR Y Value (number)	ORIFICE CALIBRATION FACTOR ΔH@ Value (in H2O)	ORIFICE CALIBRATION FACTOR ΔH@ Value (mm H2O)	ORIFICE CALIBRATION FACTOR ΔH@ Variation (in H2O)
-0.010	0.996	1.834	46.59	0.020
0.011	1.016	1.817	46.15	0.003
0.005	1.011	1.831	46.51	0.017
-0.002	1.004	1.803	45.79	-0.011
-0.004	1.001	1.784	45.32	-0.030
AVERAGE:	**1.005**	**1.814**	46.07	**PASSED**

Notes: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter,acceptable tolerance of individual values from the average is +/- 0.02. For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H_20 that equates to 0.75 cfm of air at 68 ^oF and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/- 0.2. For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

SIGNATURE: Craig McCarty DATE: 06/06/07 06/06/07

APPENDIX E

STRATIFICATION TEST DATA

STRATIFICATION TEST DATA

SDA Inlet Test Data

Source Information	
Company	Fibrominn, LLC
Plant Name	Fibrominn Biomass Power Plant
Equipment	Biomass Boiler, SDA Inlet
Location	Benson, Minnesota

Test Information	
Date	07/02/07
Project #	snc-07-benson.mn-comp#1
Unit Number	1
Load	high
Number of Ports Available	2
Number of Ports Used	2

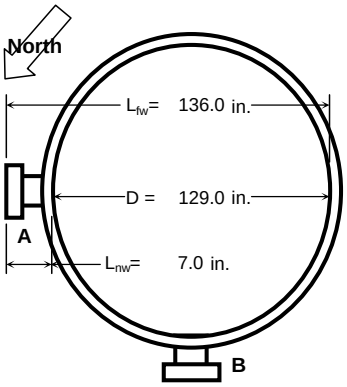
Stack and Test Type				
○	Isokinetic Traverse (Wet Chemistry Testing)			**Circular Stack**
○	Velocity Traverse (Flow and Flow RATA Test)			
◉	**Stratification Traverse (Compliance Test)**	☐ RM 20		
○	Stratification Traverse (RATA)	☐ Part 60	☐ Part 75	

METHOD 1 - STRATIFICATION TEST FOR A CIRCULAR SOURCE

Company	Fibrominn, LLC	**Date**	07/02/07
Plant Name	Fibrominn Biomass Power Plant	**Project #**	snc-07-benson.mn-comp#1
Equipment	Biomass Boiler, SDA Inlet	**# of Ports Available**	2
Location	Benson, Minnesota	**# of Ports Used**	2

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	136.00	in.
Distance to Near Wall of Stack	(L_{nw})	7.00	in.
Diameter of Stack	(D)	129.00	in.
Area of Stack	(A_s)	90.76	ft^2

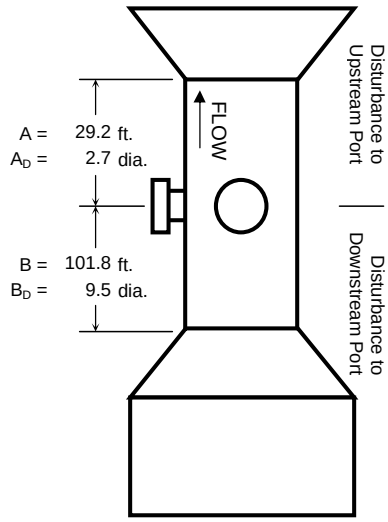
Distance from Disturbances to Port			
Distance Upstream	(A)	350.00	in.
Diameters Upstream	(A_D)	2.71	diameters
Distance Downstream	(B)	1222.00	in.
Diameters Downstream	(B_D)	9.47	diameters



Number of Traverse Points Required					
Diameters to Flow Disturbance		Minimum Number of[1] Traverse Points		**Minimum Number of Traverse Points**	
Down (B_D) Stream	Up (A_D) Stream	Particulate Points	Velocity Points	**Comp Stratification Criteria**	**Points**
2.00-4.99	0.50-1.24	24	16	☐ RM 7E 8.1.2	12 RM1 pts
5.00-5.99	1.25-1.49	20	16	☐ Alt 7E 8.1.2	3 points
6.00-6.99	1.50-1.74	16	12	12 points	
7.00-7.99	1.75-1.99	12	12		
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]	Minimum Number of	
Upstream Spec		12	12	Traverse Points	
Downstream Spec		12	12	RATA Stratification	
Traverse Pts Required		12	12	Criteria	Points
				☐ Part75/60	12 RM1 pts
				☐ 75 abrv (a)	3 points
				☐ 75 abrv (b)	6 points
				12 points	

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches



Number of Traverse Points Used				
2	**Ports by**	6	**Pts / port**	**Stratification Traverse (Compliance Test)**
12	**Pts Used**	12	**Required**	

Traverse Point Locations			
Traverse Point Number	**Percent of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
	%	in.	in.
1	4.4%	5 5/8	12 5/8
2	14.6%	18 7/8	25 7/8
3	29.6%	38 1/8	45 1/8
4	70.4%	90 7/8	97 7/8
5	85.4%	110 1/8	117 1/8
6	95.6%	123 3/8	130 3/8
7			
8			
9			
10			
11			
12			
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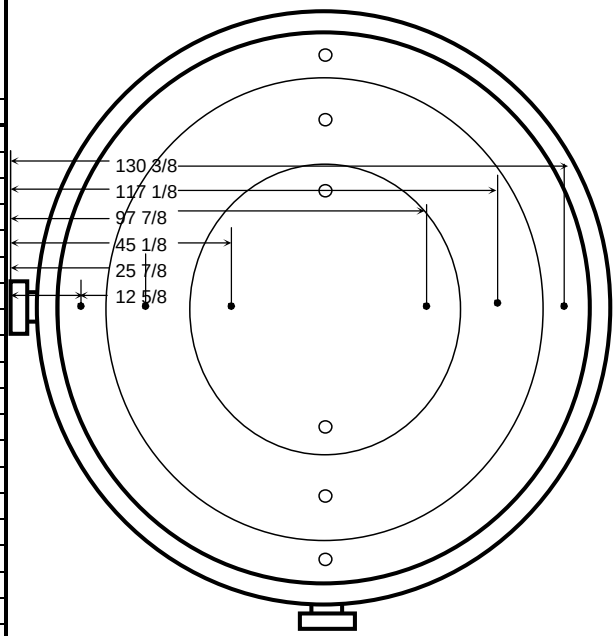
24			



STRATIFICATION TRAVERSE (COMPLIANCE TEST) RESULTS

Company	Fibrominn, LLC	**Date**	07/02/07
Plant Name	Fibrominn Biomass Power Plant	**Project #**	snc-07-benson.mn-comp#1
Equipment	Biomass Boiler, SDA Inlet	**# of Ports Available**	2
Location	Benson, Minnesota	**# of Ports Used**	2

Stack Dimensions				**Traverse Data**			
Diameter or Length of Stack	(D)	129.00	in.	2	**Ports by**	6	**Pts / port**
Width of Stack	(W)		in.	12	**Pts Used**	12	**Required**
Area of Stack	(A_s)	90.76	ft^2	**Run Start**	7:10:41	**Run End**	7:49:41

Traverse Point	**Time Per Point**	**Point Start Time**	**Point Stop Time (Reading)**	**O2**	**Percent Difference**	**SO2**	**Percent Difference**		**Percent Difference**
	min.	hh:mm:ss	hh:mm:ss	%	%	ppm	%	ppm	%
B-6	3.00	7:10:41	7:13:41	4.18	17.42%	241.14	6.42%		
B-5	3.00	7:13:41	7:16:41	5.96	17.75%	205.56	9.28%		
B-4	3.00	7:16:41	7:19:41	5.97	17.95%	187.60	17.21%		
B-3	3.00	7:19:41	7:22:41	5.89	16.36%	195.53	13.71%		
B-2	3.00	7:22:41	7:25:41	4.51	10.90%	249.56	10.14%		
B-1	3.00	7:25:41	7:28:41	4.32	14.65%	245.88	8.51%		
A-6	6.00	7:28:41	7:34:41	4.18	17.42%	226.87	0.12%		
A-5	3.00	7:34:41	7:37:41	3.85	23.94%	266.97	17.82%		
A-4	3.00	7:37:41	7:40:41	6.61	30.59%	195.19	13.86%		
A-3	3.00	7:40:41	7:43:41	3.41	32.63%	286.32	26.36%		
A-2	3.00	7:43:41	7:46:41	7.00	**38.29%**	190.93	15.74%		
A-1	3.00	7:46:41	7:49:41	4.86	3.98%	227.57	0.43%		
Average				5.06		226.59			

STRAT TEST DETERMINED SAMPLE POINTS FOR CIRCULAR STACK

Company	Fibrominn, LLC	**Date**	07/02/07
Plant Name	Fibrominn Biomass Power Plant	**Project #**	snc-07-benson.mn-comp#1
Equipment	Biomass Boiler, SDA Inlet	**# of Ports Available**	2
Location	Benson, Minnesota	**# of Ports Used**	2

Stack Dimensions				**Traverse Data**			
Diameter or Length of Stack	(D)	129.00	in.	2	**Ports by**	6	**Pts / port**
Width of Stack	(W)		in.	12	**Pts Used**	12	**Required**
Area of Stack	(A_s)	90.76	ft^2	**Run Start**	7:10:41	**Run End**	7:49:41

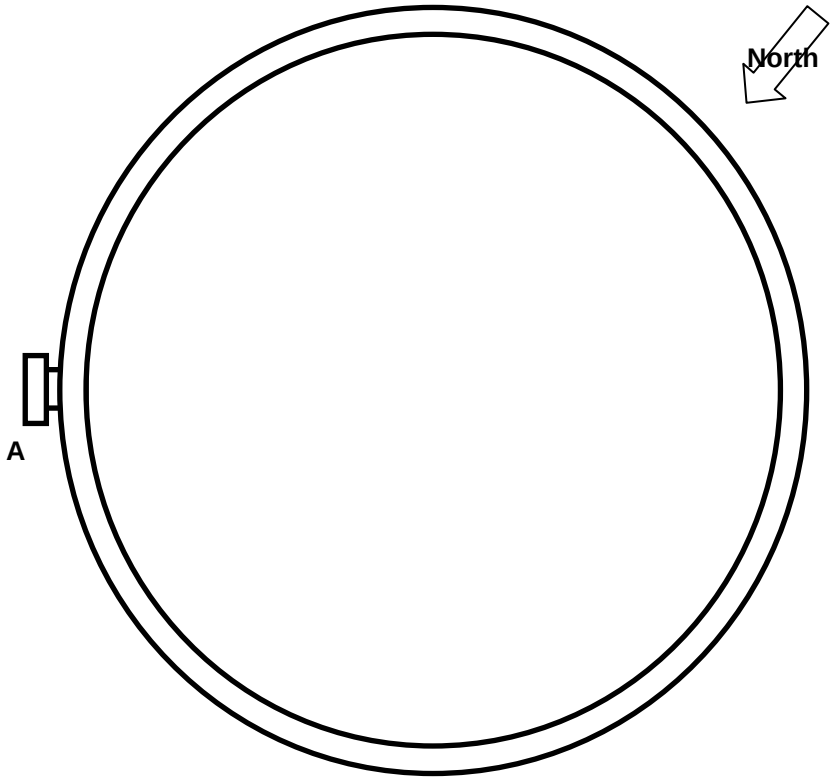
40 CFR 60, Appendix A, Method 7E Criteria

Stratification Results	
Maximum Percent Difference	38.29 % for O2
Maximum Conc. Difference	59.73 ppm for SO2
Stack Diameter	129.00 in.

Stratification Conclusions	
Maximum % Diff.	Percent Diff. >10% Failed Stratification Test
Maximum Conc. Diff.	Conc. Diff. > 0.5%
Stack Diameter	D > 93.6 in.
Use RM 1 Measurement Points and Sample Full Stack	

Traverse Point Number	**Percent of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
	%	in.	in.
1			
2			
3			

Test Type
- ☐ Moisture, for MW
- ☐ Moisture, for wet-to-dry
- ☑ Gas
- ☐ 6.5.6(b)(2) alt. points do not apply



STRATIFICATION TEST DATA

Stack Exhaust Data

Source Information	
Company	Fibrominn, LLC
Plant Name	Fibrominn Biomass Power Plant
Equipment	Biomass Boiler, Stack Exhaust
Location	Benson, Minnesota

Test Information	
Date	07/02/07
Project #	snc-07-benson.mn-comp#1
Unit Number	1
Load	high
Number of Ports Available	4
Number of Ports Used	2

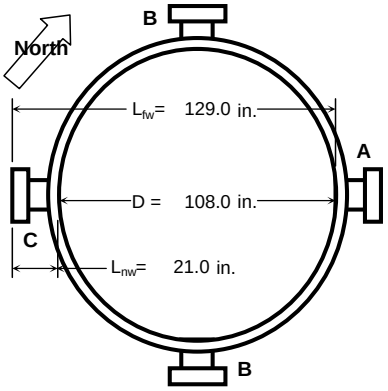
Stack and Test Type				
○	Isokinetic Traverse (Wet Chemistry Testing)			**Circular Stack**
○	Velocity Traverse (Flow and Flow RATA Test)			
◉	**Stratification Traverse (Compliance Test)**	☐ RM 20		
○	Stratification Traverse (RATA)	☐ Part 60	☐ Part 75	

METHOD 1 - STRATIFICATION TEST FOR A CIRCULAR SOURCE

Company	Fibrominn, LLC	**Date**	07/02/07
Plant Name	Fibrominn Biomass Power Plant	**Project #**	snc-07-benson.mn-comp#1
Equipment	Biomass Boiler, Stack Exhaust	**# of Ports Available**	4
Location	Benson, Minnesota	**# of Ports Used**	2

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	129.00	in.
Distance to Near Wall of Stack	(L_{nw})	21.00	in.
Diameter of Stack	(D)	108.00	in.
Area of Stack	(A_s)	63.62	ft^2

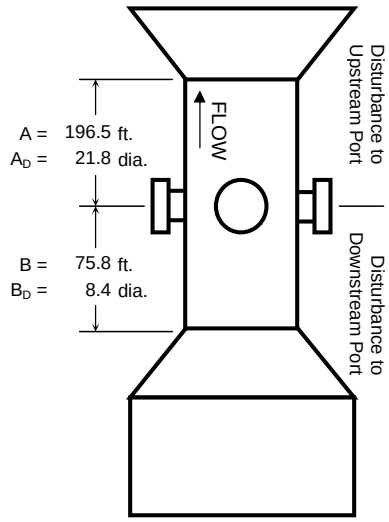
Distance from Disturbances to Port			
Distance Upstream	(A)	2358.00	in.
Diameters Upstream	(A_D)	21.83	diameters
Distance Downstream	(B)	910.00	in.
Diameters Downstream	(B_D)	8.43	diameters



Number of Traverse Points Required					
Diameters to Flow Disturbance		Minimum Number of[1] Traverse Points		**Minimum Number of Traverse Points**	
Down (B_D) Stream	Up (A_D) Stream	Particulate Points	Velocity Points	**Comp Stratification Criteria**	**Points**
2.00-4.99	0.50-1.24	24	16	☐ RM 7E 8.1.2	12 RM1 pts
5.00-5.99	1.25-1.49	20	16	☐ Alt 7E 8.1.2	3 points
6.00-6.99	1.50-1.74	16	12	12 points	
7.00-7.99	1.75-1.99	12	12		
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]	Minimum Number of	
Upstream Spec		12	12	Traverse Points	
Downstream Spec		12	12	RATA Stratification	
Traverse Pts Required		12	12	Criteria	Points
				☐ Part75/60	12 RM1 pts
				☐ 75 abrv (a)	3 points
				☐ 75 abrv (b)	6 points
				12 points	

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches



Number of Traverse Points Used				
2	**Ports by**	6	**Pts / port**	**Stratification Traverse (Compliance Test)**
12	**Pts Used**	12	**Required**	

Traverse Point Locations			
Traverse Point Number	**Percent of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
	%	in.	in.
1	4.4%	4 6/8	25 6/8
2	14.6%	15 6/8	36 6/8
3	29.6%	32	53
4	70.4%	76	97
5	85.4%	92 2/8	113 2/8
6	95.6%	103 2/8	124 2/8
7			
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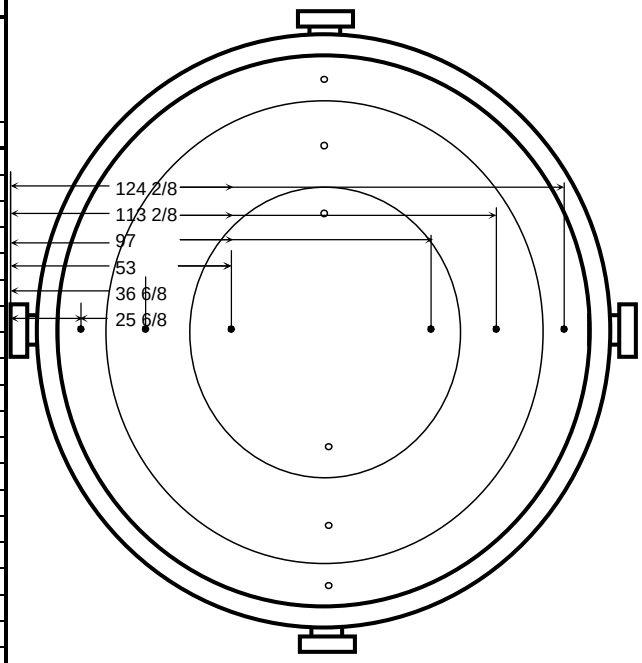


STRATIFICATION TRAVERSE (COMPLIANCE TEST) RESULTS

Company	Fibrominn, LLC	**Date**	07/02/07
Plant Name	Fibrominn Biomass Power Plant	**Project #**	snc-07-benson.mn-comp#1
Equipment	Biomass Boiler, Stack Exhaust	**# of Ports Available**	4
Location	Benson, Minnesota	**# of Ports Used**	2

Stack Dimensions				**Traverse Data**			
Diameter or Length of Stack	(D)	108.00	in.	2	**Ports by**	6	**Pts / port**
Width of Stack	(W)		in.	12	**Pts Used**	12	**Required**
Area of Stack	(A_s)	63.62	ft^2	**Run Start**	7:10:41	**Run End**	7:49:41

Traverse Point	**Time Per Point**	**Point Start Time**	**Point Stop Time (Reading)**	**O2**	**Percent Difference**	**NOx**	**Percent Difference**	**CO**	**Percent Difference**
	min.	hh:mm:ss	hh:mm:ss	%	%	ppm	%	ppm	%
B-6	3.00	7:10:41	7:13:41	4.36	**32.56%**	76.20	27.20%	1000.89	736.24%
B-5	3.00	7:13:41	7:16:41	6.88	6.42%	112.94	7.90%	46.39	61.24%
B-4	3.00	7:16:41	7:19:41	6.67	3.17%	113.14	8.09%	35.99	69.93%
B-3	3.00	7:19:41	7:22:41	6.91	6.88%	103.41	1.20%	47.81	60.06%
B-2	3.00	7:22:41	7:25:41	6.48	0.23%	93.48	10.69%	36.84	69.22%
B-1	3.00	7:25:41	7:28:41	6.92	7.04%	102.08	2.47%	30.73	74.33%
A-6	6.00	7:28:41	7:34:41	6.70	3.63%	114.81	9.69%	25.19	78.95%
A-5	3.00	7:34:41	7:37:41	6.86	6.11%	106.83	2.07%	34.73	70.98%
A-4	3.00	7:37:41	7:40:41	6.14	5.03%	109.37	4.49%	78.70	34.25%
A-3	3.00	7:40:41	7:43:41	6.04	6.57%	96.30	8.00%	30.32	74.67%
A-2	3.00	7:43:41	7:46:41	6.81	5.34%	102.14	2.42%	25.68	78.54%
A-1	3.00	7:46:41	7:49:41	6.81	5.34%	125.32	19.73%	43.01	64.07%
Average				6.47		104.67		119.69	

STRAT TEST DETERMINED SAMPLE POINTS FOR CIRCULAR STACK

Company	Fibrominn, LLC	**Date**	07/02/07
Plant Name	Fibrominn Biomass Power Plant	**Project #**	snc-07-benson.mn-comp#1
Equipment	Biomass Boiler, Stack Exhaust	**# of Ports Available**	4
Location	Benson, Minnesota	**# of Ports Used**	2

Stack Dimensions				**Traverse Data**			
Diameter or Length of Stack	(D)	108.00	in.	2	**Ports by**	6	**Pts / port**
Width of Stack	(W)		in.	12	**Pts Used**	12	**Required**
Area of Stack	(A_s)	63.62	ft^2	**Run Start**	7:10:41	**Run End**	7:49:41

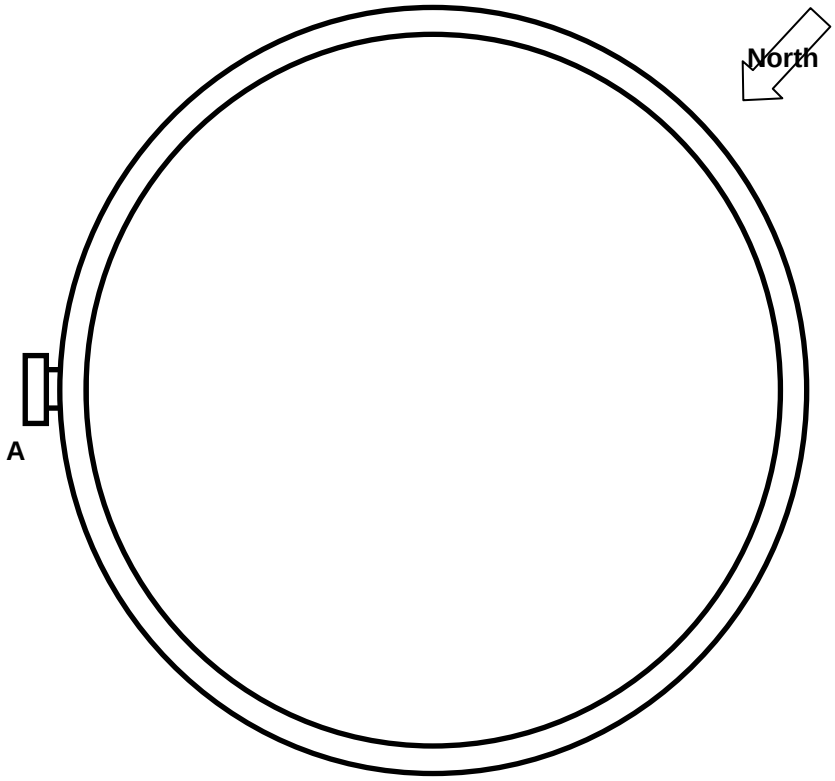
40 CFR 60, Appendix A, Method 7E Criteria

Stratification Results	
Maximum Percent Difference	736.24 % for CO
Maximum Conc. Difference	881.20 ppm for CO
Stack Diameter	108.00 in.

Stratification Conclusions	
Maximum % Diff.	Percent Diff. >10% Failed Stratification Test
Maximum Conc. Diff.	Conc. Diff. > 0.5%
Stack Diameter	D > 93.6 in.
Use RM 1 Measurement Points and Sample Full Stack	

Traverse Point Number	**Percent of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
	%	in.	in.
1			
2			
3			

Test Type
- ☐ Moisture, for MW
- ☐ Moisture, for wet-to-dry
- ☑ Gas
- ☐
- ☐ 6.5.6(b)(2) alt. points do not apply



APPENDIX F

FUEL ANALYSIS

Client: Fibrominn, LLC
Location: Fibrominn Biomass Power Plant
Date: July 3, 2007
Project #: snc-07-benson.mn-comp#1

Biomass - Fuel Analysis

Characteristics of Fuel Gas		
Btu per lb. of biomass =	4,372	gross (HHV)
Btu per lb. of biomass =	4,415	gross (HHV)
Btu per lb. of biomass =	4,203	gross (HHV)
Btu per lb. of biomass =	4,346	gross (HHV)
Btu per lb. of biomass =	**4,334**	**gross (HHV)**

Component	Wt%	Sample
carbon	25.65	LOT 10
carbon	25.50	LOT 11
carbon	25.34	LOT 12
carbon	25.60	LOT 13
carbon	**25.52**	**AVERAGE**

F_c-Factor (SCF dry exhaust per MMBtu [HHV]) =	1,883.27	LOT 10
F_c-Factor (SCF dry exhaust per MMBtu [HHV]) =	1,854.02	LOT 11
F_c-Factor (SCF dry exhaust per MMBtu [HHV]) =	1,935.32	LOT 12
F_c-Factor (SCF dry exhaust per MMBtu [HHV]) =	1,890.84	LOT 13
F_c-Factor (SCF dry exhaust per MMBtu [HHV]) =	**1,890.34**	**AVERAGE**
(Based on EPA RM-19) at 68 deg F and 14.696 psia		

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

Date July 11 2007
HRI Project 002-UD9
HRI Series No. G30/07-1
Date Rec'd. 07/06/07
Cust. P.O.#

McHale & Associates, Inc.
Gary Anderson
1635 235th Ave SE
Sammamish, WA 98075

Sample Identification
Turkey Litter Sample 10

Reporting Basis >	As Rec'd	Dry	Air Dry
Proximate (%)			
Moisture	37.60	0.00	5.26
Ash	12.51	20.05	19.00
Volatile			
Fixed C			
Total			
Sulfur	0.31	0.50	0.47
Btu/lb (HHV)	4372	7007	6639
MMF Btu/lb	5048	8944	
MAF Btu/lb		8765	
Air Dry Loss (%)	34.14		
Ultimate (%)			
Moisture	37.60	0.00	5.26
Carbon	25.65	41.10	38.94
Hydrogen	3.26	5.23	4.95
Nitrogen	2.66	4.26	4.04
Sulfur	0.31	0.50	0.47
Ash	12.51	20.05	19.00
Oxygen*	18.01	28.86	27.34
Total	100.00	100.00	100.00
Chlorine**	0.450	0.721	0.683
Forms of Sulfur (as S,%)			
Sulfate			
Pyritic			
Organic			
Total	0.31	0.50	
Water Soluble Alkalies (%)			
Na2O			
K2O			

Lb. Alkali/MM Btu=
Lb. Ash/MM Btu= 28.62
Lb. SO2/MM Btu= 1.42
HGI= @ % Moisture
As Rec'd. Sp.Gr.=
Free Swelling Index=
F-Factor(dry),DSCF/MM BTU= 9,920

Report Prepared By:

Vickie Buster for
Gerard H. Cunningham
Fuels Laboratory Supervisor

* Oxygen by Difference.
** Not usually reported as part of the ultimate analysis.

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

Date July 11 2007
HRI Project 002-UD9
HRI Series No. G30/07-2
Date Rec'd. 07/06/07
Cust. P.O.#

McHale & Associates, Inc.
Gary Anderson
1635 235th Ave SE
Sammamish, WA 98075

Sample Identification
Turkey Litter Sample 11

Reporting Basis >	As Rec'd	Dry	Air Dry
Proximate (%)			
Moisture	34.00	0.00	0.64
Ash	14.35	21.74	21.60
Volatile			
Fixed C			
Total			
Sulfur	0.30	0.45	0.45
Btu/lb (HHV)	4415	6689	6646
MMF Btu/lb	5217	8740	
MAF Btu/lb		8547	
Air Dry Loss (%)	33.57		
Ultimate (%)			
Moisture	34.00	0.00	0.64
Carbon	25.50	38.64	38.39
Hydrogen	3.45	5.22	5.19
Nitrogen	2.76	4.18	4.15
Sulfur	0.30	0.45	0.45
Ash	14.35	21.74	21.60
Oxygen*	19.64	29.77	29.58
Total	100.00	100.00	100.00
Chlorine**	0.428	0.648	0.644
Forms of Sulfur (as S,%)			
Sulfate			
Pyritic			
Organic			
Total	0.30	0.45	
Water Soluble Alkalies (%)			
Na2O			
K2O			

Lb. Alkali/MM Btu=
Lb. Ash/MM Btu= 32.50
Lb. SO2/MM Btu= 1.35
HGI= @ % Moisture
As Rec'd. Sp.Gr.=
Free Swelling Index=
F-Factor(dry),DSCF/MM BTU= 9,758

Report Prepared By:
Vicki Buster for
Gerard H. Cunningham
Fuels Laboratory Supervisor

* Oxygen by Difference.
** Not usually reported as part of the ultimate analysis.

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
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Fax: (303) 278-1528

Date July 11 2007
HRI Project 002-UD9
HRI Series No. G30/07-3
Date Rec'd. 07/06/07
Cust. P.O.#

McHale & Associates, Inc.
Gary Anderson
1635 235th Ave SE
Sammamish, WA 98075

Sample Identification
Turkey Litter Sample 12

Reporting Basis >	As Rec'd	Dry	Air Dry
Proximate (%)			
Moisture	33.32	0.00	2.86
Ash	15.51	23.27	22.60
Volatile			
Fixed C			
Total			
Sulfur	0.34	0.51	0.50
Btu/lb (HHV)	4203	6303	6123
MMF Btu/lb	5040	8416	
MAF Btu/lb		8215	
Air Dry Loss (%)	31.36		
Ultimate (%)			
Moisture	33.32	0.00	2.86
Carbon	25.34	38.01	36.92
Hydrogen	3.51	5.26	5.11
Nitrogen	2.92	4.38	4.25
Sulfur	0.34	0.51	0.50
Ash	15.51	23.27	22.60
Oxygen*	19.06	28.57	27.76
Total	100.00	100.00	100.00
Chlorine**	0.499	0.748	0.727
Forms of Sulfur (as S,%)			
Sulfate			
Pyritic			
Organic			
Total	0.34	0.51	
Water Soluble Alkalies (%)			
Na2O			
K2O			

Lb. Alkali/MM Btu=
Lb. Ash/MM Btu= 36.91
Lb. SO2/MM Btu= 1.63
HGI= @ % Moisture
As Rec'd. Sp.Gr.=
Free Swelling Index=
F-Factor(dry),DSCF/MM BTU= 10,321

Report Prepared By:

Vickie Buster for
Gerard H. Cunningham
Fuels Laboratory Supervisor

* Oxygen by Difference.
** Not usually reported as part of the ultimate analysis.

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

Date July 11 2007
HRI Project 002-UD9
HRI Series No. G30/07-4
Date Rec'd. 07/06/07
Cust. P.O.#

McHale & Associates, Inc.
Gary Anderson
1635 235th Ave SE
Sammamish, WA 98075

Sample Identification
Turkey Litter Sample 13

Reporting Basis >	As Rec'd	Dry	Air Dry
Proximate (%)			
Moisture	34.95	0.00	3.59
Ash	13.15	20.22	19.49
Volatile			
Fixed C			
Total			
Sulfur	0.36	0.55	0.53
Btu/lb (HHV)	4346	6681	6441
MMF Btu/lb	5056	8545	
MAF Btu/lb		8374	
Air Dry Loss (%)	32.53		
Ultimate (%)			
Moisture	34.95	0.00	3.59
Carbon	25.60	39.35	37.94
Hydrogen	3.57	5.49	5.29
Nitrogen	3.22	4.95	4.77
Sulfur	0.36	0.55	0.53
Ash	13.15	20.22	19.49
Oxygen*	19.15	29.44	28.39
Total	100.00	100.00	100.00
Chlorine**	0.462	0.711	0.685
Forms of Sulfur (as S,%)			
Sulfate			
Pyritic			
Organic			
Total	0.36	0.55	
Water Soluble Alkalies (%)			
Na2O			
K2O			

Lb. Alkali/MM Btu=
Lb. Ash/MM Btu= 30.26
Lb. SO2/MM Btu= 1.65
HGI= @ % Moisture
As Rec'd. Sp.Gr.=
Free Swelling Index=
F-Factor(dry),DSCF/MM BTU= 10,123

Report Prepared By:

Vickie Buster for
Gerard H. Cunningham
Fuels Laboratory Supervisor

* Oxygen by Difference.
** Not usually reported as part of the ultimate analysis.

APPENDIX G

TEST PROTOCOL

COMPLIANCE TEST PROTOCOL

FOR
ONE BIOMASS BOILER
(SPRAY DRYER ABSORBER INLET AND STACK OUTLET)

PREPARED FOR
SNC – LAVALIN, POWERMINN 9090 LLC, AND FIBROMINN LLC

AT THE
FIBROMINN BIOMASS POWER PLANT
BENSON, MINNESOTA

Minnesota Pollution Control Agency
Permit No: 15100038-004

April 25, 2007

COMPLIANCE TEST PROTOCOL

FOR
ONE BIOMASS BOILER
(SPRAY DRYER ABSORBER INLET AND STACK OUTLET)

PREPARED FOR
SNC – LAVALIN, POWERMINN 9090 LLC, AND FIBROMINN LLC

AT THE
FIBROMINN BIOMASS POWER PLANT
BENSON, MINNESOTA

Minnesota Pollution Control Agency
Permit No: 15100038-004

April 25, 2007

Prepared By:

Thomas K. Graham, PE, Director of Operations

rev - 0

Table of Contents

1.0 INTRODUCTION

1.1 General Facility Description

PowerMinn 9090, LLC (PowerMinn) owns and Fibrominn, LLC (Fibrominn) operates the Fibrominn Biomass Power Plant (FBPP) in Swift County, Benson, Minnesota. FBPP comprises one boiler, fueled principally with poultry litter. Vegetative biomass may also be burned. The facility generates an average of 50 megawatts (MW) of electricity for export and has a peak electrical export capacity of 55 MW.

Emissions from the boiler are controlled by a baghouse spray dryer to control particulate matter and particulate matter less than 10 micron in diameter (PM/PM_{10}), sulfur dioxide (SO_2), sulfuric acid mist (H_2SO_4), and hydrochloric acid (HCl). Selective non-catalytic reduction (SNCR) is used to control nitrogen oxides (NOx). Good combustion practices are used to control carbon monoxide (CO) and volatile organic compounds (VOCs).

Air emissions testing on the unit will occur at the spray dryer absorber (SDA) inlet and the stack outlet. The SDA inlet duct is circular and measures 10.8 feet (ft) (129 inches) in diameter at the test ports which are approximately 120 ft above grade level. The test ports are located approximately 101.8 ft (1,222 inches) downstream and approximately 29.2 ft (350 inches) upstream from the nearest disturbances.

The stack exhaust is circular and measures 9 feet (ft) (108 inches) in diameter at the test ports which are approximately 104 ft above grade level with an exit elevation of approximately 300 ft above grade level. The test ports are located approximately 75.8 ft (910 inches) downstream and approximately 196.5 ft (2,358 inches) upstream from the nearest disturbances.

1.2 Reason for Testing

FBPP is required to perform air emissions testing in conjunction with the requirements of the Minnesota Pollution Control Agency (MPCA) air emissions permit (Permit No. 15100038-004) and the requirements of the United States Environmental Protection Agency (EPA); to determine the concentrations, rates, and reductions of certain pollutants. Pollutants measured at the stack exhaust will include HCl, mercury (Hg), PM/PM_{10}, dioxins/furans (PCDD/PCDF), SO_2, NOx, CO, opacity, carbon dioxide (CO_2), and oxygen (O_2). A reduced number of pollutants will be measured at the SDA inlet (SO_2, HCl, and Hg) to calculate capture efficiencies. All common stack exhaust and SDA pollutant tests will be performed simultaneously.

This protocol will be submitted to the MPCA at least 30 days before the first test.

2.0 SUMMARY

2.1 Owner Information

Company:	PowerMinn 9090, LLC
Mailing address:	2295 Corporate Boulevard, Suite 222 Boca Raton, Florida 33431

2.2 Operator Information

Company:	Fibrominn, LLC
Contact Person:	Chuck Wagoner, Owners Site Construction Rep.
Mailing address:	900 Industrial Drive PO Box 265 Benson, Minnesota 56215
Office:	(320) 843-9013
Fax:	(320) 843-9014
Email:	chuck.wagoner@fibrowattusa.com

2.3 Site Information

Site Name:	Fibrominn Biomass Power Plant
Contact Person:	Victor Myers, Commissioning Manager
Location:	900 Industry Drive Benson Swift County, Minnesota 56215
Office:	(320) 843-5170
Cell:	(425) 922-9018
Fax:	(320) 843-4193
Email:	victor.myers@slthermal.com

2.4 Engineering Consultant Information

Company:	SNC – Lavalin (SNC)
Contact Person:	Robert Dolesky, Project Engineer
Mailing Address:	1200-1075 West Georgia St Vancouver, British Columbia Canada V6E 3C9
Office:	(604) 605-4927
Fax:	(604) 683-1672
E-mail:	robert.dolesky@snclavalin.com

2.5 Test Contractor Information

Company:	Air Hygiene International, Inc.
Contact Person:	Thomas K. Graham, PE, Director of Operations
Mailing Address:	5634 South 122nd East Ave., Suite F Tulsa, Oklahoma 74146
Office:	(918) 307-8865
Cell:	(918) 407-5168
Fax:	(918) 307-9131
E-mail:	tom@airhygiene.com
Website:	www.airhygiene.com

2.6 Expected Test Start Date

Thursday, June 14, 2007

2.7 Testing Schedule

The following schedule indicates specific activities required to be done each day; however, the schedule may require flexibility and will be extended as necessary. If there are no operational delays, this schedule can be completed as detailed by the testing crew on the two sources (stack outlet and SDA inlet). The details below describe the activities to be conducted on each source.

Pre-test Activities	**Due Date**
1. Conduct site inspection	per SNC and Air Hygiene
2. Prepare draft test protocol (Air Hygiene)	prior to testing
3. Submit final approved test plan to SNC (Air Hygiene)	3 days after comments on draft
4. Pre-test meeting with SNC, MPCA, etc.	Prior to testing
5. Receive site safety training	Day of arrival for setup

On-Site Pre-testing Schedule	**Time**
Day 0 – Initial Site Mobilization and Setup	
• Arrive at site	09:00
• Attend safety training class	09:00 – 10:00
• Setup on inlet and outlet	10:00 – 18:00

Activities below will be conducted at the SDA inlet and stack exhaust outlet. Testing will be conducted as appropriate run conditions are available and the testing schedule may move up each day if conditions permit. The schedule assumes 12 hour days with no overtime.

All tests will be conducted under representative operation conditions with the biomass fired boiler steam load between 90 and 100 percent of the nominal rating (490,000 lb/hr). Operation during periods of boiler and air pollution control system malfunctions or upset conditions will not be considered representative conditions and will be reason for delaying, interrupting, aborting, or invalidating a test run. The following are typical malfunctions or upset conditions that will be reason for delaying, interrupting, or invalidating a test run.

1. Crane outage
2. Fan outage
3. Spray dryer absorber or lime slaker problem
4. Carbon system malfunction
5. Broken or frozen grate bar
6. Plugged feed chute
7. Plugged ash discharge
8. Plugged ash conveyor system
9. Turbine trip
10. Hydraulic failure of system
11. Fabric filter malfunction
12. Steam flow not within 10 percent of steam flow set point
13. Boiler tube leak or rupture
14. Plug or bridge in refuse feed hopper

When the malfunction or upset condition has been cleared, testing will resume from that point at which it was stopped. If the malfunction or upset condition results in an extended test delay, then the affected test run(s) may be aborted and a new run(s) conducted when the malfunction has been corrected or process upset cleared. The above list represents but not entirely encompasses the most typical malfunctions or process upsets potentially encountered.

On-site Testing Activities	**Time**
Day 1 – Compliance / Performance Testing	
• Daily setup and calibrations	06:00 – 07:00
• Conduct stratification test	07:00 – 09:00
o Collect outlet data for NOx and O_2 to determine sample collection location(s)	
• Conduct preliminary cyclonic testing and flow measurements	07:00 – 09:00
o Collect inlet and outlet data for differential pressures, temperatures, and null angles	
• Conduct testing for NOx, CO, SO_2, CO_2, and O_2	09:00 – 13:00
o Collect outlet data for NOx, CO, SO_2, CO_2, and O_2 (3, 60-minute runs)	
o Collect simultaneous inlet data for SO_2 and O_2 (3, 60-minute runs)	
• Conduct testing for opacity	09:00 – 13:00
o Collect outlet data for opacity (3, 60-minute runs)	
• Conduct simultaneous testing for HCl	09:00 – 14:00
o Collect inlet data for HCl (3, 60-minute runs with setup)	
• O_2, CO_2, and CO data will be monitored by periodic Tedlar bag collection	
o Collect outlet data for HCl (3, 60-minute runs with setup)	
• O_2, CO_2, and CO data will be monitored by the RM analyzers	
Day 2 – Compliance / Performance Testing	
• Daily setup and calibrations	06:00 – 07:00
• Conduct simultaneous testing for Hg	07:00 – 16:00
o Collect inlet data for Hg (3, 120-minute runs with setup)	
• O_2, CO_2, and CO data will be monitored by periodic Tedlar bag collection	
o Collect outlet data for Hg (3, 120-minute runs with setup)	
• O_2, CO_2, and CO data will be monitored by the RM analyzers	
Day 3 – Compliance / Performance Testing	
• Daily setup and calibrations	06:00 – 07:00
• Conduct testing for PCDD/PCDF (Runs 1 and 2)	07:00 – 18:00
o Collect outlet data for PCDD/PCDF (2, 240-min runs with setup)	
• O_2, CO_2, and CO data will be monitored by the RM analyzers	
Day 4 – Compliance / Performance Testing	
• Daily setup and calibrations	06:00 – 07:00
• Conduct testing for PCDD/PCDF (Run 3)	07:00 – 13:00
o Collect outlet data for PCDD/PCDF (1, 240-min run with setup)	
• O_2, CO_2, and CO data will be monitored by the RM analyzers	
Day 5 – Compliance / Performance Testing	
• Daily setup and calibrations	06:00 – 07:00
• Conduct testing for PM/PM_{10}	07:00 – 18:00
o Collect outlet data for PM/PM_{10} (3, approx. 150-min, min. 100dscf runs with setup)	
• O_2, CO_2, and CO data will be monitored by the RM analyzers	

Activities after Testing

• Demobilization of Testing Crew (Air Hygiene)	Day 5
• Preparation of draft test report (Air Hygiene)	Days 6 – 14*
• Submit for review to SNC (Air Hygiene)	Day 15
• Review and comment on draft (SNC)	Days 16 – 17
• Prepare final hard copy test reports (Air Hygiene)	Days 17 – 18
• Final reports delivered to SNC (Air Hygiene)	Day 19

* Draft report timeline may depend on out-sourced laboratory analysis timeline. PCDD/PCDF analysis in particular typically takes from 17 to 21 days to complete a full analysis.

2.8 Test Report Content

The test report methods and content will meet the requirements of the MPCA and the EPA for compliance and certification testing. The reports will include discussion of the following:

- Introduction
- Plant and Sampling Location Description
- Summary and Discussion of Test Results Relative to Acceptance Criteria
- Sampling and Analytical Procedures
- QA/QC Activities
- Test Results and Related Calculations
- Stack and Testing Equipment Drawings
- Raw Field Data and Calibration Data Sheets
- Sampling Log and Chain-of-Custody Records
- Audit Data Sheets

2.9 Equipment and Procedures

Test Methods and Parameters to Satisfy 40 CFR Part 60

EPA Method 1 for sample location [inlet and outlet]
EPA Method 2 for exhaust flow [inlet and outlet]
EPA Method 3a for oxygen (O_2) [inlet and outlet]
EPA Method 3a for carbon dioxide (CO_2) [inlet and outlet]
EPA Method 4 for exhaust gas moisture [inlet and outlet]
EPA Method 5 for particulate matter (PM – front half filterable) [outlet]
EPA Method 6c for sulfur dioxide (SO_2) [inlet and outlet, simultaneous]
EPA Method 7e for nitrogen oxides (NOx) [outlet]
EPA Method 9 for opacity [outlet]
EPA Method 10 for carbon monoxide (CO) [outlet]
EPA Method 23 for dioxins and furans (PCDD/PCDF) [outlet]
EPA Method 26a for hydrogen chloride (HCl) [inlet and outlet, simultaneous]
EPA Method 202 for particulate matter (PM_{10} – back half condensable) [outlet]
Ontario Hydro Method for mercury (Hg) [inlet and outlet, simultaneous]

2.10 Proposed Variations

- Stainless steel nozzles and inconel liners will be used instead of borosilicate glass (to prevent breakage) in the Method 5/202 sampling assembly.

- Due to test matrix restrictions, schedule, and operations availability; wet chemistry (isokinetic) runs may be stopped before a run is complete. In this case a delay of more than two hours will constitute cooling and capping off the impinger train. Also, wet chemistry test runs may not be run consecutively.
- Method 26a testing will be from a single point.

2.11 Compliance Sampling Strategy

All compliance testing will be performed while the unit is operating between 90 and 100 percent of the nominal throughput. During the dioxin/furan testing, the temperature (^{o}F) at the inlet to the baghouse spray dryer will be recorded by the plant. In addition to this parameter, for all testing, plant personnel will also track boiler measurements including: turbine output (MW), steam flow (lb/hr), feed water flow (gpm), ambient temperature (^{o}F), ambient relative humidity (%), barometric pressure (in. Hg), fuel flow (tph), feed water temperature (^{o}F), super heater outlet steam temperature (^{o}F), super heater outlet steam pressure (psig), super heater outlet flue gas temperature (^{o}F), total over fire and under fire combustion air flow (Kacfm); and spray dryer absorber measurements including: total slurry feed (gpm), dilution water feed (gpm), inlet and outlet flue gas temperature (^{o}F), slurry concentration (%).

A. Gases (NOx, SO_2, CO, CO_2, and O_2) – EPA Methods 7e, 6c, 10, and 3a
NOx, SO_2, CO, CO_2, and O_2 testing will be conducted on the stack outlet. Each test run will be 60 minutes in duration. Simultaneously, SO_2 and O_2 testing will be conducted on the SDA inlet to calculate control efficiency.

B. PM/PM_{10} Testing – EPA Methods 5/202
Total Particulate matter (PM) and particulate matter less than 10 microns in diameter (PM_{10}) testing will be conducted on the stack outlet. Each test run will be approximately 150 minutes in duration pulling at least 100 dry standard cubic feet (dscf) of sample volume. An S-type pitot tube will be used to measure cyclonic flow and velocity pressure in accordance with EPA Method 2. This data will be correlated with meter coefficients, temperatures, barometric pressure, and stack gas moisture (EPA Method 4) to determine the stack gas dry exhaust flow rate. PM/PM_{10} samples will be collected following EPA Method 5 (front half filterables) and EPA Method 202 (back half condensables) with an isokinetic sampling train utilizing a stainless steel nozzle and inconel probe liner. A scale will be used to measure net weight gain from each impinger to determine moisture gain. Gravimetric analysis by Air Hygiene's in-house laboratory will provide PM/PM_{10} results.

The exit of the filter holder is connected to a series of four full size impingers. The first three impingers each contain 100 milliliters of de-ionized water. The fourth contains a tared quantity of silica gel. The impingers are maintained at a temperature below 68 ^{o}F for the duration of each test. In accordance with EPA Method 202 requirements, all glassware is cleaned prior to testing with soap and water, rinsed with de-ionized water, acetone and finally methylene chloride.

Procedures for selecting sampling locations and for operation of the apparatus are derived from EPA Method 5/202 and associated EPA Methods 1 though 4. The sampling apparatus is leak-cheaked before and after each test run. Sampling is performed at an isokinetic rate greater than 90 percent and less than 110 percent.

At the conclusion of each test run, the filter is removed from the filter holder and placed in a labeled Petri dish (container No. 1). Any particles adhering to the filter holder gasket are also transferred to the dish. The probe liner, nozzle, probe fittings and front half of the filter holder are washed three times with acetone to remove any particulate matter or condensate. These rinses are saved in a pre-cleaned glass sample jar (container No. 2).

As soon as possible after the post-test leak check the probe and filter will be detached from the impinger train and the nitrogen (N_2) purge will begin. During the purge, N_2 will flow through the back half of the sample train at 20 liters per min for one hour. The purge will effectively remove any SO_2 in the sample train which may solidify and cause the laboratory to over-report the amount of particulate matter.

The first three impinger catches are measured, their weights recorded, and the catches transferred to container No. 3. The weight gain is added to the silica gel weight gain of the forth impinger to determine the stack gas moisture content. The impingers and all connecting glassware are then rinsed twice with de-ionized water. These rinses are added to container No. 3. A final rinse, of the above components, with methylene chloride is saved in glass sample container No. 4.

Sample bottles are sealed, shaken and labeled, and the liquid level is marked. At that time, approximately 200-ml each of de-ionized water, acetone and methylene chloride are prepared for analysis as reagent blanks.

Particulate samples collected on the glass fiber filters are analyzed gravimetrically to a constant weight. The front half wastes are transferred to tared beakers, evaporated to dryness, and brought to constant weights.

The impinger water is extracted by adding the contents of the methylene chloride rinse to the impinger water, and separating the layers in a separatory funnel. Two additional 75 milliliter portions of methylene chloride are added to the funnel to complete the extraction. The organic extract fraction is then placed into a tared beaker and evaporated at room temperature to dryness. It is then desiccated for 24 hours and brought to a constant weight. The aqueous inorganic fraction is taken to dryness at a slightly elevated temperature and allowed to air dry at room temperature. The residue is then desiccated for 24 hours and brought to a constant weight. The weight differentials for the organic and inorganic fractions are combined to determine the total condensable particulate matter.

The particulate analysis is performed by Air Hygiene's in house laboratory.

C. Mercury Testing – Ontario Hydro Method

Mercury (Hg) testing will be conducted simultaneously on the SDA inlet and stack outlet. Each test run will be 120 minutes in duration. An S-type pitot tube will be used to measure cyclonic flow and velocity pressure in accordance with EPA Method 2. This data will be correlated with meter coefficients, temperatures, barometric pressure, and stack gas moisture (EPA Method 4) to determine the stack gas dry exhaust flow rate. Mercury samples will be collected following the Ontario Hydro Method (ASTM D6784-02) with an isokinetic sampling train utilizing a glass nozzle and probe liner.

The exit of the filter holder is connected to a series of eight full size impingers. The first three impingers each contain 100 mL of 1.0 N potassium chloride (KCl). The fourth impinger contains 100 mL of 5% nitric acid (HNO_3) / 10% hydrogen peroxide (H_2O_2). The fifth, sixth, and seventh impinger contain 100 mL of 10% sulfuric acid (H_2SO_4) / 4% potassium permangate ($KMnO_4$). The eighth contains a tared quantity of silica gel. The impingers are maintained at a temperature below 68 ^oF for the duration of each test.

Procedures for selecting sampling locations and for operation of the apparatus are derived from Ontario Hydro Method and associated EPA RMs 1 though 4. The sampling apparatus is leak-checked before and after each test run. Sampling is performed at an isokinetic rate greater than 90 percent and less than 110 percent.

At the conclusion of each test run, the probe and nozzle will be rinsed and brushed with 0.1 normal nitric acid to remove any particulate matter. These rinses will be collected into polyethylene sample containers. The quartz fiber filter will be recovered and placed into a polyethylene sample container. The volume of liquid collected in each of the impingers will be quantified.

The liquid from the first three impingers will be transferred to a leak-free polyethylene storage container. The first three impingers and all connecting glassware will be rinsed with 0.1 normal nitric acid which will be added to the storage container. The liquid from the fourth impinger will be transferred to a separate polyethylene container, and the impinger will be rinsed into the container with 0.1 normal nitric acid. The contents of impingers 5, 6, and 7 will be collected into an amber glass container. All impingers 5, 6, and 7 and the connecting glassware will then be rinsed with 0.1 normal nitric acid and 8.0 normal hydrochloric acid. These rinses will also be collected in the glass container.

All containers will be sealed, labeled and liquid levels marked prior to transport to the laboratory. The silica gel weight and the volume of condensate collected in the impingers will be used to determine moisture content of the stack gas. A scale will be used to measure net weight gain from each impinger to determine moisture gain. An out-sourced laboratory will be used to provide mercury results.

D. Dioxin/Furan Testing – EPA Method 23

Dioxin/Furan (PCDD/PCDF) testing will be conducted on the stack outlet. Each test run will be 240 minutes in duration. An S-type pitot tube will be used to measure cyclonic flow and velocity pressure in accordance with EPA Method 2. This data will be correlated with meter coefficients, temperatures, barometric pressure, and stack gas moisture (EPA Method 4) to determine the stack gas dry exhaust flow rate. Dioxin/Furan samples will be collected following EPA Method 23 with an isokinetic sampling train utilizing a glass nozzle and probe liner. Particulate will be collected on a filter and a sorbent cartridge will retain vaporous emissions. Following sampling, the appropriate components of the train will be recovered and transferred to the laboratory for analysis. The components will be extracted and the extracts will be cleaned to remove excessive levels of potential interference. A scale will be used to measure net weight gain from each impinger to determine moisture gain. An out-sourced laboratory will be used to provide dioxin/furan results.

All sampling train components that contact the recovered sample will be composed of borosilicate glass, polytetrafluoroethylene (PTFE) or similar materials to avoid potential sample contamination or reactions with PCDDs and PCDFs.

The exit of the filter holder will be connected to a water jacketed glass coil condenser and adsorbent trap unit, configured such that the flue gas and condensed moisture will flow down through the resin in the cartridge. The adsorbent trap will contain an XAD resin cartridge to adsorb the PCDDs and PCDFs present in the vapor and condensed portion of the sample. The resin cartridges will be pre-cleaned and spiked with isotopically labeled surrogates by an outsourced laboratory prior to use in the field. During operation, a leak-free submersible pump will be used to re-circulate cooling water through the coil condenser to ensure proper cooling of the condenser and resin cartridge unit.

Immediately following the adsorbent cartridge will be a series of four full size leak-free glass impingers. All impingers will be of the Greenburg-Smith design, with the first impinger being further modified to have a short stem, to prevent the sample gas from bubbling through the collected condensate. The first impinger will be empty, the second and third impingers each contained 100 milliliters of HPLC-grade distilled water, the fourth empty and the firth will be charge with silica gel. The impingers will be immersed in an ice bath for the duration of the test.

All train components will be cleaned before use to avoid organic contamination. This cleaning will include a hot soapy wash, three dionized water rinses, two hours of heating at 450 ^{o}F, three acetone rinses, and three methylene chloride rinses. All glassware components are then covered with hexane rinsed aluminum foil until assembled at the site.

The impingers will be connected to the metering system via an umbilical. The metering system includes a vacuum gauge, a leak-free pump, thermometers accurate to within ±5.4 ^{o}F, and a dry gas meter accurate to within two percent.

Procedures for selecting sampling locations and for operation of the train will be derived from EPA Method 23 and associated Methods 1 through 5. The flue gas sample will be collected by operating the train according to the Method 5 specifications, including leak-checking, isokinetic sampling rates, and stack traversing. Sampling will be performed isokinetically (within plus or minus 10 percent).

At the conclusion of each test run, the probe and umbilical will be carefully removed from the sampling train. The inlet to the sampling train will be removed to a clean field laboratory for sample recovery. The sample from the probe nozzle and probe liner will be recovered at the sampling location. The recovered sample will consist of the following components:

- Glass fiber filter and particulate catch;
- Adsorbent trap containing the XAD-2 resin;
- Acetone/Methylene chloride rinse: Probe liner and nozzle rinsed and brushed three times with acetone and rinsed three times with methylene chloride combined with three rinses of the filter holder, coil condenser and all interconnecting glassware, with three soaks of the condenser with acetone and methylene chloride each;

- ♦ Toluene rinse: Probe liner and nozzle rinsed three times combined with three rinses of the filter holder, coil condenser and all interconnecting glassware with three soaks of the condenser with toluene;
- ♦ The volume of water collected in the impinger train will be measured gravimetrically.

One field train blank will be assembled, recovered and analyzed in the same manner as a sample train.

The samples will be analyzed for PCDDs and PCDFs in accordance with EPA Method 23 protocol using high resolution gas chromatography and high resolution mass spectrometry (GC/MS). All Method 23 samples will be analyzed with the DB-5S column with modified calibration and additional quality assurance procedures as a direct substitute for the DB-5 and DB-225 columns. Confirmation of the 2,3,7,8 TCDF and 2,3,7,8 isomers will be performed on the DB-5S column and modified calibration procedures meets the column separation requirement and can be used as a direct substitute for the DB-5 and DB-225 columns in accordance with Method 23 as approved by the USEPA.

All of the organic analytical work will be performed by an outsourced laboratory. All components of the recovered sampling train, including the toluene rinse, will be pooled and extracted for one analysis.

E. Hydrogen Chloride Testing – EPA Method 26/26a

Hydrogen chloride (HCl) testing will be conducted simultaneously on the SDA inlet and stack outlet. Each test run will be 60 minutes in duration. Each test will be conducted from a single point in the stack. This data will be correlated with meter coefficients, temperatures, barometric pressure, and stack gas moisture (EPA Method 4) to determine the stack gas dry exhaust flow rate. HCl samples will be collected following EPA Method 26a with an isokinetic sampling train utilizing a glass nozzle and probe liner. A scale will be used to measure net weight gain from each impinger to determine moisture gain. An out-sourced laboratory will be used to provide HCl results.

The train components will include a glass nozzle, heated glass lined probe, heated quartz fiber filter, and four full size impingers. The first impinger will have 50 milliliters of 0.1 N sulfuric acid solution and a short stem. The second and third impingers will each have 100 milliliters of 0.1 N sulfuric acid solution. The forth impinger will be empty and the fifth will contain silica gel. The soldium hydroxide impingers will not be used as chlorine (Cl_2), does not need to be determined.

An integrated sample of at least 30 dry standard cubic feet will be extracted from the gas stream and passed through the dilute sulfuric acid. In the dilute acid, the HCl gas dissolves and forms chloride (Cl^-) ions. The train will be leak checked as described in Method 5 from the end of the glass probe liner after testing. After the one hour test the first four impingers, all connecting glassware and back half of the filter housing will be rinsed into one polyethylene container. The probe liner, filter and filter housing will not be recovered. The liquid level of the one sample container will be marked. The Cl^- concentration will be determined by ion chromatoghraphy.

As part of the quality assurance program, one duplicate analysis will be performed as specified in Method 26a. In addition, a spike analysis will be performed on one of the

samples. Three runs will be performed for each unit. The hydrogen chloride removal efficiency will be calculated using the ppmdv @ 7% O_2 concentration at the SDA inlet and stack outlet.

F. Opacity – EPA Method 9

Visual opacity from the stack outlet will be determined using EPA Method 9. This method determines the level of any visible emissions that occur during the observation period. It requires that the opacity of emission be determined by a trained and certified individual. Three one hour runs will be observed from the proper location(s) on the stack outlet. The opacity level is recorded every 15 seconds.

APPENDIX A
QA/QC PROGRAM

QA/QC PROGRAM

AIR HYGIENE ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by an internal QA team and encompasses five major areas:

1. QA reviews of reports, laboratory work, and field testing;
2. Equipment calibration and maintenance;
3. Chain-of-custody;
4. Training; and
5. Knowledge of current test methods.

QA Reviews

AIR HYGIENE's review procedure includes a review of each source test report, along with laboratory and fieldwork by the QA Team.

The most important review is the one that takes place before a test program begins. The QA Team works closely with technical division personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance

The equipment used to conduct the emission measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined by the Environmental Protection Agency. Quality control checks are also conducted in the field for each test program.

Chain-of-Custody

AIR HYGIENE maintains full chain-of-custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, AIR HYGIENE documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.). Samples are stored in a locked area to which only AIR HYGIENE personnel have access. Field data sheets are secured at AIR HYGIENE's offices upon return from the field.

Training

Personnel training is essential to ensure quality testing. AIR HYGIENE has formal and informal training programs, which include:

1. Attendance at EPA-sponsored training courses;
2. Enrollment in EPA correspondence courses;
3. A requirement for all technicians to read and understand Air Hygiene Incorporated's QA manual;
4. In-house training and QA meetings on a regular basis; and
5. Maintenance of training records.

Knowledge of Current Test Methods

With the constant updating of standard test methods and the wide variety of emerging test procedures, it is essential that any qualified source tester keep abreast of new developments. AIR HYGIENE subscribes to services, which provide updates on EPA reference methods, rules, and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences.

COMBUSTION TESTING QUALITY ASSURANCE ACTIVITIES

A number of quality assurance activities are undertaken before, during, and after each testing project. The following paragraphs detail the quality control techniques, which are rigorously followed during testing projects.

Each instrument's response is checked and adjusted in the field prior to the collection of data via multi-point calibration. The instrument's linearity is checked by first adjusting its zero and span responses to zero nitrogen and an upscale calibration gas in the range of the expected concentrations. The instrument response is then challenged with other calibration gases of known concentration and accepted as being linear if the response of the other calibration gases agreed within ± 2 percent of range of the predicted values.

After each test run, the analyzers are checked for zero and span drift. This allowed each test run to be bracketed by calibrations and documents the precision of the data just collected. The criteria for acceptable data are that the instrument drift is no more than 3 percent of the full-scale response. Quality assurance worksheets are prepared to document the multipoint calibration checks and zero to span checks performed during the tests.

The sampling systems are leak checked by demonstrating that a vacuum greater than 10 in Hg could be held for at least 1 minute with a decline of less than 1 in. Hg. A leak test is conducted after the sample system is set up and before the system is dismantled. This test was conducted to ensure that ambient air had not diluted the sample. Any leakage detected prior to the tests would be repaired and another leak check conducted before testing commenced.

The absence of leaks in the sampling system is also verified by a sampling system bias check. The sampling system's integrity is tested by comparing the responses of the analyzers to the calibration gases introduced via two paths. The first path was directly into the analyzer and the second path via the sample system at the sample probe. Any difference in the instrument responses by these two methods is attributed to sampling system bias or leakage. The criteria for acceptance are agreement within 5% of the span of the analyzer.

The control gases used to calibrate the instruments are analyzed and certified by the compressed gas vendors to ± 1% accuracy for all gases. EPA Protocol No. 1 was used where applicable to assign the concentration values traceable to the National Institute of Standards and Technology (NIST), Standard Reference Materials.

AIR HYGIENE maintains a large variety of calibration gases to allow the flexibility to accurately test emissions over a wide range of concentrations.

APPENDIX B
TEST EQUIPMENT CONFIGURATION and DESCRIPTION

INSTRUMENT CONFIGURATION AND OPERATIONS FOR GAS ANALYSIS

The sampling and analysis procedures to be used conform in principle with the methods outlined in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1, 2, 3a, 4, 5, 6c, 7e, 9, 10, 23, 26a; 40 CFR 51, Appendix M, Method 202; and the Ontario Hydro Method.

The sample system to be used for the NOx, SO_2, CO_2, CO, and O_2 tests is configured per the following description. A stainless steel probe will be inserted into the sample port of the stack. The gas sample will be continuously pulled through the probe and transported via 3/8 inch heat-traced Teflon® tubing to a stainless steel, minimum-contact condenser designed to dry the sample and then through Teflon® tubing via a stainless steel/Teflon® diaphragm pump and into the sample manifold within the mobile laboratory. From the manifold, the sample is partitioned to the NOx, SO_2, CO_2, CO, and O_2 analyzers through rotameters that control the flow rate of the sample.

The schematic (Figure 1) shows that the sample system is also equipped with a separate path through which a calibration gas could be delivered to the probe and back through the entire sampling system. This allows for convenient performance of system bias checks as required by the testing methods.

All instruments are housed in an air-conditioned, trailer-mounted mobile laboratory. Gaseous calibration standards are provided in aluminum cylinders with the concentrations certified by the vendor according to EPA Protocol No. 1.

This general schematic also illustrates the analyzers to be used for the tests (i.e., O_2, CO). All data from the Reference Method continuous monitoring instruments are recorded on a Logic Beach Hyperlogger. The Hyperlogger retrieves calibrated emissions data from each instrument every second. An average value is recorded every 30 seconds.

The stack gas analysis for O_2 and CO_2 concentrations will be performed in accordance with procedures set forth in EPA Method 3a. The O_2 analyzer uses a paramagnetic cell detector. The CO_2 analyzer uses a continuous nondispersive infrared (NDIR) analyzer.

EPA Method 6c will be used to determine the concentrations of SO_2. An ultraviolet analyzer will be used to determine the sulfur dioxide concentrations in the gas stream.

EPA Method 7e will be used to determine concentrations of NOx. A chemiluminescence analyzer will be used to determine the nitrogen oxides concentration in the gas stream. A NO_2 in nitrogen certified gas cylinder will be used to verify at least a 90 percent NO_2 conversion on the day of the test.

CO emission concentrations will be quantified in accordance with procedures set forth in EPA Method 10. A continuous nondispersive infrared (NDIR) analyzer was used for this purpose.

Figure 2 represents the sample train setup for all of the wet chemistry (isokinetic) sampling. An S-type pitot tube will be used to measure cyclonic flow and velocity pressure in accordance with EPA Method 2. This data will be correlated with meter coefficients, temperatures, barometric pressure, and stack gas moisture (EPA Method 4) to determine the stack gas dry exhaust flow rate. Samples will be collected following EPA Methods with an isokinetic sampling train utilizing a stainless steel or glass nozzles and inconel or glass probe liners as appropriate. A scale will be used to measure net weight gain from each impinger to determine moisture gain.

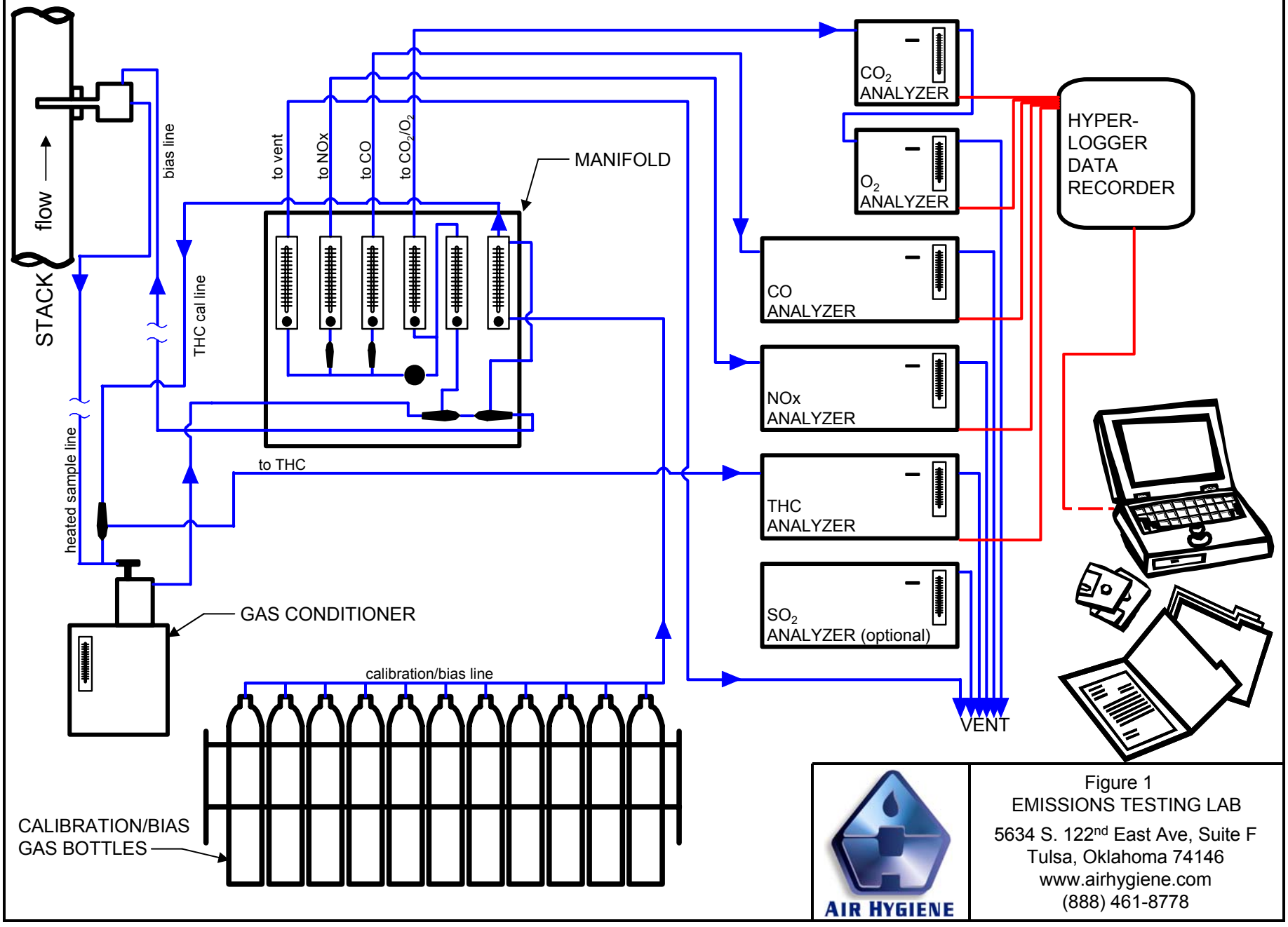

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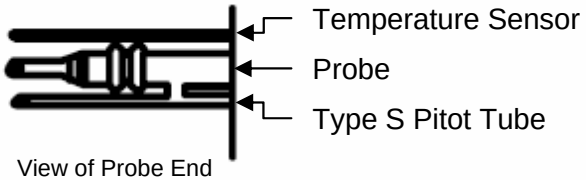
Figure 1
EMISSIONS TESTING LAB

5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
www.airhygiene.com
(888) 461-8778



View of Probe End
(from the bottom)

Wet Chemistry Assembly
(photo)

Temperature Sensor

Temperature Sensor

Stack Wall

Liner
(glass, stainless steel, or inconel)

Probe Housing
(heated opt.)

could add more impingers or other components to system

Temperature Sensor

Impingers

Nozzle

Type S Pitot Tube

Glass Filter Holder

Ice Water Bath

Vacuum Line

Heated Area

Oil-Filler Manometer

Hot Box

Filled with water or other various chemicals to cause capture of condensed liquid or reaction with target compounds

Cold Box

Vacuum Gauge

Temperature Sensor

Temperature Sensor

Orifice

By-pass Valve

Main Valve

Dry Gas Meter

Air-Tight Pump

Oil-Filler Manometer

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Figure 2
WET CHEMISTRY ASSEMBLY

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TABLE #1: TESTING MATRIX

Target Emission	EPA Test Method	Location	Test Length
O_2	3a	Inlet / Outlet	3, 60 minute runs [inlet] 3, 60 minute runs [outlet]
SO_2	6c	Inlet / Outlet	3, 60 minute runs [inlet] 3, 60 minute runs [outlet]
NOx	7e	Outlet	3, 60 minute runs
CO	10	Inlet / Outlet	3, 60 minute runs [inlet] 3, 60 minute runs [outlet]
CO_2	3a	Inlet / Outlet	3, 60 minute runs [inlet] 3, 60 minute runs [outlet]
PM (front half filterable)	5	Outlet	3, 150-minute runs
PM_{10} (back half condensable)	202	Outlet	3, 150-minute runs
Opacity	9	Outlet	3, 60-minute runs
Hg	Ontario Hydro	Outlet	3, 120-minute runs
HCl	26/26a	Inlet / Outlet	3, 60 minute runs [inlet] 3, 60 minute runs [outlet]
Dioxins/Furans	23	Outlet	3, 240-minute runs

TABLE #2: ANALYTICAL INSTRUMENTATION

Parameter	Model and Manufacturer	Common Use Ranges	Sensitivity	Detection Principle
NOx	API 200AH or equivalent	User may select up to 5,000 ppm	0.1 ppm	Thermal reduction of NO_2 to NO Chemilumines-cence of reaction of NO with O_3. Detection by PMT. Inherently linear for listed ranges.
SO_2	Ametek 721M or equivalent	User may select up to 10,000 ppm	0.1 ppm	Ultraviolet
CO	TECO 48C or equivalent	0-10,000 ppm	0.1 ppm	Infrared absorption, gas filter correlation detector, microprocessor based linearization.
CO_2	Servomex or equivalent	0-20%	0.1%	Nondispersive infrared
O_2	Servomex or equivalent	0-25%	0.1%	Oxygen - Paramagnetic cell

TABLE #3: ANALYTICAL INSTRUMENTATION TESTING CONFIGURATION

Parameter	Sample Methodology	Example Range	Sensitivity	Calibration Gases (based on example range)
NOx	7e	0-500 ppm	0.1 ppm	Zero = 0 ppm nitrogen Mid = 200 – 300 ppm High = 500 ppm
SO_2	6c	0-200 ppm	0.1 ppm	Zero = 0 ppm nitrogen Mid = 80 – 120 ppm High = 200 ppm
CO	10	0-200 ppm	0.1 ppm	Zero = 0 ppm nitrogen Mid = 80 – 120 ppm High = 200 ppm
CO_2	3a	0-20%	0.1%	Zero = 0 ppm nitrogen Mid = 8 – 12% High = 20%
O_2	3a	0-21%	0.1%	Zero = 0 ppm nitrogen Mid = 8.4 – 12.6% High = 21%

APPENDIX C
STACK DRAWINGS

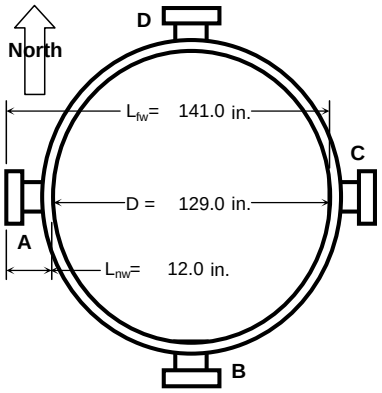
METHOD 1 - ISOKINETIC TRAVERSE FOR A CIRCULAR SOURCE

Company	SNC - Lavalin	**Date**	2007
Plant Name	Fibrominn Biomass Power Plant	**Project #**	snc-07-benson.mn-comp#1
Equipment	Biomass Boiler, SDA Inlet	**# of Ports Available**	4
Location	Benson, Minnesota	**# of Ports Used**	4

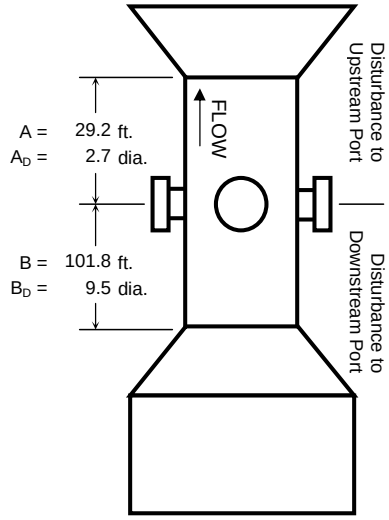
Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	141.00	in.
Distance to Near Wall of Stack	(L_{nw})	12.00	in.*
Diameter of Stack	(D)	129.00	in.
Area of Stack	(A_s)	90.76	ft^2

*assume 12 in. reference

Distance from Disturbances to Port			
Distance Upstream	(A)	350.00	in.
Diameters Upstream	(A_D)	2.71	diameters
Distance Downstream	(B)	1222.00	in.
Diameters Downstream	(B_D)	9.47	diameters



Number of Traverse Points Required					
Diameters to Flow Disturbance		**Minimum Number of[1] Traverse Points**		Minimum Number of Traverse Points	
Down (B_D) Stream	**Up (A_D) Stream**	**Particulate Points**	Velocity Points	Comp Stratification Criteria	Points
2.00-4.99	0.50-1.24	24	16	☐ RM 7E 8.1.2	12 RM1 pts
5.00-5.99	1.25-1.49	20	16	☐ Alt 7E 8.1.2	3 points
6.00-6.99	1.50-1.74	16	12	12 points	
7.00-7.99	1.75-1.99	12	12		
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]	Minimum Number of Traverse Points	
Upstream Spec		12	12	RATA Stratification	
Downstream Spec		12	12	Criteria	Points
Traverse Pts Required		12	12	☐ Part75/60	12 RM1 pts
[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.				☐ 75 abrv (a)	3 points
[2] 8 for Circular Stacks 12 to 24 inches 12 for Circular Stacks over 24 inches				☐ 75 abrv (b)	6 points
				12 points	



Number of Traverse Points Used				
4	**Ports by**	3	**Pts / port**	**Isokinetic Traverse (Wet Chemistry**
12	**Pts Used**	12	**Required**	

Traverse Point Locations			
Traverse Point Number	**Percent of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
	%	in.	in.
1	4.4%	5 5/8	17 5/8
2	14.6%	18 7/8	30 7/8
3	29.6%	38 1/8	50 1/8
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
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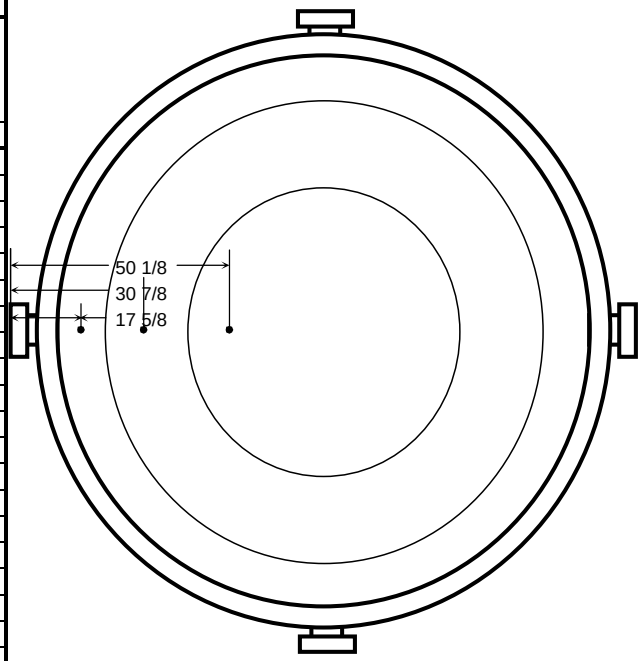
23			
24			



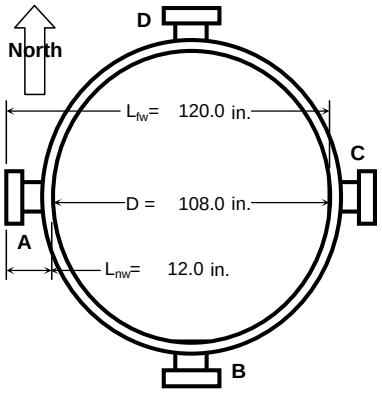
METHOD 1 - ISOKINETIC TRAVERSE FOR A CIRCULAR SOURCE

Company	SNC - Lavalin	**Date**	2007
Plant Name	Fibrominn Biomass Power Plant	**Project #**	snc-07-benson.mn-comp#1
Equipment	Biomass Boiler, Stack Exhaust	**# of Ports Available**	4
Location	Benson, Minnesota	**# of Ports Used**	4

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	120.00	in.
Distance to Near Wall of Stack	(L_{nw})	12.00	in.*
Diameter of Stack	(D)	108.00	in.
Area of Stack	(A_s)	63.62	ft^2

*assume 12 in. reference

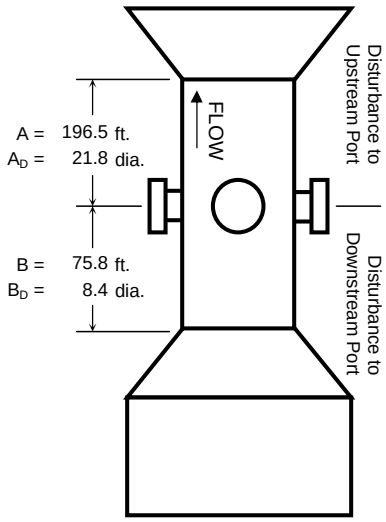
Distance from Disturbances to Port			
Distance Upstream	(A)	2358.00	in.
Diameters Upstream	(A_D)	21.83	diameters
Distance Downstream	(B)	910.00	in.
Diameters Downstream	(B_D)	8.43	diameters



Number of Traverse Points Required					
Diameters to Flow Disturbance		**Minimum Number of[1] Traverse Points**		Minimum Number of Traverse Points	
Down (B_D) Stream	**Up (A_D) Stream**	**Particulate Points**	Velocity Points	Comp Stratification Criteria	Points
2.00-4.99	0.50-1.24	24	16	☐ RM 7E 8.1.2	12 RM1 pts
5.00-5.99	1.25-1.49	20	16	☐ Alt 7E 8.1.2	3 points
6.00-6.99	1.50-1.74	16	12	12 points	
7.00-7.99	1.75-1.99	12	12		
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]	Minimum Number of Traverse Points	
Upstream Spec		12	12		
Downstream Spec		12	12	RATA Stratification	
Traverse Pts Required		12	12	Criteria	Points
				☐ Part75/60	12 RM1 pts
				☐ 75 abrv (a)	3 points
				☐ 75 abrv (b)	6 points
				12 points	

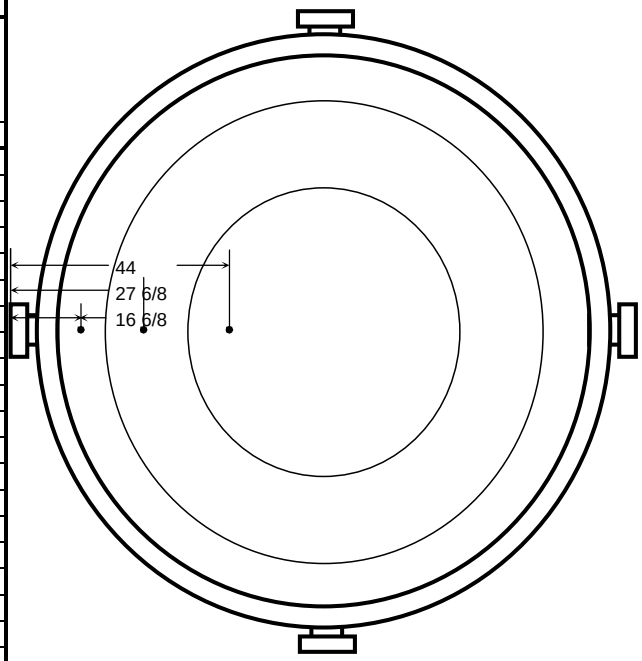
[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches



Number of Traverse Points Used				
4	**Ports by**	3	**Pts / port**	**Isokinetic Traverse (Wet Chemistry**
12	**Pts Used**	12	**Required**	

Traverse Point Locations			
Traverse Point Number	**Percent of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
	%	in.	in.
1	4.4%	4 6/8	16 6/8
2	14.6%	15 6/8	27 6/8
3	29.6%	32	44
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			



APPENDIX D
EXAMPLE TEMPLATES AND CALCULATIONS

SINGLE LOAD TEST - FIELD DATA SHEET

AIR HYGIENE

Company:		
Location:		
Date:		
Unit Make and Model:		
Unit Number:		
Serial Number:		
Data Recorded By:		
Tested With AHI Unit(s):	Truck(s):	Trailer(s):
LDEQ Warmup/Cal Req:	On (Day/Time):	Cal (Day/Time):

CYLINDER SERIAL NUMBERS		O_2	NOx	CO
	Low			
	Mid			
	High			

CYLINDER SERIAL NUMBERS		THC	CO_2	SO_2
	Low			
	Mid			
	High			

RUN INFORMATION	Load		
	_____% #1	_____% #2	_____% #3
Time Start (hh:mm:ss)			
Time Stop (hh:mm:ss)			
Rated Power (MW or hp)			
Actual Power (MW or hp)			
Barometric Pressure (in. Hg)			
Ambient Temperature (^oF)			
Relative Humidity (%)			
Fuel Flow (lb/min)			
Fuel Flow (SCF/hr)=(lb/min)*21.7			
Specific Humidity (gr/lb)			
Spec. Hum. (lb H_2O/lb air)=(gr/lb)/7000			
PCD (psi)			
PCD (mm Hg)=(psi+14.24)*51.71493			
NOx Water Injection (gpm)			

NO_2 CONVERSION	
NO_2 Gas (ppm)	
NO Reading (ppm)	
NOx Reading (ppm)	
Cylinder Num	

REPORT INFORMATION		
	INSTRUMENT	SERIAL #
O_2		
NOx		
CO		
THC		
CO_2		
SO_2		

RESPONSE TIME		
	TIME (hh:mm)	RESP (min)
1st Gas Inject		
1st Inst. @ 95%		
2nd Inst. @ 95%		
3rd Inst. @ 95%		
2nd Gas Inject		
1st Inst. @ 95%		
2nd Inst. @ 95%		
3rd Inst. @ 95%		
3rd Gas Inject		
1st Inst. @ 95%		
2nd Inst. @ 95%		
3rd Inst. @ 95%		

CALIBRATION	O_2		NOx		CO		THC		CO_2		SO_2	
	Conc.	Actual	Conc.	Actual	Conc.	Actual	Conc.	Actual	Conc.	Actual	Conc.	Actual
Zero Gas												
Low Gas												
Mid Gas												
High Gas												

BIAS	O_2		NOx		CO		THC		CO_2		SO_2	
	Zero	Mid	Zero	Mid	Zero	Mid	Zero	Mid	Zero	Mid	Zero	Mid
Initial Run #1												
Run #1 / Run #2												
Run #2 / Run #3												
Run #3 / Final												

Bias Gas Actual Conc. _____ _____ _____ _____ _____ _____

VISUAL EMISSIONS OBSERVATION FORM

Method Used (Circle One)
Method 9 203A 203B Other: _____

Company Name

Facility Name

Street Address

City State Zip

Process Unit # Operating Mode

Control Equipment Operating Mode

Describe Emissions Pont

Height of Emiss. Pt. Start End
Height of Emiss. Pt. Rel. to Observer Start End

Distance to Emiss. Pt. Start End
Direction to Emiss. Pt. (Degrees) Start End

Vetical Angle to Obs. Pt. Start End
Direction to Obs. Pt. (Degrees) Start End

Distance and Direction to Observation Point from Emission Point Start End

Describe Emissions Start End

Emission Color Start End
Water Droplet Plume Start End

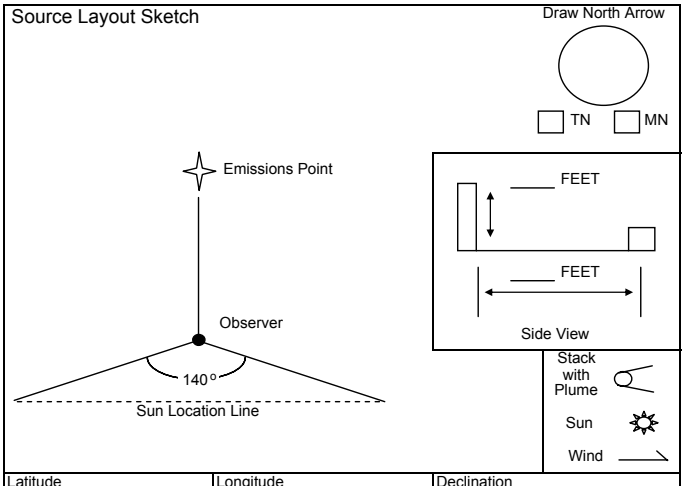
Describe Plume Background Start End

Background Color Start End
Sky Conditions Start End

Wind Speed Start End
Wind Direction Start End

Ambient Temp. Start End
Wet Bulb Temp.
RH Percent

Source Layout Sketch



Latitude | Longitude | Declination

Additional Information

Form Number Page of

Continued on Form Number

Observation Date | Time Zone | Start Time | End Time

Min. \ Sec.	0	15	30	45	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

Observer's Name (Print)

Observer's Signature Date

Organization

Certified By Date

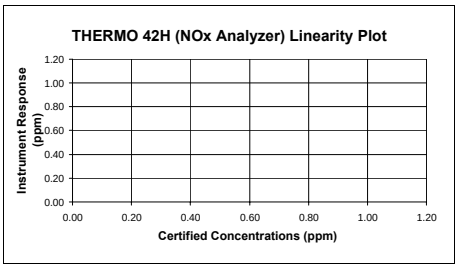
Air Permit # :	
Plant Name or Location:	
Date:	
Project Number:	
Manufacturer & Equipment:	
Model:	
Serial Number:	
Unit Number:	
Test Load:	
Tester(s) / Test Unit(s):	

		RUN																
	UNITS	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Start Time	hh:mm:ss																		
End Time	hh:mm:ss																		
Bar. Pressure	in. Hg																		
Amb. Temp.	°F																		
Rel. Humidity	%																		
Spec. Humidity	lb water / lb air																		
Comb. Inlet Pres.	psig																		
NOx Water Inj.	gpm																		
Total Fuel Flow	SCFH																		
Heat Input	MMBtu/hr																		
Power Output	megawatts																		
Steam Rate	lb/hr																		

Calibration Date:
Client:

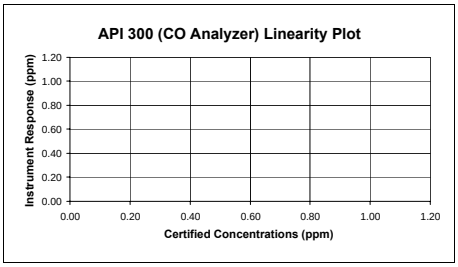
NOx Span (ppm) =

THERMO 42H (NOx Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
Linearity =				



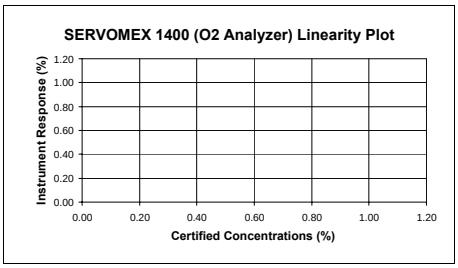
CO Span (ppm) =

API 300 (CO Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
Linearity =				



O2 Span (%) =

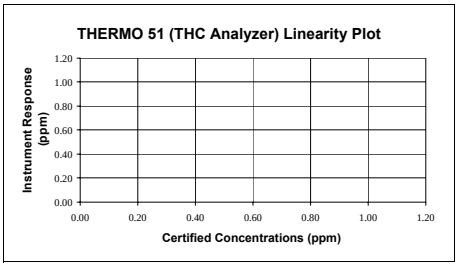
SERVOMEX 1400 (O_2 Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5%)
Linearity =				



THC Range (ppm) =

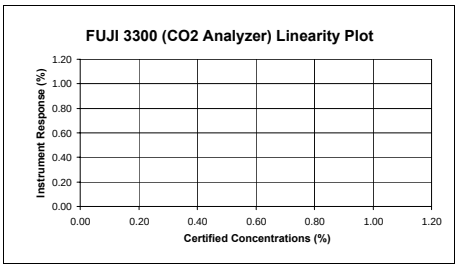
THERMO 51 (THC Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Estimated Point (ppm)	Pass or Fail (±2,5%)[1]
Linearity =				

[1]-zero/high based on 2% of spanlow/mid based on 5% of concentration



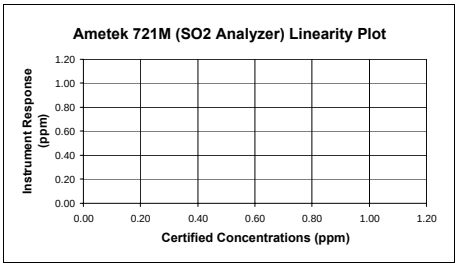
CO2 Span (%) =

FUJI 3300 (CO_2 Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5%)
Linearity =				



SO2 Span (ppm) =

Ametek 721M (SO_2 Analyzer)				
Certified Concentration (ppm)	Instrument Response (ppm)	Calibration Error (%)	Absolute Conc. (ppm)	Pass or Fail (±2%, ≤0.5ppm)
Linearity =				



NOx Converter Efficiency

Date:

Analyzer:

RM 7E, (08-15-06), 8.2.4.1 Introduce a concentration of 40 to 60 ppmv NO_2 to the analyzer in direct calibration mode and record the NOx concentration displayed by the analyzer. ... Calculate the converter efficiency using Equation 7E-7 in Section 12.7. The specification for converter efficiency in Section 13.5 must be met. ... The NO_2 must be prepared according to the EPA Traceability Protocol and have an accuracy within 2.0 percent.

Audit Gas: NO_2 Concentration (C_v), ppmvd

Converter Efficiency Calculations:

Analyzer Reading, NO Channel, ppmvd

Analyzer Reading, NOx Channel, ppmvd

Analyzer Reading, NO_2 Channel ($C_{Dir(NO2)}$), ppmvd

Converter Efficiency, %

RM 7E, (08-15-06), 13.5 NO2 to NO Conversion Efficiency Test (as applicable). The NO2 to NO conversion efficiency, calculated according to Equation 7E-7 or Equation 7E-9, must be greater than or equal to 90 percent.

$$Eff_{NO2} = \left(\frac{C_{Dir}}{C_V} \right) \times 100$$

Eq. 7E-7 = $\frac{\text{ppmvd}}{\text{ppmvd}}$ x 100 =

Date/Time	Elapsed Time	NOx	NO
mm/dd/yy hh:mm:ss	Seconds	ppmvd	ppmvd

Fuel Data

Fuel F_d factor		SCF/MMBtu
Fuel Heating Value (HHV)		Btu/SCF

Weather Data

Barometric Pressure		in. Hg
Relative Humidity		%
Ambient Temperature		^{o}F
Specific Humidity		lb H_2O / lb air

Unit Data

Unit Load		megawatts
Heat Input		lb/MMBtu
Steam Rate		Steam lb/hr
Combustor Inlet Pres.		psig
NOx Control Water Injection		gpm
Est. Stack Moisture		%
Stack Exhaust Flow (M2)		SCFH
Stack Exhaust Flow (M19)		SCFH

Run - 1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)

RAW AVERAGE

	Serial Number:	O_2 (%)	NOx (ppmvd)	CO (ppmvd)
Bias	Initial Zero			
	Final Zero			
	Avg. Zero			
	Initial UpScale			
	Final UpScale			
	Avg. UpScale			

Upscale Cal Gas

EMISSIONS DATA	O_2	NOx	CO
Corrected Raw Average (ppm/% dry basis)			
Corrected Raw Average (ppm/% wet basis)			
Concentration (ppm@ %O_2)			
Concentration (ppm@ %O_2 &ISO)			
Emission Rate (lb/hr)			
Emission Rate (tons/day) at 24 hr/day			
Emission Rate (tons/year) at 8760 hr/yr			
Emission Rate (lb/MMBtu)			
Emission Rate (g/hp*hr)			

DRIFT AND BIAS CHECK			
Run - 1	**O2**	**NOx**	**CO**
Raw Average			
Corrected Average			
Initial Zero			
Final Zero			
Avg. Zero			
Initial UpScale			
Final UpScale			
Avg. UpScale			
Sys Resp (Zero)			
Sys Resp (Upscale)			
Upscale Cal Gas			
Initial Zero Bias			
Final Zero Bias			
Zero Drift			
Initial Upscale Bias			
Final Upscale Bias			
Upscale Drift			
Alternative Specification Abs Diff **Initial Zero**			
Alternative Specification Abs Diff **Final Zero**			
Alternative Specification Abs Diff **Initial Upscale**			
Alternative Specification Abs Diff **Final Upscale**			
Calibration Span			
3% of Range (drift)			
5% of Range (bias)			

DRIFT AND BIAS CHECK			
Run - 2	**O2**	**NOx**	**CO**
Raw Average			
Corrected Average			
Initial Zero			
Final Zero			
Avg. Zero			
Initial UpScale			
Final UpScale			
Avg. UpScale			
Sys Resp (Zero)			
Sys Resp (Upscale)			
Upscale Cal Gas			
Initial Zero Bias			
Final Zero Bias			
Zero Drift			
Initial Upscale Bias			
Final Upscale Bias			
Upscale Drift			
Alternative Specification Abs Diff **Initial Zero**			
Alternative Specification Abs Diff **Final Zero**			
Alternative Specification Abs Diff **Initial Upscale**			
Alternative Specification Abs Diff **Final Upscale**			
Calibration Span			
3% of Range (drift)			
5% of Range (bias)			

TABLE A.2
LOAD 1 DATA SUMMARY

Parameter	Run - 1	Run - 2	Run - 3	Average
Start Time (hh:mm:ss)				
End Time (hh:mm:ss)				
Run Duration (min)				
Bar. Pressure (in. Hg)				
Amb. Temp. (°F)				
Rel. Humidity (%)				
Spec. Humidity (lb water / lb air)				
Turbine Fuel Flow (SCFH)				
Stack Flow (RM19) (SCFH)				
Power Output (megawatts)				
NOx (ppmvd)				
NOx (lb/hr)				
NOx (lb/MMBtu)				
NOx (g/hp*hr)				
CO (ppmvd)				
CO (lb/hr)				
CO (lb/MMBtu)				
CO (g/hp*hr)				
O_2 (%)				

TABLE A.3
LOAD 2 DATA SUMMARY

Parameter	Run - 4	Run - 5	Run - 6	Average
Start Time (hh:mm:ss)				
End Time (hh:mm:ss)				
Run Duration (min)				
Bar. Pressure (in. Hg)				
Amb. Temp. (°F)				
Rel. Humidity (%)				
Spec. Humidity (lb water / lb air)				
Turbine Fuel Flow (SCFH)				
Stack Flow (RM19) (SCFH)				
Power Output (megawatts)				
NOx (ppmvd)				
NOx (lb/hr)				
NOx (lb/MMBtu)				
NOx (g/hp*hr)				
CO (ppmvd)				
CO (lb/hr)				
CO (lb/MMBtu)				
CO (g/hp*hr)				
O_2 (%)				

EXAMPLE CALCULATIONS (INFORMATION)

Specific Humidity (RH_{sp})

Note: RHsp (gr/lb) calculated using temperature, relative humidity, and barometric pressure with psychrometric chart, psychrometric calculator, or built in psychrometric algorithm.

$$RH_{sp}(lb/lb) = \left[\left(\frac{gr}{lb}\right) \times \frac{lb}{7000\ gr}\right]$$

RH_{sp}= $\frac{\text{gr}}{\text{lb}}$ x $\frac{\text{l lb}}{\text{7000 gr}}$ = $\frac{\text{lb } H_2O}{\text{lb Air}}$

Fuel Flow Conversion (Q_f)

Note: Qf(lb/min) is a value uptained from the source operator.

$$Q_f = \left[Q_f \times G \times \left(\frac{1}{MW_{Fuel}}\right)\right]$$

Q_f = $\frac{\text{lb}}{\text{min}}$ x $\frac{\text{60 min}}{\text{hr}}$ x $\frac{\text{ft}^3}{\text{lb-mol}}$ x $\frac{\text{lb-mol}}{\text{lb}}$ = SCFH

Combustor Inlet Pressure / Compressor Discharge Pressure (CIP / CDP)

(corrected from gauge to atmospheric pres. and conv. to mm Hg.)

Note: CIP / CDP (psig) is a value obtained from the source operator.

$$CIP/CDP = \left[(psig + P) \times \frac{51.71493\ mmHg}{1\ psi}\right]$$

CIP / CDP = (psig +) x $\frac{\text{51.71493 mmHg}}{\text{1 psia}}$ = mmHg (abs)

Heat Rate (MMBtu/hr)

$$HR = \frac{HHV_{DRY} \times Q_f}{1{,}000{,}000}$$

Heat Rate = $\frac{\text{Btu}}{\text{SCF}}$ x $\frac{\text{SCF}}{\text{hr}}$ x $\frac{\text{MMBtu}}{10^6\ \text{Btu}}$ = $\frac{\text{MMBtu}}{\text{hr}}$

Estimated Stack Gas Moisture Content (B_{ws})

$$B_{ws}(\%) = \frac{2 \times Q_f}{Q_s} \times 100$$

B_{ws} = 2 x $\frac{\text{SCF}}{\text{hr}}$ x $\frac{\text{hr}}{\text{SCF}}$ x 100 = %

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (CALIBRATION)

Analyzer Calibration Error

RM 7E, (08-15-06), 12.2 Analyzer Calibration Error. For non-dilution systems, use Equation 7E-1 to calculate the analyzer calibration error for the low-, mid-, and high-level calibration gases. (calc for analyzer mid gas, if applicable)

$$ACE = \left(\frac{C_{Dir} - C_V}{CS}\right) \times 100$$ Eq. 7E-1

ACE = $\frac{\text{ppm - ppm}}{\text{ppm}}$ x 100 = %

Calibration Error and Estimated Point, RM 25A, THC Analyzer

RM 25A, (07-19-06), 8.4 Calibration Error Test. Immediately prior to the test series (within 2 hours of the start of the test), introduce zero gas and high-level calibration gas at the calibration valve assembly. Adjust the analyzer output to the appropriate levels, if necessary. Calculate the predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level response. Then introduce low-level and mid-level calibration gases successively to the measurement system. ... These differences must be less than 5 percent of the respective calibration gas value. (calc for THC analyzer mid gas, if applicable)

$$E_P = \frac{C_{Dir(H)} - C_{Dir(Z)}}{C_{V(H)} - C_{V(Z)}} \times C_{Dir(M)} + C_{Dir(Z)}$$

Eq. of a line y=mx+b

E_p = $\frac{\text{ppm - ppm}}{\text{ppm - ppm}}$ x ppm + = ppm

$$ACE = \left(\frac{C_{Dir} - C_V}{CS}\right) \times 100$$ Eq. 7E-1

ACE_{THC} = $\frac{\text{ppm - ppm}}{\text{ppm}}$ x 100 = %

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (BIAS, DRIFT, AND CORRECTED RAW AVERAGE)

System Bias

RM 7E, (08-15-06), 12.3 System Bias. For non-dilution systems, use Equation 7E-2 to calculate the system bias separately for the low-level and upscale calibration gases. (calc for analyzer upscale gas, Run 1 initial bias, if applicable)

$$SB = \left(\frac{C_S - C_{Dir}}{CS}\right) \times 100$$ Eq. 7E-2

SB = (ppm - ppm) / ppm x 100 = %

Drift Assessment

RM 7E, (08-15-06), 12.5 Drift Assessment. Use Equation 7E-4 to separately calculate the low-level and upscale drift over each test run. (calc for analyzer upscale drift, Run 1, if applicable)

$$D = \left|SB_{final} - SB_i\right|$$ Eq. 7E-4

D = | % - % | = %

Alternative Drift and Bias

RM 7E, (08-15-06), 13.2 / 13.3 System Bias and Drift. Alternatively, the results are acceptable if |Cs – Cdir| is ≤ 0.5 ppmv or if |Cs – Cv| is ≤ 0.5 ppmv (as applicable). (calc for analyzer initial upscale, Run 1, if applicable)

$$SB / D_{Alt} = \left|C_S - C_{Dir}\right|$$ Eq. Section 13.2 and 13.3

SB / D_{Alt} = | ppm - ppm | = ppm

Bias Adjusted Average

RM 7E, (08-15-06), 12.6 Effluent Gas Concentration. For each test run, calculate Cavg, the arithmetic average of all valid concentration values (e.g., 1-minute averages). Then adjust the value of Cavg for bias, using Equation 7E-5. (calc for analyzer, Run 1, if applicable)

$$C_{Gas} = \left(C_{Avg} - C_O\right) \times \left(\frac{C_{MA}}{C_M - C_O}\right)$$ Eq. 7E-5

C_{Gas} = (ppm - ppm) x (ppm / (ppm - ppm)) = ppm

EXAMPLE CALCULATIONS (BSFC)

Using LHV with Q_f (Btu/hp*hr)

$$BSFC\ (Btu / hp \cdot hr) = Q_f$$

BSFC = Btu / hp*hr = Btu / hp*hr

Using HHV with Q_f (SCFH)

$$BSFC\ (Btu / hp \cdot hr) = \frac{HHV \times Q_f}{bhp}$$

BSFC = Btu / SCF x SCF / hr x 1 / hp = Btu / hp*hr

Using LHV with Q_f (SCFH)

$$BSFC\ (Btu / hp \cdot hr) = \frac{LHV \times Q_f}{bhp}$$

BSFC = Btu / SCF x SCF / hr x 1 / hp = Btu / hp*hr

Using HHV with Q_f (Btu/hp*hr)

$$BSFC\ (Btu / hp \cdot hr) = \frac{Q_f \times HHV}{LHV}$$

BSFC = N/A Btu / hp*hr x Btu / SCF x scf / Btu = Btu / hp*hr

EXAMPLE CALCULATIONS (Emissions based on Table 29 values)

Emission Rate (lb/hr)
Q_f (Btu/hp*hr))

$$E(lb / hr) = \frac{E_{g/hp \cdot hr} \times bhp}{453.6}$$

E (lb/hr) = g / hp*hr x lb / 453.6 g x hp = lb / hr

Emission Rate (g/hp-hr)
Q_f (Btu/hp*hr))

$$E\ (g / hp \cdot hr) = CRA \times Q_f \times FFactor \times MW \times \frac{1}{10^6} \times \frac{1}{10^6} \times \frac{453.6}{G} \times \frac{20.9\%}{20.9\% - CRA_{O_2}}$$

E (g/hp-hr) = ppm x Btu / hp*hr x SCF / MMBtu x lb / lb-mol x 1 parts / 10^6 ppm x 1 MMBtu / 10^6 Btu x 453.6 g / lb x lb-mol / SCF x 20.9% / (20.9% - %) = g / hp*hr

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (RUNS)

Stack Exhaust Flow (Q_S) - RM19

$$Q_S = \left(\frac{FFactor \times Q_f \times HHV}{1{,}000{,}000}\right) \times \left(\frac{20.9\%}{20.9\% - C_{Gas(O2)}}\right)$$

Q_S = SCF/MMBtu x SCF/hr x Btu/SCF x MMBtu/10^6 Btu x [20.90% / (20.9% - %)] = SCFH

NO_2 Conversion Efficiency Correction

RM 7E, (08-15-06), 12.8 NO2 - NO Conversion Efficiency Correction. If desired, calculate the total NOX concentration with a correction for converter efficiency using Equations 7E-8. (calc for non-bias corrected (raw) NOx gas, Run 1, if applicable)

$$NOx_{Corr} = NO + \frac{NOx - NO}{Eff_{NO2}} \times 100$$ Eq. 7E-8

NOx_{Corr} = ppm + (ppm - ppm) / % x 100 = ppm

Moisture Correction

RM 7E, (08-15-06), RM7E, (08-15-06), 12.10 Moisture Correction. Use Equation 7E-10 if your measurements need to be corrected to a dry basis. (calc for THC analyzer, Run 1, if applicable) Note: Calculations may not match as Run 1 results are typically also bias adjusted

$$C_D = \frac{C_W}{1 - B_{WS}}$$ Eq. 7E-10

C_D = ppmvw / (1 -) = ppmvd

Diluent-Corrected Polutant Concentration, O_2 Based

RM 20, (11-26-02), 7.3.1 Correction of Pollutant Concentration Using O2 Concentration. Calculate the O2 corrected pollutant concentration, as follows: (calc for gas, Run 1, if applicable)

$$C_{adj} = C_{Gas(T\,arget)} \times \left(\frac{20.9\% - AdjFactor}{20.9\% - C_{Gas(O2)}}\right)$$ Eq. 20-4

C_{adj} = ppm x [20.9% - % / 20.9% - %] = ppm@%O_2

Diluent-Corrected Polutant Concentration, CO_2 Based

RM 20, (11-26-02), 7.3.2 Correction of Pollutant Concentration Using CO2 Concentration. Calculate the CO2 corrected pollutant concentration, as follows: (calc for gas, Run 1, if applicable)

$$C_{adj} = C_{Gas(T\,arget)} \times \frac{X_{CO2}}{C_{Gas(CO2)}}$$ Eq. 20-5

C_{adj} = ppm x % / % =

7.2 CO_2 Correction Factor. If pollutant concentrations are to be corrected to percent O_2 and CO_2 concentration is measured in lieu of O_2 concentration measurement, a CO_2 correction factor is needed. Calculate the CO_2 correction factor as follows: 7.2.1 Calculate the fuel specific F_o, as follows:

$$F_0 = \frac{0.209\,F_d}{F_c}$$ Eq. 20-2

F_0 = 0.209 x SCF/MMBtu / SCF/MMBtu =

7.2.2. Calculate the CO_2 correction factor for correcting measurement data to percent oxygen, as follows:

$$X_{CO2} = \frac{20.9\% - AdjFactor}{F_0}$$ Eq. 20-3

X_{CO2} = 20.9% - % = %

Diluent-Corrected Polutant Concentration Corrected to ISO Conditions

40CFR60.335(b)(1), Conversion for conc. at ISO Conditions (68°F, 1 atm). Calculate, as follows: (calc for @% with Run 1 data, if applicable)

$$C_{ISO} = C_{Adj} \times \sqrt{\frac{P_r}{P_o}} \times e^{(19 \times (H_O - 0.00633))} \times \left(\frac{288}{T_a}\right)^{1.53}$$

C_{ISO} = ppm@%O_2 x $\sqrt{}$ (psig + 14.69232 psi) / 0.01933677 psi/mm Hg. / (psig + psi) / 0.01933677 psi/mm Hg. x 2.718 (19x(lb/lb-0.00633)) x [288 K / K]$^{1.53}$ = ppm@% and ISO

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (RUNS)

Emissions Rate (lb/hr)

Calculation for pound per hour emission rate. Calculate, as follows: (calc for gas Run 1, if applicable)

$$E_{lb/hr} = \frac{C_{Gas}}{10^6} \times \frac{Q_S \times MW}{G}$$

$$E_{lb/hr} = \frac{\text{ppm}}{10^6 \text{ ppm/part}} \text{ x } \frac{\text{SCFH x lb/lb-mol}}{\text{SCF/lb-mol}} = \frac{\text{lb}}{\text{hr}}$$

Emissions Rate (ton/year)

Calculation for tons per year emission rate based on 8760 hours per year. Calculate, as follows: (calc for gas Run 1, if applicable)

$$E_{ton/yr} = \frac{E_{lb/hr} \times hr_{year}}{2000}$$

$$E_{ton/yr} = \frac{\text{lb}}{\text{hr}} \text{ x } \frac{\text{hr}}{\text{year}} \text{ x } \frac{\text{ton}}{\text{2000 lb}} = \frac{\text{ton}}{\text{year}}$$

Emissions Rate (lb/MMBtu)

RM 19, (07-19-06), 12.2 Emission Rates of PM, SO2, and NOx. Select from the following sections the applicable procedure to compute the PM, SO2, or NOx emission rate (E) in ng/J (lb/million Btu). (calc for gas Run 1, if applicable)

Oxygen Based

12.2.1 Oxygen-Based F Factor, Dry Basis. When measurements are on a dry basis for both O_2 (%O_2d) and pollutant (Cd) concentrations, use the following equation:

$$E_{lb/MMBtu} = \frac{C_{Gas} \times F_d Factor \times Conv_C \times 20.9\%}{20.9\% - C_{Gas(O2)}} \qquad \text{Eq. 19-1}$$

$$E_{lb/MMBtu} = \frac{\text{ppm x SCF/MMBtu x lb/ppm*ft}^3 \text{ x 20.9\%}}{\text{20.9\% - \%}} = \frac{\text{lb}}{\text{MMBtu}}$$

Carbon Dioxide Based

12.2.4 Carbon Dioxide-Based F Factor, Dry Basis. When measurements are on a dry basis for both CO_2 (%CO_2d) and pollutant (Cd) concentrations, use the following equation:

$$E_{lb/MMBtu} = \frac{C_{Gas} \times F_d Factor \times Conv_C \times 100\%}{C_{Gas(CO2)}} \qquad \text{Eq. 19-6}$$

$$E_{lb/MMBtu} = \frac{\text{ppm x SCF/MMBtu x lb/ppm*ft}^3 \text{ x 100\%}}{\text{\%}} = \frac{\text{lb}}{\text{MMBtu}}$$

Conversion Constant

Convc for

$$Conv_c(lb/ppm \cdot ft^3) = \frac{\frac{MW}{G}}{10^6}$$

$$Conv_c = \frac{\text{lb}}{\text{lb•mole}} \text{ x } \frac{\text{lb•mole}}{\text{SCF}} = \frac{\text{lb}}{\text{ppm-ft}^3}$$

Sulfur Dioxide Rate (lb/MMBtu), 40CFR60, App. A, RM 19, Eq. 19-25 (11/20/03)

$$SO_2(lb/MMBtu) = 0.97 \times K \times \frac{S(wt\%)}{GCV}$$

$$SO_2 = 0.97 \text{ x } \frac{\text{2x10}^4 \text{ Btu}}{\text{wt\%•MMBtu}} \text{ x } \frac{\text{wt\%}}{\text{Btu/lb}} = \frac{\text{lb}}{\text{MMBtu}}$$

Emissions Rate (g/hp-hr)

Calculation for grams per horsepower-hour. Calculate, as follows: (calc for gas Run 1, if applicable)

$$E_{g/hp \cdot hr} = \frac{E_{lb/hr} \times 453.6}{mw \times 1314.022} \; or \; \frac{E_{lb/hr} \times 453.6}{hp}$$

$$E_{g/hp-hr} = \frac{\text{lb}}{\text{hr}} \text{ x } \frac{\text{453.6 g}}{\text{lb}} \text{ x } \frac{\text{1}}{\text{mw}} \text{ x } \frac{\text{mw}}{\text{1314.022 hp}} = \frac{\text{g}}{\text{hp*hr}}$$

$$E_{g/hp-hr} = \frac{\text{lb}}{\text{hr}} \text{ x } \frac{\text{453.6 g}}{\text{lb}} \text{ x } \frac{\text{1}}{\text{hp}} = \frac{\text{g}}{\text{hp*hr}}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

RM 7E, (08-15-06), 12.1 Nomenclature. The terms used in the equations are defined as follows:

ACE = Analyzer calibration error, percent of calibration span.
B_{WS} = Moisture content of sample gas as measured by Method 4 or other approved method, percent/100.
C_{Avg} = Average unadjusted gas concentration indicated by data recorder for the test run.
C_D = Pollutant concentration adjusted to dry conditions.
C_{Dir} = Measured concentration of a calibration gas (low, mid, or high) when introduced in direct calibration mode.
C_{Gas} = Average effluent gas concentration adjusted for bias.
C_M = Average of initial and final system calibration bias (or 2-point system calibration error) check responses for the upscale calibration gas.
C_{MA} = Actual concentration of the upscale calibration gas, ppmv.
C_O = Average of the initial and final system calibration bias (or 2-point system calibration error) check responses from the low-level (or zero) calibration gas.
C_S = Measured concentration of a calibration gas (low, mid, or high) when introduced in system calibration mode.
C_{SS} = Concentration of NOx measured in the spiked sample.
C_{Spike} = Concentration of NOx in the undiluted spike gas.
C_{Calc} = Calculated concentration of NOx in the spike gas diluted in the sample.
C_V = Manufacturer certified concentration of a calibration gas (low, mid, or high).
C_W = Pollutant concentration measured under moist sample conditions, wet basis.
CS = Calibration span.
D = Drift assessment, percent of calibration span.
E_p = The predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level response.
Eff_{NO2} = NO_2 to NO converter efficiency, percent.
H = High calibration gas, designator.
L = Low calibration gas, designator.
M = Mid calibration gas, designator.
NOFinal = The average NO concentration observed with the analyzer in the NO mode during the converter efficiency test in Section 16.2.2.
NOxCorr = The NOx concentration corrected for the converter efficiency.
NOxFinal = The final NOx concentration observed during the converter efficiency test in Section 16.2.2.
NOxPeak = The highest NOx concentration observed during the converter efficiency test in Section 16.2.2.
Q_{Spike} = Flow rate of spike gas introduced in system calibration mode, L/min.
Q_{Total} = Total sample flow rate during the spike test, L/min.
R = Spike recovery, percent.
SB = System bias, percent of calibration span.
SB_i = Pre-run system bias, percent of calibration span.
SB_f = Post-run system bias, percent of calibration span.
SB / D_{Alt} = Alternative absolute difference criteria to pass bias and/or drift checks.
SCE = System calibration error, percent of calibration span.
SCE_i = Pre-run system calibration error, percent of calibration span.
SCE_{final} = Post-run system calibration error, percent of calibration span.
Z = Zero calibration gas, designator.

40CFR60.355(b)(1), (09-20-06), Nomenclature. The terms used in the equations are defined as follows:

P_r = reference combustor inlet absolute pressure at 101.3 kilopascals ambient pressure, mm Hg
P_o = observed combustor inlet absolute pressure at test, mm Hg
H_o = observed humidity of ambient air, g H_2O/g air
e = transcendental constant, 2.718
T_a = ambient temperature, K

Small Engine and FTIR Nomenclature. The terms used in the equations are defined as follows:

bhp = brake horsepower
hp = horsepower
Q_{sys} = system flow (lpm)
Q_m = matrix spike flow (lpm)

RM 19, (07-29-06), 12.1 Nomenclature. The terms used in the equations are defined as follows:

AdjFactor = percent oxygen or carbon dioxide adjustment applied to a target polltant
B_{wa} = Moisture fraction of ambient air, percent.
Btu = British thermal unit
$\%_C$ = Concentration of carbon from an ultimate analysis of fuel, weight percent.
$\%_{CO2d}$,$\%_{CO2w}$ = Concentration of carbon dioxide on a dry and wet basis, respectively, percent.
CIP / CDP = Combustor inlet pressure / compressor discharge pressure (mm Hg); note, some manufactures reference as PCD.
E = Pollutant emission rate, ng/J (lb/million Btu).
E_a = Average pollutant rate for the specified performance test period, ng/J (lb/million Btu).
E_{ao}, E_{ai} = Average pollutant rate of the control device, outlet and inlet, respectively, for the performance test period, ng/J (lb/million Btu).
E_{bi} = Pollutant rate from the steam generating unit, ng/J (lb/million Btu).
E_{bo} = Pollutant emission rate from the steam generating unit, ng/J (lb/million Btu).
E_{ci} = Pollutant rate in combined effluent, ng/J (lb/million Btu).
E_{co} = Pollutant emission rate in combined effluent, ng/J (lb/million Btu).
E_d = Average pollutant rate for each sampling period (e.g.,24-hr Method 6B sample or 24-hr fuel sample) or for each fuel lot (e.g., amount of fuel bunkered), ng/J (lb/million Btu).
E_{di} = Average inlet SO_2 rate for each sampling period d, ng/J (lb/million Btu).
E_g = Pollutant rate from gas turbine, ng/J (lb/million Btu).
E_{ga} = Daily geometric average pollutant rate, ng/J (lbs/million Btu) or ppm corrected to 7 percent O_2.
E_{jo},E_{ji} = Matched pair hourly arithmetic average pollutant rate, outlet and inlet, respectively, ng/J (lb/million Btu) or ppm corrected to 7 percent O_2.
E_h = Hourly average pollutant, ng/J (lb/million Btu).
E_{hj} = Hourly arithmetic average pollutant rate for hour "j," ng/J (lb/million Btu) or ppm corrected to 7 percent O_2.
EXP = Natural logarithmic base (2.718) raised to the value enclosed by brackets.
Fc = Ratio of the volume of carbon dioxide produced to the gross calorific value of the fuel from Method 19
F_d, F_w, F_c = Volumes of combustion components per unit of heat content, scm/J (scf/million Btu).
ft^3 = cubic feet
G = ideal gas conversion factor
(385.23 SCF/lb-mol at 68 deg F & 14.696 psia)
GCM = gross Btu per SCF (constant, compound based)
GCV = Gross calorific value of the fuel consistent with the ultimate analysis, kJ/kg (Btu/lb).
GCV_p, GCV_r = Gross calorific value for the product and raw fuel lots, respectively, dry basis, kJ/kg (Btu/lb).
$\%_H$ = Concentration of hydrogen from an ultimate analysis of fuel, weight percent.
H_b = Heat input rate to the steam generating unit from fuels fired in the steam generating unit, J/hr (million Btu/hr).
H_g = Heat input rate to gas turbine from all fuels fired in the gas turbine, J/hr (million Btu/hr).
$\%_{H2O}$ = Concentration of water from an ultimate analysis of fuel, weight percent.
H_r = Total numbers of hours in the performance test period (e.g., 720 hours for 30-day performance test period).
K = volume of combustion component per pound of component (constant)
K = Conversion factor, 10^{-5} (kJ/J)/(%) [10^6 Btu/million Btu].
K_c = (9.57 scm/kg)/% [(1.53 scf/lb)/%].
K_{cc} = (2.0 scm/kg)/% [(0.321 scf/lb)/%].
K_{hd} = (22.7 scm/kg)/% [(3.64 scf/lb)/%].
K_{hw} = (34.74 scm/kg)/% [(5.57 scf/lb)/%].
K_n = (0.86 scm/kg)/% [(0.14 scf/lb)/%].
K_o = (2.85 scm/kg)/% [(0.46 scf/lb)/%].
K_s = (3.54 scm/kg)/% [(0.57 scf/lb)/%].
K_{sulfur} = $2x10^4$ Btu/wt%-MMBtu
K_w = (1.30 scm/kg)/% [(0.21 scf/lb)/%].
lb = pound
ln = Natural log of indicated value.
L_p,L_r = Weight of the product and raw fuel lots, respectively, metric ton (ton).
$\%_N$ = Concentration of nitrogen from an ultimate analysis of fuel, weight percent.
$M_\%$ = mole percent
mol = mole
MW = molecular weight (lb/lb-mol)
MW_{AIR} = molecular weight of air (28.9625 lb/lb-mole)[1]
NCM = net Btu per SCF (constant based on compound)
$\%_O$ = Concentration of oxygen from an ultimate analysis of fuel, weight percent.
$\%_{O2d}$, $\%_{O2w}$ = Concentration of oxygen on a dry and wet basis, respectively, percent.
P_B = barometirc pressure, in Hg
P_s = Potential SO2 emissions, percent.
$\%_S$ = Sulfur content of as-fired fuel lot, dry basis, weight percent.
S_e = Standard deviation of the hourly average pollutant rates for each performance test period, ng/J (lb/million Btu).
$\%_{Sf}$ = Concentration of sulfur from an ultimate analysis of fuel, weight percent.
S(wt%) = weight percent of sulfur, per lab analysis by appropriate ASTM standard
S_i = Standard deviation of the hourly average inlet pollutant rates for each performance test period, ng/J (lb/million Btu).
S_o = Standard deviation of the hourly average emission rates for each performance test period, ng/J (lb/million Btu).
$\%S_p$, $\%S_r$ = Sulfur content of the product and raw fuel lots respectively, dry basis, weight percent.
SCF = standard cubic feet
SH = specific humidity, pounds of water per pound of air
$t_{0.95}$ = Values shown in Table 19-3 for the indicated number of data points n.
T_{amb} = ambient temperature, ^oF
W/D Factor = 1.0236 = conv. at 14.696 psia and
68 deg F (ref. Civil Eng. Ref. Manual, 7th Ed.)
X_{CO2}=CO_2 Correction factor, percent.
X_k = Fraction of total heat input from each type of fuel k.

ALARMS EXIST !!! - Check Alarm Sheet

	English Units	○ ◉	Cells Unprotected

Source Information				
Plant Name				
Sampling Location				
Fuel or Source Type	Gas, Natural			
Fuel F-Factor				

Test Information				
Starting Test Date				
Project #				
Operator				
Standard Temperature		68	oF	
Standard Pressure		29.92	in Hg	
Minimum Required Sample Vol.	indust. spec.	100	scf	
Run Duration	chk Subpart	180	minutes	
Unit Number				
Load	% or w/DB			
Base Run Number				
Number of Ports Available				
Number of Ports Used				
Port Inside Diameter			in	
Circular Stack				

Test Equipment Information					
Run		**1**	**2**	**3**	
Meter Box Number	from ACS				
Meter Calibration Factor	(Y)				
Orifice Meter Coefficient	($\Delta H_@$)				in H_2O
Pitot Identification	from ACS				
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840	
Orsat Identification	from ACS				
Nozzle Number	from ACS				
Nozzle Diameter	(D_n)				in
Probe Number	from ACS				
Probe Length					in
(SS, Glass ….) Liner Material	from list	inconel	inconel	inconel	
Sample Case / Oven Number	from ACS				
Impinger Case Number	from ACS				
Acetone Lot Number	from bottle				

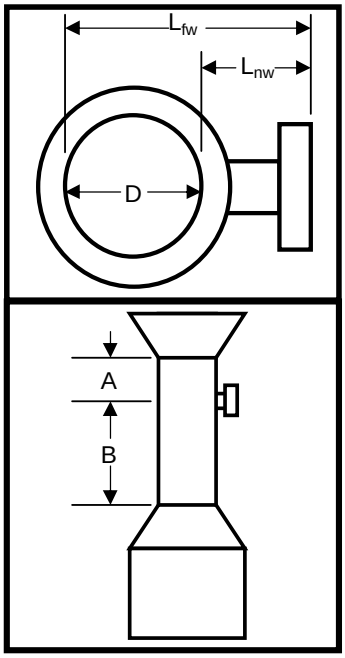
Testing Company Information	
Company Name	Air Hygiene International, Inc. (Tulsa, Oklahoma)
Address	5634 S. 122nd East Ave., Suite F
City, State Country Zip	Tulsa, Oklahoma 74146
Project Manager	
Phone Number	(918) 307-8865
Fax Number	(918) 307-9131

METHOD 1 - SAMPLE AND VELOCITY TRAVERSES FOR CIRCULAR SOURCES

Plant Name		**Date**	
Sampling Location		**Project #**	
Operator		**# of Ports Available**	
Stack Type	Circular	**# of Ports Used**	
Stack Size		**Port Inside Diameter**	

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})		in
Distance to Near Wall of Stack	(L_{nw})		in
Diameter of Stack	(D)		in
Area of Stack	(A_s)		ft2

Distance from Port to Disturbances			
Distance Downstream	(B)		in
Diameters Downstream	(B_D)		diameters
Distance Upstream	(A)		in
Diameters Upstream	(A_D)		diameters



Number of Traverse Points Required			
Diameters to Flow Disturbance		**Minimum Number of[1] Traverse Points**	
Down Stream	**Up Stream**	**Particulate Points**	**Velocity Points**
2.00-4.99	0.50-1.24	24	16
5.00-5.99	1.25-1.49	20	16
6.00-6.99	1.50-1.74	16	12
7.00-7.99	1.75-1.99	12	12
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]
Upstream Spec			
Downstream Spec			
Traverse Pts Required			

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

Number of Traverse Points Used			
	Ports by		**Across**
	Pts Used		**Required**
		Particulate Traverse	

Location of Traverse Points in Circular Stacks									
Traverse	(Fraction of Stack Dimension from Inside Wall to Traverse Point)								
Point	**Number of Traverse Points Across the Stack**								
Number	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**
1	.146	.067	.044	.032	.026	.021	.018	.016	.014
2	.854	.250	.146	.105	.082	.067	.057	.049	.044
3		.750	.296	.194	.146	.118	.099	.085	.075
4		.933	.704	.323	.226	.177	.146	.125	.109
5			.854	.677	.342	.250	.201	.169	.146
6			.956	.806	.658	.356	.269	.220	.188
7				.895	.774	.644	.366	.283	.236
8				.968	.854	.750	.634	.375	.296
9					.918	.823	.731	.625	.382
10					.974	.882	.799	.717	.618
11						.933	.854	.780	.704
12						.979	.901	.831	.764

Traverse Point Locations			
Traverse Point Number	**Fraction of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
		in	in
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

METHOD 2 - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant Name					**Date**		
Sampling Location					**Project #**		
Operator					**# of Ports Used**		
Stack Type	Circular				**Pitot Identification**		
Pitot Leak Check	☐	**PreTest**	☐	**PostTest**	**Pitot Coefficient (C_p)**	0.84	

Stack Dimensions			
Diameter or Length of Stack	(D)		in
Width of Stack	(W)		in
Area of Stack	(A_s)		ft2

Pressures			
Barometric Pressure	(P_b)		in Hg
Static Pressure	(P_{static})		in H2O
Absolute Stack Pressure	(P_s)		in Hg

Alarms Exist - Enter Static Pressure (see below)!!!

Stack Gas Composition			
Composition Data:		**Estimated Composition**	
Carbon Dioxide Concentration	(%CO_2)		%
Oxygen Concentration	(%O_2)		%
Carbon Monoxide Concentration	(%CO)		%
Nitrogen Concentration	(%N_2)		%
Stack Moisture Content	(B_{ws})		%
Stack Dry Molecular Weight	(M_d)		lb/lb-mole
Stack Wet Molecular Weight	(M_s)		lb/lb-mole

Results			
Avg Stack Gas Velocity	(v_s)		ft/sec
Avg Stack Dry Std Flow Rate	(Q_{sd})		dscf/hr
Avg Stack Dry Std Flow Rate	(Q_{sd})		dscf/min
Avg Stack Wet Flow Rate	(Q_{aw})		acf/min
Avg Stack Wet Std Flow Rate	(Q_{sw})		ascf/hr

Stack Cross Section Schematic

Velocity Traverse Data				
Run Number		V1		
Run Time		**Start**		**End**
Traverse Point	**Velocity Head** (Δp)	**Null Angle** (N_a)	**Stack Temp** (t_s)	**Local Velocity** ($v_{s(l)}$)
	in H2O	deg	oF	ft/sec
Average				

= Square roots of Δp

Alarms Exist - Measure Static Pressure, turn side-to side, unplug to get positive reading!!!

METHOD 3a - DETERMINATION OF DRY MOLECULAR WEIGHT BY ANALYZER

Plant Name					**Date**		
Sampling Location					**Project #**		
Operator					**# of Ports Used**		
Fuel Type	N/A		**Minimum Fuel Factor**	1.600	**Maximum Fuel Factor**	1.836	
Orsat Leak Check	☐	**PreTest**	☐	**PostTest**	**Orsat Identification**		

Gas Analysis Data									
Run Number		1		**Run Start Time**			**Run Stop Time**		
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
Results			**Averages**						
Average Calculated Fuel Factor			$(F_o)_{avg}$			**Molecular Wt Deviation < 0.3?**			☐
Average Excess Air			$(\%EA)_{avg}$		percent	**Fuel Factor in Handbook Range?**			☐

Gas Analysis Data									
Run Number		2		**Run Start Time**			**Run Stop Time**		
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
Results			**Averages**						
Average Calculated Fuel Factor			$(F_o)_{avg}$			**Molecular Wt Deviation < 0.3?**			☐
Average Excess Air			$(\%EA)_{avg}$		percent	**Fuel Factor in Handbook Range?**			☐

Gas Analysis Data									
Run Number		3		**Run Start Time**			**Run Stop Time**		
Sample Analysis Time	**Carbon Dioxide Conc.** (%CO2)	**Oxygen Conc.** (%O2)	**Carbon Monoxide Conc.** (ppmCO)	**Carbon Dioxide Conc.** ($\%CO_2$)	**Oxygen Conc.** ($\%O_2$)	**Carbon Monoxide Conc.** (%CO)	**Nitrogen Conc.** ($\%N_2$)	**Dry Molecular Weight** (M_d)	**Molecular Weight Deviation** (ΔM_d)
hh:mm	percent	percent	ppm	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
Results			**Averages**						
Average Calculated Fuel Factor			$(F_o)_{avg}$			**Molecular Wt Deviation < 0.3?**			☐
Average Excess Air			$(\%EA)_{avg}$		percent	**Fuel Factor in Handbook Range?**			☐

Fuel Factor Fo		
Fuel Type	**Minimum**	**Maximum**
Coal, Anthracite	1.016	1.130
Coal, Lignite	1.016	1.130
Coal, Bituminous	1.083	1.230
Oil, Distillate	1.260	1.413
Oil, Residual	1.210	1.370
Gas, Natural	1.600	1.836
Gas, Propane	1.434	1.586
Gas, Butane	1.405	1.553
Wood	1.000	1.120
Wood Bark	1.003	1.130

METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

Plant Name					**Date**		
Sampling Location					**Project #**		
Operator					**# of Ports Used**		
Stack Type	Circular				**Meter Box Number**		
Train Leak Check	☐	**PreTest**	☐	**PostTest**	**Meter Cal Factor (Y)**		

Moisture Content Data									
Run Number	1		**Run Start Time**			**Run Stop Time**			
Total Meter Volume	(V_m)		dcf	**Barometric Press.**		(P_b)		in Hg	
Avg Meter Temp	$(t_m)_{avg}$		oF	**Stack Static Press.**		(P_{static})		in H2O	
Avg Stack Temp	$(t_s)_{avg}$		oF	**Avg Orifice Press.**		$(\Delta H)_{avg}$		in H2O	
	Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**	
	g	g	g	g	g	g	g	g	
Contents	DI	DI	DI	Sil Gel					
Final Value $(V_f),(W_f)$									
Initial Value $(V_i),(W_i)$									
Net Value $(V_n),(W_n)$									
Results									
Total Weight	(W_t)		g	**Water Vol Weighed**		$(V_{wsg(std)})$		scf	
Std Meter Volume	$(V_{m(std)})$		dscf	**Sat. Moisture Content**		$(B_{ws(svp)})$		%	
Calc Moisture Content	$(B_{ws(calc)})$		%	**Final Moisture Content**		(B_{ws})		%	

Moisture Content Data									
Run Number	2		**Run Start Time**			**Run Stop Time**			
Total Meter Volume	(V_m)		dcf	**Barometric Press.**		(P_b)		in Hg	
Avg Meter Temp	$(t_m)_{avg}$		oF	**Stack Static Press.**		(P_{static})		in H2O	
Avg Stack Temp	$(t_s)_{avg}$		oF	**Avg Orifice Press.**		$(\Delta H)_{avg}$		in H2O	
	Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**	
	g	g	g	g	g	g	g	g	
Contents	DI	DI	DI	Sil Gel					
Final Value $(V_f),(W_f)$									
Initial Value $(V_i),(W_i)$									
Net Value $(V_n),(W_n)$									
Results									
Total Weight	(W_t)		g	**Water Vol Weighed**		$(V_{wsg(std)})$		scf	
Std Meter Volume	$(V_{m(std)})$		dscf	**Sat. Moisture Content**		$(B_{ws(svp)})$		%	
Calc Moisture Content	(B_{ws})		%	**Final Moisture Content**		(B_{ws})		%	

Moisture Content Data									
Run Number	3		**Run Start Time**			**Run Stop Time**			
Total Meter Volume	(V_m)		dcf	**Barometric Press.**		(P_b)		in Hg	
Avg Meter Temp	$(t_m)_{avg}$		oF	**Stack Static Press.**		(P_{static})		in H2O	
Avg Stack Temp	$(t_s)_{avg}$		oF	**Avg Orifice Press.**		$(\Delta H)_{avg}$		in H2O	
	Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**	
	g	g	g	g	g	g	g	g	
Contents	DI	DI	DI	Sil Gel					
Final Value $(V_f),(W_f)$									
Initial Value $(V_i),(W_i)$									
Net Value $(V_n),(W_n)$									
Results									
Total Weight	(W_t)		g	**Water Vol Weighed**		$(V_{wsg(std)})$		scf	
Std Meter Volume	$(V_{m(std)})$		dscf	**Sat. Moisture Content**		$(B_{ws(svp)})$		%	
Calc Moisture Content	(B_{ws})		%	**Final Moisture Content**		(B_{ws})		%	

ISOKINETIC SAMPLING DATA

Plant Name		**Date**	
Sampling Location		**Project #**	
Operator		**Run #**	1
# of Points Across		**# of Ports Used**	

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.84	
Avg Stack Temp	(t_s)		oF
Avg Gas Meter Temp	(t_m)		
DH @ 0.75 SCFM	($\Delta H@$)		in H2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})		in H2O
Stack Moisture Content	(B_{ws})		%
Stack Dry Molecular Weight	(M_d)		lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.750	acfm
DP to DH Isokinetic Factor	(K)		

Leak Checks					
Train	**Pre**		ft3/min @		in Hg
OK? ☐	**Post**		ft3/min @		in Hg
Pitot	**Pre**		in. H_2O for		sec
OK? ☐	**Post**		in. H_2O for		sec
Orsat	OK? ☐				

Sampling Equipment			
Meter #			
Meterbox Cal. Factor	(Y)		
Nozzle #			
Average Nozzle Diameter	(D_{na})		in
Rec. Nozzle Diameter	(D_{ni})		in
Probe # / Length			in
Liner Material	inconel		
Sample Case / Oven #			
Impinger Case #			

Pressures			
Barometric Pressure	(P_b)		in Hg
Stack Static Pressure	(P_{static})		in H2O
Absolute Stack Pressure	(P_s)		in Hg
Absolute Meter Pressure	(P_m)		in Hg

Nozzle Measurements				
Pre				**PASS**
Post				**PASS**

Run Time			
Start		**End**	

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre								
Post								

Wash Volume	**H_2O**	50.0	ml	**Filter #**
	MeCl		ml	

Alarms Exist - Enter Run Times!!!

Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp**	**Filter Temp**	**Impinger Exit Temp**	**Aux Temp**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumulative Meter Volume (V_m)$_{std}$**	**Cumulative Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft3	in H2O	in H2O	in H2O	oF	oF	oF	oF	oF	oF	oF	in Hg	(in H2O)1/2	ft/sec	scf	%	scf
	0.0	0:00:00																	
	#VALUE!																		
Final Val	0.0	0:00:00											**Max Vac**		**Final Values**				
Average Values																			

- SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant Name		**Date**	
Sampling Location		**Project #**	
Operator		**Acetone Lot Number**	

Run History Data				
Run Number	1	2	3	
Run Start Time				(hh:mm)
Run Stop Time				(hh:mm)
Train Prepared By				
Train Recovered By				
Recovery Date				(mm/dd/yy)
Relinquished By				
Received By				
Relinquished Date				(mm/dd/yy)
Relinquished Time				(hh:mm)

Equipment Identification Numbers			
Filter			
Acetone Wash			
Silica Gel			
Impinger Case			
Sample Box			
Oven			

Alarms Exist - Enter Filter Numbers!!!

Sample Blank Taken ☐ NO

Alarms Exist - Collect Sample Blanks of at least 75ml each!!!

Moisture Content Data					
Impingers 1, 2, and 3 - Liquid Volume					
Final Volume	(V_f)				ml
Initial Volume	(V_i)				ml
Net Volume	(V_n)				ml
Comments					
Impinger 4 - Silica Gel Weight					
Final Weight	(W_f)				g
Initial Weight	(W_i)				g
Net Weight	(W_n)				g
Comments					
Total Water Collected					
Total Volume	(V_{lc})				ml

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - SAMPLE ANALYTICAL DATA SHEET

Plant Name		**Date**	
Sampling Location		**Project #**	
Operator		**Acetone Lot Number**	

Analytical Data							
Placed in Desiccator				**Run**	1	**Start Time**	
	Number	**Date**	**Time**	**Leakage Evident?**		☐	
Filter				**Estimated Volume**		0.00	
Probe Wash Beaker #							
Water Beaker #							
MeCl (org) Beaker #							

Weight Data							
Filter and Beaker Weight		**Filter**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1f})						
Measurement 2	(m_{2f})						
Measurement 3	(m_{3f})						
Measurement 4	(m_{4f})						
Probe Wash and Beaker Weight		**Acetone**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1a})						
Measurement 2	(m_{2a})						
Measurement 3	(m_{3a})						
Measurement 4	(m_{4a})						
Imp Content and Beaker Weight		**Imp Water**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1ino})						
Measurement 2	(m_{2ino})						
Measurement 3	(m_{3ino})						
Measurement 4	(m_{4ino})						
Organics and Beaker Weight		**MeCl Org**	**Date**	**Time**	**Humidity**	**Temp**	**Cal Audit**
		g	mm/dd/yy	hh:mm	%RH	oF	g
Measurement 1	(m_{1org})						
Measurement 2	(m_{2org})						
Measurement 3	(m_{3org})						
Measurement 4	(m_{4org})						

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - SAMPLE ANALYTICAL DATA SHEET

Plant Name		**Date**	
Sampling Location		**Project #**	
Operator		**Acetone Lot Number**	

Tare (Pre-Particulate) Weights						
Tare	**Filter**	**Filter Beaker**	**Acetone Beaker**	**Imp Content Beaker**		
						g
Tare		**Organics Beaker**	**PM_{10} Beaker**			
				g	**Run**	1

Sample Volume and Blank Concentrations			
Probe Wash Volume	(v_a)		ml
Impinger Content Volume	(v_{ino})		ml
Organics Wash Volume	(v_{org})		ml
Net Wash Volume	(v_n)		ml
Acetone Blank Weight of Solids	(w_{ab})		g
Imp Cont Blank Weight of Solids	(w_{inob})		g
MeCl Blank Weight of Solids	(w_{orgb})		g
Acetone Blank Volume	(v_{ab})		ml
Imp Content Blank Volume	(v_{inob})		ml
MeCl Blank Volume	(v_{orgb})		ml
Acetone Blank Concentration	(C_a)		mg/ml
Imp Content Blank Concentration	(C_{ino})		mg/ml
MeCl Blank Concentration	(C_{org})		mg/ml

Results							
		$Filter_f$	**$PM10_{a1'}$**	**$Probe_{a'}$**	**$Imp\ Cont_{ino'}$**	**$Organics_{org'}$**	
Final Weight	(m_{fx})						g
Tare Weight	(m_{tx})						g
Weight Gain	(m_x)						mg
Blank Adjustment	(W_x)						mg
Total Particulates	(M_n)						mg

METHOD 5 (FRONTHALF) AND 202 (BACKHALF) - RESULTS

Plant Name		**Date**	
Sampling Location		**Project #**	
Operator		**Stack Type**	Circular

Historical Data						
Run Number		1	2	3	**Average**	
Run Start Time						hh:mm
Run Stop Time						hh:mm
Meter Calibration Factor	(Y)					
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840		
Average Nozzle Diameter	(D_{na})		#DIV/0!	#DIV/0!		in
Stack Test Data						
Initial Meter Volume	(V_m)$_i$					ft3
Final Meter Volume	(V_m)$_f$					ft3
Total Meter Volume	(V_m)					ft3
Total Sampling Time	(Θ)	0.0	0.0	0.0	0.0	min
Average Meter Temperature	(t_m)$_{avg}$					oF
Average Stack Temperature	(t_s)$_{avg}$					oF
Barometric Pressure	(P_b)					in Hg
Stack Static Pressure	(P_{static})					in H2O
Absolute Stack Pressure	(P_s)					in Hg
Average Orifice Pressure Drop	(ΔH)$_{avg}$					in H2O
Absolute Meter Pressure	(P_m)					in Hg
Avg Square Root Pitot Pressure	($\Delta p^{1/2}$)$_{avg}$					(in H2O)1/2
Moisture Content Data						
Impingers 1-3 Water Volume Gain	(V_n)					ml
Impinger 4 Silica Gel Weight Gain	(W_n)					g
Total Water Volume Collected	(V_{lc})					ml
Standard Water Vapor Volume	(V_w)$_{std}$					scf
Standard Meter Volume	(V_m)$_{std}$					dscf
Calculated Stack Moisture	($B_{ws(calc)}$)					%
Saturated Stack Moisture	($B_{ws(svp)}$)					%
Reported Stack Moisture Content	(B_{ws})					%
Gas Analysis Data						
Carbon Dioxide Percentage	(%CO_2)					%
Oxygen Percentage	(%O_2)					%
Carbon Monoxide Percentage	(%CO)					%
Nitrogen Percentage	(%N_2)					%
Dry Gas Molecular Weight	(M_d)					lb/lb-mole
Wet Stack Gas Molecular Weight	(M_s)					lb/lb-mole
Calculated Fuel Factor	(F_o)					
Fuel F-Factor	(F_d)					dscf/MMBtu
Percent Excess Air	(%EA)					%
Volumetric Flow Rate Data						
Average Stack Gas Velocity	(v_s)					ft/sec
Stack Cross-Sectional Area	(A_s)					ft2
Actual Stack Flow Rate	(Q_{aw})					acfm
Wet Standard Stack Flow Rate	(Q_{sw})					wkscfh
Dry Standard Stack Flow Rate	(Q_{sd})					dscfm
Percent of Isokinetic Rate	(I)					%
Emission Rate Data						
Mass of Particulate on Filter	(M_f)					mg
Mass of Particulate in Acetone	(M_a')					mg
Mass of Particulate in Imp Content	(M_{ino}')					mg
Mass of Particulate in Org Rinse	(M_{org}')					mg
Total Mass of Particulates	(M_n)					mg
Stack Particulate Concentration	(c_s)					g/dscf
	(c_s)					gr/dscf
Particulate Emission Rate	(E)					kg/hr
	($\dot{E}$)					lbs/hr
	($\dot{E}$)					tons/yr
	($\ddot{E}$)					lbs/MMBtu
(Pt 75 App F Sect. 5.2.1) **Heat Input**	(HI)					MMBtu/hr

SAMPLE DESCRIPTION AND CHAIN OF CUSTODY RECORD

Air Hygiene International, Inc.
5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
(888) 461-8778
www.airhygiene.com

Project Number:		Laboratory Analysis Requested:	
Person Taking Samples:			

Sample Number	Location	Date	Volume	Analysis Method			

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

EXAMPLE CALCULATIONS (Reference Method 1 - Circular Stack)

L_{fw} = distance to far wall of stack (in.)
L_{nw} = distance to near wall of stack (in.) [reference]
D = diameter of stack (in.)
A_s = area of stack (ft^2)
B = distance downstream (in.)
B_D = stack diameters downstream (dia.)
A = distance upstream (in.)
A_D = stack diameters upstream (dia.)

Diameter of Stack (in.)

$$D(in.) = L_{fw} - L_{nw}$$

D (in.) = 0 in. - 0 in. = in.

Area of Stack (ft^2)

$$A_s(ft^2) = \pi \times \left(\frac{D}{2 \times 12}\right)^2$$

A_s (ft^2) = 3.14 x (in. / 2 x 12in./ft)^2 = ft^2

Stack Diameters Downstream

$$B_D(dia.) = \frac{B}{D}$$

B_D (dia.) = 0 in. / in. = diameters

Stack Diameters Upstream

$$A_D(dia.) = \frac{A}{D}$$

A_D (dia.) = 0 in. / in. = diameters

Number of Traverse Points

Based on 40 CFR Part 60, Appendix A, Method 1, Section 2.2

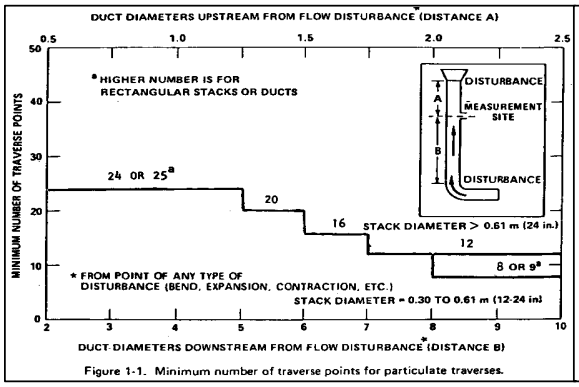


Figure 1-1. Minimum number of traverse points for particulate traverses.

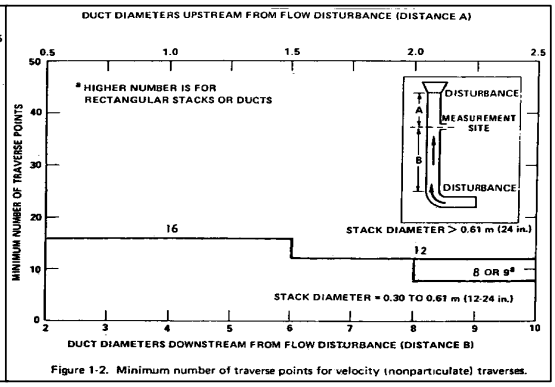


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses.

Traverse Point Locations

Based on 40 CFR Part 60, Appendix A, Method 1, Section 2.3

Location of Traverse Points in Circular Stacks												
Traverse Point Number	(Fraction of Stack Dimension from Inside Wall to Traverse Point) Number of Traverse Points Across the Stack											
	2	4	6	8	10	12	14	16	18	20	22	24
1	.146	.067	.044	.032	.026	.021	.018	.016	.014	.013	.011	.011
2	.854	.250	.146	.105	.082	.067	.057	.049	.044	.039	.035	.032
3		.750	.296	.194	.146	.118	.099	.085	.075	.067	.060	.055
4		.933	.704	.323	.226	.177	.146	.125	.109	.097	.087	.079
5			.854	.677	.342	.250	.201	.169	.146	.129	.116	.105
6			.956	.806	.658	.356	.269	.220	.188	.165	.146	.132
7				.895	.774	.644	.366	.283	.236	.204	.180	.161
8				.968	.854	.750	.634	.375	.296	.250	.218	.194
9					.918	.823	.731	.625	.382	.306	.262	.230
10					.974	.882	.799	.717	.618	.388	.315	.272
11						.933	.854	.780	.704	.612	.393	.323
12						.979	.901	.831	.764	.694	.607	.398
13							.943	.875	.812	.750	.685	.602
14							.982	.915	.854	.796	.738	.677
15								.951	.891	.835	.782	.728
16								.984	.925	.871	.820	.770
17									.956	.903	.854	.806
18									.986	.933	.884	.839
19										.961	.913	.868
20										.987	.940	.895
21											.965	.921
22											.989	.945
23												.968
24												.989

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 2)

P_b = barometric pressure (in. Hg)
P_{static} = static pressure (in. H_20)
P_s = absolute stack pressure (in. Hg)
$\%N_2$ = nitrogen concentration (%)
$\%CO_2$ = carbon dioxide concentration (%)
$\%O_2$ = oxygen concentration (%)
%CO = carbon monoxide concentration (%)
MW = molecular weight (lb/lb-mole)
B_{ws} = stack moisture content (%)
M_d = stack dry molecular weight (lb/lb-mole)
M_s = stack wet molecular weight (lb/lb-mole)
T_{std} = standard temperature, 68°F, 528°R
P_{std} = standard pressure, 29.92 in. Hg
v_{sl} = local velocity (ft/sec)
v_s = average stack gas velocity (ft/sec)
Q_{sd} = average stack dry standard flow rate (dscf/hr)
Q_{aw} = average stack wet flow rate (ascf/min)

C_p = pitot tube coefficient
Δp = velocity head (in. H_2O)
A_s = area of stack (ft^2)
N_a = null angle (deg.)
t_s = stack temperature (°F)
T_u = temperature offset, 460°R
K_p = pitot tube constant,
85.49 (ft/sec)(((lb/lb-mole)(in. Hg))/((°R)(in. Hg)))$^{1/2}$

Absolute Stack Pressure (in. Hg)

$$P_S\,(in.Hg) = P_b + \frac{P_{static}}{13.6}$$

P_s (in. Hg) = 0 in. Hg + $\frac{0.00 \text{ in. } H_2O}{13.6 \text{ in. } H_2O/\text{in. Hg}}$ = in. Hg

Nitrogen Concentration (%)

$$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$$

$\%N_2$ (%) = 100 - 0 % - 0 % - 0 % = %

Stack Dry Molecular Weight (lb/lb-mole)

$$M_d\,(lb/lb-mol) = \sum\left(\frac{MW_{comp}}{100} \times \%component\right)$$

M_d (lb/lb-mol) = $\left(\frac{44 \text{ lb/lb-mol}}{100} \text{ x } 0 \%\right) + \left(\frac{32 \text{ lb/lb-mol}}{100} \text{ x } 0 \%\right)$ + etc. = $\frac{\text{lb}}{\text{lb-mol}}$

Stack Wet Molecular Weight (lb/lb-mole)

$$M_S\,(lb/lb-mol) = \left[M_d \times \left(1 - \frac{B_{WS}}{100}\right)\right] + \left[MW_{H_2O} \times \frac{B_{WS}}{100}\right]$$

M_S (lb/lb-mol) = $\left\{\frac{\text{lb}}{\text{lb-mol}} \text{ x } \left(1 - \frac{0 \%}{100}\right)\right\} + \left\{\frac{18 \text{ lb}}{\text{lb-mol}} \text{ x } \frac{0 \%}{100}\right\} = \frac{\text{lb}}{\text{lb-mol}}$

Local Velocity (ft/sec)

$$v_{s(l)}(ft/\sec) = K_p \times C_p \times \sqrt{\Delta p} \times \sqrt{\frac{t_s + T_u}{P_s \times M_s}}$$

v_{sl} (ft/sec) = $\frac{85.49 \text{ ft}}{\text{sec}} \left(\frac{(\text{lb/lb-mol})(\text{in. Hg})}{(^\circ R)(\text{in. } H_2O)}\right)^{1/2}$ x 0.84 x $\sqrt{0.00 \text{ in.} H_2O}$ x $\sqrt{\frac{0 + 460\ ^\circ R}{\text{in. Hg x lb/lb-mol}}}$ = $\frac{\text{ft}}{\text{sec}}$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 2)

P_b = barometric pressure (in. Hg)
P_{static} = static pressure (in. H_20)
P_s = absolute stack pressure (in. Hg)
$\%N_2$ = nitrogen concentration (%)
$\%CO_2$ = carbon dioxide concentration (%)
$\%O_2$ = oxygen concentration (%)
%CO = carbon monoxide concentration (%)
MW = molecular weight (lb/lb-mole)
B_{ws} = stack moisture content (%)
M_d = stack dry molecular weight (lb/lb-mole)
M_s = stack wet molecular weight (lb/lb-mole)
K_p = pitot tube constant,
85.49 (ft/sec)(((lb/lb-mole)(in. Hg))/((^oR)(in. Hg)))$^{1/2}$
T_{STD} = standard temperature, 68^oF
P_{STD} = standard pressure, 29.92 in. Hg
v_{sl} = local velocity (ft/sec)
v_s = average stack gas velocity (ft/sec)
Q_{SD} = average stack dry standard flow rate (dscf/hr)
Q_{AW} = average stack wet flow rate (ascf/min)

C_p = pitot tube coefficient
Δp = velocity head (in. H_2O)
A_s = area of stack (ft^2)
N_A = null angle (deg.)
t_s = stack temperature (^oF)
T_u = temperature offset, 460^oR

Average Stack Gas Velocity (ft/sec)

$$v_s(ft/\sec) = K_p \times C_p \times \left(\sqrt{\Delta p}\right)_{avg} \times \sqrt{\frac{(t_s)_{avg} + T_u}{P_s \times M_s}}$$

$$v_{sl}\ (ft/sec) = \frac{85.49\ ft}{sec}\left(\frac{(lb/lb\text{-}mol)(in.\ Hg)}{(^oR)(in.\ H_2O)}\right)^{1/2} \times 0.84 \times in.H_2O^{1/2} \times \sqrt{\frac{+\ 460\ ^oR}{in.\ Hg \times\ lb/lb\text{-}mol}} = \frac{ft}{sec}$$

Average Stack Dry Standard Flow Rate (dscfh)

$$Q_{sd}(dscfh) = \frac{60 \times 60 \times \left(1 - \frac{B_{ws}}{100}\right) \times v_s \times A_s \times T_{std} \times P_s}{(t_s + T_u) \times P_{std}}$$

$$Q_{sd}\ (dscf/hr) = \frac{3600\ sec}{hr} \times \left(1 - \frac{0.0\ \%}{100}\right) \times \frac{ft}{sec} \times ft^2 \times \frac{68\ \ +\ 460\ ^oR}{+\ 460\ ^oR} \times \frac{in.\ Hg}{29.92\ \ in.\ Hg} = \frac{dscf}{hr}$$

Average Stack Wet Flow Rate (acfm)

$$Q_{aw}(acfm) = 60 \times v_s \times A_s$$

$$Q_{aw}\ (acf/min) = \frac{60\ sec}{min} \times \frac{ft}{sec} \times ft^2 = \frac{ascf}{min}$$

Average Stack Wet Standard Flow Rate (dscfh)

$$Q_{sw}(ascfh) = \frac{60 \times Q_{aw} \times T_{std} \times P_s}{(t_s + T_u) \times P_{std}}$$

$$Q_{sw}\ (ascf/hr) = \frac{60\ min}{hr} \times \frac{acf}{min} \times \frac{68\ \ +\ 460\ ^oR}{+\ 460\ ^oR} \times \frac{in.\ Hg}{29.92\ \ in.\ Hg} = \frac{ascf}{hr}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 3a)

$\%N_2$ = nitrogen concentration (%)
$\%CO_2$ = carbon dioxide concentration (%)
$\%O_2$ = oxygen concentration (%)
ppmCO = carbon monoxide concentration (ppm)
%CO = carbon monoxide concentration (%)
M_d = stack dry molecular weight (lb/lb-mole)
$(F_o)_{avg}$ = average calculated fuel factor
$(\%EA)_{avg}$ = average excess air (%)

Carbon Monoxide Concentration (%)

$$\%CO = \frac{ppmCO}{10{,}000}$$

%CO (%) = 0.00 ppm / 10,000 ppm/% = %

Nitrogen Concentration (%)

$$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$$

%N$_2$ (%) = 100 - % - % - % = %

Stack Dry Molecular Weight (lb/lb-mole)

$$M_d\,(lb/lb-mol) = \sum\left(\frac{MW_{comp}}{100} \times \%component\right)$$

M_d (lb/lb-mol) = (44 lb/lb-mol / 100 x %) + (32 lb/lb-mol / 100 x %) + etc. = lb / lb-mol

Average Calculated Fuel Factor

$$F_{o(avg)} = \frac{\left[20.9 - (\%O_2)_{avg} - (0.5 \times (\%CO)_{avg})\right]}{(\%CO_2)_{avg} + (\%CO)_{avg}}$$

$F_{o(avg)}$ = (20.9% - % - [0.5 x %]) / (% + %) =

Average Excess Air (%)

$$\%EA_{avg}(\%) = \frac{100 \times \left[(\%O_2)_{avg} - (0.5 \times (\%CO)_{avg})\right]}{(0.264 \times (N_2)_{avg}) - \left[(\%O_2)_{avg} - (0.5 \times (\%CO)_{avg})\right]}$$

$(\%EA)_{AVG}$ = 100 x{ % - [0.5 x %] } / [0.264 x %] - { % - [0.5 x %] } = %

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 4)

V_{mf} = final dry gas meter reading (dcf)
V_{mi} = initial dry gas meter reading (dcf)
V_m = total meter volume (dcf)
$t_{m(avg)}$ = average meter temp. (^oF)
$t_{s(avg)}$ = average stack temp. (^oF)
P_b = barometric pressure (in. Hg)
P_{static} = static pressure (in. H_2O)
ΔH_{avg} = average orifice pressure (in. H_2O)
V_i = initial impinger volume (ml)
V_f = final impinger volume (ml)
W_i = initial impinger weight (g)
W_f = final impinger weight (g)
V_t = total impinger volume (ml) = $\Sigma(V_f-V_i)$
W_t = total impinger weight (g) = $\Sigma(W_f-W_i)$
K_5 = water mass to std water vapor, 0.04715 ft^3/g
K_1 = standard volume correction, 17.65^oR/in. Hg
Y = meter calibration factor
T_u = absolute temperature offset, 460^oR
B_{ws} = final moisture content (%) = min of $B_{ws(calc)}$ and $B_{ws(svp)}$

Water Volume Weighed (dscf)

$$V_{wsg(std)}(dscf) = W_t \times K_5$$

$V_{wsg(std)}$ = g x 0.04715 ft^3/g = dscf

Standard Meter Volume (dscf)

$$V_{m(std)}(dscf) = \frac{K_1 \times Y \times V_m \times \left(P_b + \frac{\Delta H_{avg}}{13.6}\right)}{(t_m)_{avg} + T_u}$$

$$V_{m(std)} = \frac{\frac{17.65\ ^oR}{\text{in. Hg}} \text{ x } \quad \text{ x } \quad \text{dcf x} \left(\quad \text{in. Hg} + \frac{\text{in. } H_2O}{13.6 \text{ in. } H_2O / \text{in. Hg}} \right)}{^oF + \quad 460 \quad ^oR} = \quad \text{dscf}$$

Calculated Moisture Content (%)

$$B_{ws(calc)}(\%) = 100 \times \frac{V_{wsg(std)}}{V_{wsg(std)} + V_{m(std)}}$$

$$B_{ws(calc)} = 100 \text{ x } \frac{\text{dscf}}{\text{dscf} + \quad \text{dscf}} = \quad \%$$

Saturated Moisture Content (%)

$$B_{ws(svp)}(\%) = 100 \times \frac{10^{6.691 - \frac{3144}{t_{s(avg)} + 390.86}}}{P_b + \frac{P_{static}}{13.6}} \le 100$$

$$B_{ws(svp)} = 100 \text{ x } \frac{10^{\left(6.691 \text{ - } \frac{3144}{^oF + 390.86}\right)}}{\text{in. Hg} + \frac{\text{in. } H_2O}{13.6 \text{ in. } H_2O / \text{in. Hg}}} \le 100 = \quad \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Isokinetic Sampling)

C_n = nozzle diameter constant, 0.03575
Q_m = estimated orifice flow rate, 0.750 acfm
else Vm/Θ from previous run
V_m = total meter volume (acf)
Θ = total sampling time (min)
t_m = average gas meter temperature (°F)
T_u = absolute temperature offset, 460°R
C_p = pitot tube coefficient
B_{wm} = meter moisture content (%)
B_{ws} = stack moisture content (%)
t_s = average stack temperature (°F)
M_d = stack dry molecular weight (lb/lb-mole)
P_s = absolute stack pressure (in. Hg)
C_k = K Factor Constant, 849.8

Δp_{avg} = average pitot tube differential pressure (in. H_2O)
ΔH@ = DH @ 0.75 SCFM (in. H_2O)
D_{na} = actual nozzle diameter (in.)
Δp = velocity head (in. H_2O)

Desired Orifice (in. H_2O)

$$\Delta H_d\,(in.H_2O) = K \times \Delta p$$

ΔH_d (in. H_2O) = x 0 in. H_2O = in. H_2O

Absolute Meter Pressure (in. Hg)

$$P_m\,(in.Hg) = P_b + \frac{\Delta H\,@}{13.6}$$

P_m (in. Hg) = 0.00 in. Hg + $\frac{\text{in. } H_2O}{13.6 \text{ in. } H_2O/\text{in. Hg}}$ = in. Hg

Recommended Nozzle Diameter (in.)

$$D_{ni}\,(in.) = \sqrt{\frac{C_n \times Q_m \times P_m}{(t_m + T_u) \times C_p} \times \left(\frac{1 - \frac{B_{wm}}{100}}{1 - \frac{B_{ws}}{100}}\right)} \times \sqrt{(t_s + T_u) \times \left[\frac{M_d \times \left(1 - \frac{B_{ws}}{100}\right) + (18 \times B_{ws})}{P_s \times \Delta p_{avg}}\right]}$$

$$D_{ni}\,(in.) = \sqrt{\frac{0.03575 \text{ (lb-mole•°R•in. } H_2O)^{1/2}\text{•min•in.}^2}{\text{acf•in. Hg}^{3/4}\text{•lb}^{1/2}} \text{ x } 0.75 \text{ acf x in. Hg} \times \left(\frac{1 - \frac{0.0\ \%}{100}}{1 - \frac{0.0\ \%}{100}}\right) \text{ x } \sqrt{(0\ ^\circ\text{F} + 460^\circ\text{R}) \text{ x } 0.84 \times \frac{\frac{\text{lb}}{\text{lb-mole}} \text{ x } \left(1 - \frac{0.0\ \%}{100}\right) + \left(\frac{18 \text{ lb}}{\text{lb-mol}} \text{ x } 0.0\ \%\right)}{\text{in. Hg x } 0.00 \text{ in. } H_2O}}} = \text{in.}$$

DP to DH Isokinetic Factor

$$K = C_k \times C_p^2 \times \Delta H\,@ \times D_{na}^4 \times \left[\frac{M_d \times \left(1 - \frac{B_{wm}}{100}\right) + \left(18 \times \frac{B_{wm}}{100}\right)}{M_d \times \left(1 - \frac{B_{ws}}{100}\right) + \left(18 \times \frac{B_{ws}}{100}\right)}\right] \times \left(\frac{1 - \frac{B_{ws}}{100}}{1 - \frac{B_{wm}}{100}}\right)^2 \times \left(\frac{t_m + T_u}{ts + T_u}\right) \times \frac{P_s}{P_m}$$

$$K = \frac{849.8}{\text{in. } H_2O\text{•in.}^4} \text{ x } 0.84^2 \text{ x in. } H_2O \text{ x } 4 \text{ x } \left(\frac{1 - \frac{0.0\ \%}{100}}{1 - \frac{0.0\ \%}{100}}\right)^2 \text{ x } \left(\frac{0\ ^\circ\text{F} + 460^\circ\text{R}}{0\ ^\circ\text{F} + 460^\circ\text{R}}\right) \text{ x } \left(\frac{\frac{\text{lb}}{\text{lb/mole}} \text{ x } \left(1 - \frac{0.0\ \%}{100}\right) + \left(\frac{18 \text{ lb}}{\text{lb-mol}} \text{ x } \frac{0.0\ \%}{100}\right)}{\frac{\text{lb}}{\text{lb/mole}} \text{ x } \left(1 - \frac{0.0\ \%}{100}\right) + \left(\frac{18 \text{ lb}}{\text{lb-mol}} \text{ x } \frac{0.0\ \%}{100}\right)}\right) \text{ x } \frac{\text{in. Hg}}{\text{in. Hg}} =$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 5)

K_4 = isokinetic conversion constant, 0.0945min•in.Hg/sec•°R
$m_{\#x}$ = weight measurements (g)
v_a = acetone volume (ml)
v_{ino} = impinger content volume (ml)
v_{org} = organics wash volume (ml)
w_x = blank weight of solids (g)
v_x = blank volume (ml)
m_{fx} = final weight, avg of last two measurements (g)
m_{tx} = tare weight (g)

Total Particulates (mg)

$$M_n(mg) = \Sigma(m_x - W_x)$$

M_n (mg) = Σ(mg - mg)+ etc… = mg

Local Stack Velocity (ft/sec)

$$v_{s(l)}(ft/\sec) = K_p \times C_p \times \sqrt{\Delta p} \times \sqrt{\frac{t_s + T_u}{P_s \times \left[M_d \times \left(1 - \frac{B_{ws}}{100}\right) + \left(18 \times \frac{B_{ws}}{100}\right)\right]}}$$

$v_{s(l)}$ (ft/sec) = 85.49 ft (lb/lb-mol)(in. Hg) / sec (°R)(in. H_2O))^1/2 x 0.84 x √0.00 in.H_2O x √(0 °F + 460 °R / in. Hg x (lb/lb/mole x (1 - 0.0 %/100) + (18 lb/lb-mol x 0.0 %/100))) = ft/sec

Cumulative Percent Isokinetic (%)

$$I(\%) = \frac{K_4 \times \left((t_s)_{avg} + T_u\right) \times V_m}{\left(\Theta \times \left(v_{s(l)}\right)_{avg} \times P_s \times \pi \times \left(\frac{D_{na}}{2} \times \frac{1}{12}\right)^2\right) \times \left(1 - \frac{B_{ws}}{100}\right)}$$

I (%) =

(0.0945 min•in. Hg / sec•°R x (#DIV/0! °F + 460 °R) x scf) / (##### min x #DIV/0! ft/sec x in. Hg x 3.14 x (in./2 x ft./12 in.)^2 x (1 - 0 %/100)) = %

Net Wash Volume (ml)

$$v_n(ml) = v_a + v_{ino} + v_{org}$$

v_n (ml) = ml + ml + ml = ml

Blank Concentration (mg/ml)

$$C_x(mg/ml) = \frac{1000 \times w_x}{v_x}$$

C_x (mg/ml) = 1000 x g / ml = mg / ml

Blank Adjustment (lesser of)

$$W_x(mg) = m_x \cdots or \cdots v_x \times C_x$$

W_x (mg) = mg or

ml x mg/ml = mg

Weight Gain (mg)

$$m_x(mg) = (m_{fx} - m_{tx}) \times 1000$$

m_x (mg) = (mg - mg) x 1000 = mg

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 5)

M_n = total particulates (mg)
$V_{m(std)}$ = standard meter volume (dscf)
Q_{sd} = dry standard stack flow rate (dscfm)
F_d = fuel f-factor (dscf/MMBtu)
$\%O_2$ = oxygen percentage (%)
Q_{sw} = wet standard stack flow rate (ascfm)

Stack Particulate Concentration (g/dscf)

$$c_s(g/dscf) = 0.001 \times \frac{M_n}{V_{m(std)}}$$

$$c_s \text{ (g/dscf)} = \frac{\text{g}}{1000\text{ mg}} \times \frac{\text{mg}}{\text{dscf}} = \frac{\text{g}}{\text{dscf}}$$

Stack Particulate Concentration (gr/dscf)

$$c'_s(gr/dscf) = 0.001 \times \frac{M_n}{V_{m(std)}} \times \frac{7000}{453.592}$$

$$c'_s \text{ (gr/dscf)} = \frac{\text{g}}{1000\text{ mg}} \times \frac{\text{mg}}{\text{dscf}} \times \frac{7000\text{ gr}}{\text{lb}} \times \frac{\text{lb}}{453.592\text{ g}} = \frac{\text{gr}}{\text{dscf}}$$

Particulate Emissions Rate (kg/hr)

$$E(kg/hr) = c_s \times Q_{sd} \times \frac{60}{1000}$$

$$E \text{ (kg/hr)} = \frac{\text{kg}}{1000\text{ g}} \times \frac{60\text{ min}}{\text{hr}} \times \frac{\text{g}}{\text{dscf}} \times \frac{\text{dscf}}{\text{min}} = \frac{\text{kg}}{\text{hr}}$$

Particulate Emissions Rate (lb/hr)

$$E'(lb/hr) = \frac{M_n \times Q_{sd}}{V_{m(std)}} \times \frac{60}{453.592 \times 1000}$$

$$E' \text{ (lb/hr)} = \frac{\text{g}}{1000\text{ mg}} \times \frac{60\text{ min}}{\text{hr}} \times \frac{\text{lb}}{453.592\text{ g}} \times \frac{\text{mg}}{\text{dscf}} \times \frac{\text{dscf}}{\text{min}} = \frac{\text{lb}}{\text{hr}}$$

Particulate Emissions Rate (ton/yr)

$$E''(ton/yr) = E' \times \frac{8760}{2000}$$

$$E'' \text{ (ton/yr)} = \frac{\text{ton}}{2000\text{ lb}} \times \frac{8760\text{ hr}}{\text{yr}} \times \frac{\text{lb}}{\text{hr}} = \frac{\text{ton}}{\text{yr}}$$

Particulate Emissions Rate (lb/MMBtu)

$$E'''(lb/MMBtu) = \frac{M_n \times F_d}{V_{m(std)} \times 1000 \times 453.592} \times \left(\frac{20.9}{20.9 - \%O_2}\right)$$

$$E''' \text{ (lb/MMBtu)} = \frac{\text{g}}{1000\text{ mg}} \times \frac{\text{lb}}{453.592\text{ g}} \times \frac{\text{mg}}{\text{dscf}} \times \frac{\text{dscf}}{\text{MMBtu}} \times \left(\frac{20.9}{20.9 - \quad \%}\right) = \frac{\text{lb}}{\text{MMBtu}}$$

Heat Input (MMBtu/hr)

$$HI(MMBtu/hr) = Q_{sw} \times 1000 \times \left(\frac{100 - B_{ws}}{100 \times F_d}\right) \times \left(\frac{20.9 - \%O_2}{20.9}\right)$$

$$HI \text{ (MMBtu/hr)} = \frac{\text{wkscf}}{\text{hr}} \times \frac{10^3\text{ scf}}{\text{kscf}} \times \left(\frac{100 - \quad \%}{100 \times \quad \text{dscf/MMBtu}}\right) \times \left(\frac{20.9 - \quad \%}{20.9}\right) = \frac{\text{MMBtu}}{\text{hr}}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

APPENDIX E
AIR HYGIENE STATEMENT OF QUALIFICATIONS

Air Hygiene International, Inc.

The Clear Choice

STATEMENT OF QUALIFICATIONS
POWERPLANT EMISSIONS TESTING – 2006

AIR HYGIENE INT'L

Corporate Headquarters
5634 S. 122nd E. Ave. Ste. F
Tulsa, OK 74146
918-307-8865 or 888-461-8778

Houston, TX Office
1920 Treble Drive, Suite E-5
Humble, TX 77338

Las Vegas Office
5925 E. Lake Mead Blvd
Las Vegas, NV 89156

Philadelphia, PA Office
8900 State Road
Philadelphia, PA 19136

STATEMENT OF QUALIFICATIONS

AIR HYGIENE

AIR TESTING SERVICES FOR POWER PLANTS

www.airhygiene.com

January, 2005

INTRODUCTION

AIR HYGIENE INTERNATIONAL, INC. (**AIR HYGIENE**) is a professional air emission testing services firm with fixed offices in Tulsa, Oklahoma; Houston, Texas; Denver, Colorado; and Orlando, Florida. Additional mobilization points are located in Philadelphia, Atlanta, Chicago, Los Angeles, and Seattle to serve all 50 United States. **AIR HYGIENE** specializes in air emission testing services for combustion sources in both simple and combined cycle operation burning multiple fuels with multiple control devices and supporting equipment.

AIR HYGIENE has testing laboratories which serve all fifty (50) of the United States and North America. Each mobile laboratory can be equipped with the following equipment and capabilities:

1. State-of-the-Art air emission analyzers, computers, and datalogging software. All designed into an efficient system to provide the fastest, most reliable information possible!
2. Dual racks for multiple source testing simultaneously or multiple points on a single source (in/out SCR, etc.)!
3. NIST traceable gases for the most accurate calibration. Ranges as low as 5 ppm!
4. PM_{10}, NH_3, mercury, sulfuric acid mist (H_2SO_4), SO_3, and formaldehyde sampling equipment!
5. VOC testing with on-board gas chromatograph to remove methane and ethane!
6. On-board printers to provide hard copies of testing information on-site!
7. Networking capabilities to provide real-time emission data directly into the control room!

AIR HYGIENE is known for providing professional services which include the following:

- Providing superior, cost saving services to our clients!
- High quality emission testing personnel with service oriented, friendly attitude!
- Meeting our client's needs whether it is 24 hour a day testing or short notice mobilization!
- Using great equipment that is maintained and dependable!
- Understanding the unique startup and operational needs associated with combustion turbines!

MISSION STATEMENT

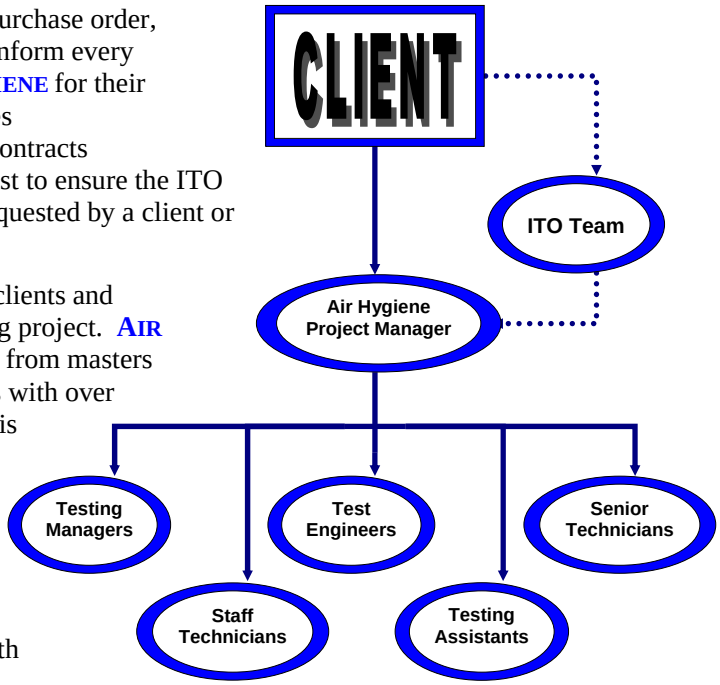
Our mission is to provide innovative, practical, top-quality services allowing our clients to increase operating efficiency, save money, and comply with federal/state requirements. We believe our first responsibility is to the client. In providing our unique services, the owners of **AIR HYGIENE** demand ethical conduct from each employee of the company. The character and integrity of **AIR HYGIENE** employees allows our clients to feel confidence in the air testing services of **AIR HYGIENE**. Through a long-term commitment to this mission, **AIR HYGIENE** is known as a company committed to improving our clients' operations.

AIR HYGIENE … Does work worth paying for every time!
… Is well known for our emission testing services and uncompromising efforts to serve our clients!
… Does work that matters!
… Is proud of our emission testing capabilities!
… Provides exciting growth opportunities for energetic individuals!

EMISSION TESTING TEAM

Air Hygiene International, Inc. (**AIR HYGIENE**) intends to exceed your expectations on every project. From project management to field-testing teams, we're committed to hard work on your behalf. The job descriptions and flowchart below outline **AIR HYGIENE**'s client management strategy for your testing services.

From the initial request through receipt of the purchase order, the Inquisition To Order (ITO) team strives to inform every client of the benefits gained by using **AIR HYGIENE** for their emission testing project. The ITO team includes representatives from the sales, marketing, and contracts divisions. In addition, several support staff assist to ensure the ITO team provides the support for client needs as requested by a client or project manager.



Project Managers are the primary contact for clients and ultimately responsible for every emission testing project. **AIR HYGIENE**'s Project Managers experience range from masters level, professional engineers to industry experts with over 5,000 testing projects completed. Each project is assigned a Project Manager based primarily upon geographic location, then industry experience, contact history, and availability. The Project Manager prepares the testing strategy and organization for the project. This includes preparation of testing protocol; coordination with state agencies, client representatives, and any interested third parties. The site testing and report preparation are executed under the direction of the Project Manager from start to finish.

Testing Managers have completed Air Hygiene's rigorous demonstration of capability training program and are capable of operating all testing equipment and performing all test methods required for your testing project. Testing Managers assist Project Managers by leading the field testing when required, preparing draft reports, calibrating equipment, and overseeing testing team on-site.

Test Engineers have significant background and understanding of emission testing or related services. Test Engineers prepare pre-test drawings for port location, ensure on-site logistics for electrical and mechanical/structural needs, and conduct on site testing as directed by the Project Manager and/or Testing Manager. Test Engineers often have special understanding of process and/or regulations applicable to specific testing jobs, which provide great value to both the client and Project Manager in testing strategies.

Testing Specialists have performed over 500 emission tests and have a basic understanding of both particulate and gaseous sampling strategies. Testing Specialists have significant testing experience with **AIR HYGIENE** equipment along with a variety of industries and source equipment. Testing Specialists often operate isokinetic sampling trains or gas analyzers on-site under the direction of the Project Manager and assist with preparation of field reports and quality assurance procedures.

Staff Technicians are entry-level personnel who have performed 100 to 500 emission tests. Staff Technicians perform pre-test equipment preparation, on-site test preparation, and testing assistance under the direction of Project Manager and/or Testing Manager. At least one Staff Technician is assigned to every project to assist on-site. Staff Technicians connect sampling probes to ports, assist with leak checks, raise and lower equipment to and from sampling platform, and other support activities under the direction of the Project Manager and/or Testing Manager.

Testing Assistants are entry-level personnel who have performed less than 100 emission tests. Testing Assistants help with equipment set-up, teardown, and simple testing procedures (i.e. move probe, fill ice bath, clean impingers, etc.) as directed.

AIR HYGIENE Emission Services Summary

Air Hygiene International, Inc. (**AIR HYGIENE**) is a privately-held professional services firm headquartered in Tulsa, Oklahoma with additional offices in Denver, Colorado; Houston, Texas; and Orlando, Florida. **AIR HYGIENE** specializes in emission testing services for a variety of industries including natural gas companies, utilities, refineries, printers, glass plants, bulk fuel loading stations, chemical plants, pulp & paper mills, various manufacturers and related industries.

AIR HYGIENE provides turn-key emission testing services which include:

1. Pre-test site visit and consulting for port locations and setup;
2. Preparation of test plan for state agency;
3. Coordination with state agency regarding emission testing;
4. On-site emission testing services; and
5. Preparation of draft and final reports.

AIR HYGIENE has mobile laboratories that serve all 50 United States and around the world. **AIR HYGIENE** employees have performed over 15,000 emission tests on a variety of sources.

AIR HYGIENE performs air emission certification compliance testing on combustion sources (natural gas, coal, fuel oil, jet fuel, etc), NSPS sources, and Title V compliance sites. Our experience ranges from emission testing for new PSD facilities, MACT and RACT required performance certification testing to Relative Accuracy Test Audits (RATA Tests) for Continuous Emission Monitoring Systems (CEMS) and Parametric Emission Monitoring Systems (PEMS).

Air Hygiene has conducted numerous emission testing projects, which involved multiple groups relying upon instantaneous reporting of important test data. These projects relied upon **Air Hygiene**'s **SPIDER** network. The **SPIDER** network provides Simultaneously Produced Information During Emission Readings (**SPIDER**) between the emission monitoring system and multiple locations (i.e. control room, test center, office, etc.). Hence, you can view real-time emission testing data on-demand from any location you choose!

AIR HYGIENE performs FTIR testing by EPA Method 320 for Hazardous Air Pollutants (HAPS) including formaldehyde, benzene, xylene, toluene, hexane, ammonia, hydrogen chloride, etc. This methodology provides real-time analysis of these critical pollutants.

AIR HYGIENE specializes in the following types of pollutants and EPA Reference Methods (RM):

- Nitrogen Oxides (NOx) – RM 7e &/or 20
- Sulfur Dioxide (SO_2) – RM 6c
- Total Hydrocarbons (THC) – RM 25a
- Volatile Organic Compounds (VOC) RM 25a & RM 18
- Particulates (PM) – RM 5(filterable) & 202(condensable)
- PM < 10 microns (PM_{10}) – RM 201a
- PM < 2.5 microns ($PM_{2.5}$) – RM 201b
- Opacity – RM 9
- Exhaust Flow – RM 2 &/or 19
- Moisture – RM 4
- Carbon Monoxide (CO) – RM 10
- Carbon Dioxide (CO_2) – RM 3a
- Oxygen (O_2) – RM 3a &/or 20
- Dioxin & Furans – RM 23
- Metals – RM 29
- Chrome – RM 306
- Lead – RM 12
- Formaldehyde – RM 320 (FTIR), SW-846 0011, CARB 429, or CTM-037
- H_2S – RM 11
- BTEX – RM 18
- HAPS – FTIR – RM 320 (FTIR)
- Ammonia – CTM-027 or BAAQMD ST-1B
- Mercury – Ontario Hydro Method or RM 29

TESTING EXPERIENCE

AIR HYGIENE testing personnel account for more than sixty-five (65) years of testing experience and over 15,000 emission tests. Our testing services have involved dealings with all 50 state agencies and EPA regional offices. **AIR HYGIENE** testing personnel are rigorously trained on EPA reference test methods from 40 CFR Part 51, 60, 63, and 75. All testing personnel are instructed and tested on test responsibilities and must complete a "Demonstration of Capability" test per the **AIR HYGIENE** Quality Assurance Manual and the **AIR HYGIENE** Emission Testing Standard Operating Procedures Handbook.

AIR HYGIENE has completed testing on over 134 power plants including 315 combustion turbines, 21 coal fired boilers, 17 gas fired boilers representing 64,876 megawatts (MW). ***Let us add your project to our list of satisfied customers!***

TESTING SUCCESS STORIES

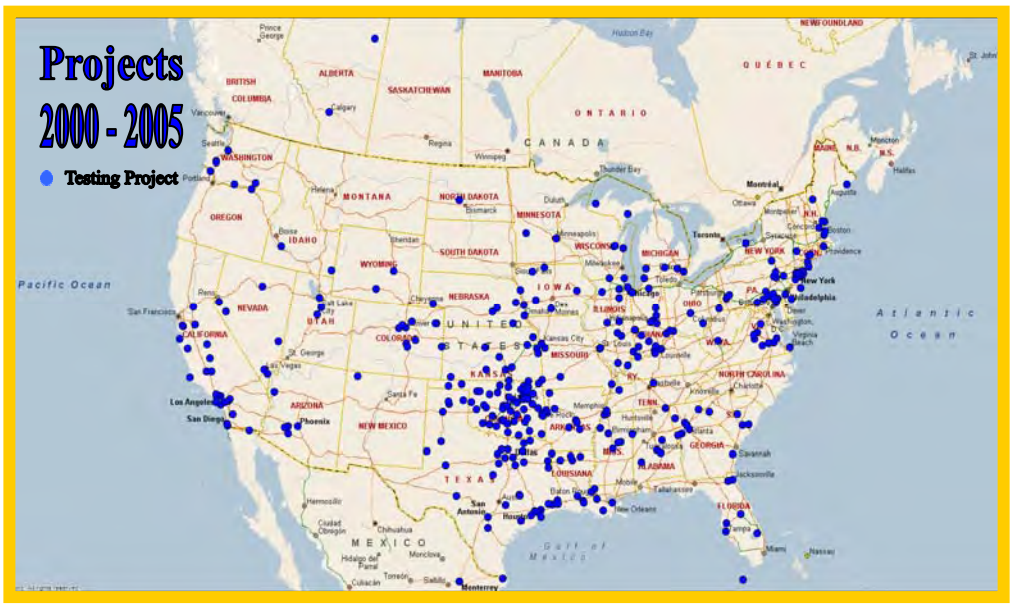
AIR HYGIENE personnel have performed thousands of testing projects which have yielded significant benefits for our clients. The following project descriptions briefly discuss some of these emission testing projects.

- Conducted numerous projects optimizing SCR performance by conducting inlet & outlet SCR analysis for NH_3, NOx, flow, and Oxygen. Used information to assist with flow optimization and AIG tuning.
- Conducted federal and state required compliance testing for NOx, CO, PM-10 (front & back-half), SO_2, VOC, Ammonia, Formaldehyde, Opacity, RATA testing (NOx and CO) for new and updated power plants with both simple and combined cycle turbines firing natural gas and fuel oil.
- Conducted dry low NOx burner tuning and performance testing for various models of GE, Siemens Westinghouse, Mitsubishi, Pratt & Whitney, and ABB combustion turbines to verify manufacturer's emission guarantees for clients in preparation for compliance testing.
- Conducted emission testing for NOx, CO, and VOC to assist tuning by performance engineers for meeting low-level NOx emissions and balancing combustion turbine performance.
- Performed power plant emission testing for natural gas fired combustion turbines. Tests included federal required testing per 40 CFR Part 75, state air permit requirements, RATA testing, and emission testing to verify manufacturer's guarantee's during electric/heat output performance testing. Other services for combustion turbine testing included preparation of the QA/QC manual, monitoring plan, seven-day drift test report, system linearity test, and cycle time test.

TESTING LOCATIONS

AIR HYGIENE bases mobilization charges on the distance from your site to the closest of nine (9) regional starting points covering all 50 United States. These include Seattle, Los Angeles, Denver, Tulsa, Houston, Chicago, Orlando, Atlanta, and Philadelphia.

Each start point is located such that the **AIR HYGIENE** test teams can mobilize to your site at affordable costs to ensure we are price competitive to any U.S. location.



COMBUSTION TURBINE TESTING SERVICES SUMMARY

Thank you for your consideration of the power and energy industry testing services of Air Hygiene International, Inc. (**AIR HYGIENE**). The following list details some of the testing services and extras **AIR HYGIENE** includes with each testing job.

Types of Air Testing Services for Combustion Turbines:

- Turbine tuning/mapping for NOx & NH_3 emissions
- Pollutant testing to verify EPC contractual emission guarantees
- Research and Development (R&D) emission data research and turbine optimization
- 40 CFR Part 60 Subpart GG – Turbine Compliance Testing
- 40 CFR Part 75 – Acid Rain Classified Equipment Testing
- 40 CFR Part 75 Appendix E – Peaking Plant CEMS alternative NOx emissions versus Heat Input mapping
- RATA Testing on CEMS systems for NOx, CO, SO_2, CO_2 or O_2, Flow (3-D & Wall effects)
- QA/QC Plans, Monitoring Plans, Linearity Checks, Testing Protocols, etc. are provided with our high quality, service oriented emission testing services
- Initial permit compliance testing for PM, PM-10, PM-2.5, SO_2, NOx, CO, exhaust flow, moisture, O_2, CO_2, Ammonia, Formaldehyde, other HAPs

AIR HYGIENE will provide the following testing services:

- On-site, real-time test data
- Fuel F-Factor calculation data sheet
- Experienced turbine testing personnel
- Flexible testing schedules to meet your needs
- Electronic reports provided on CD upon request
- Extensive experience with all 50 state agencies in the U.S.
- EPA Protocol 1 Certified Gases (one percent accuracy) for precise calibration
- Low range (0-10 ppm) equipment calibration and measurement available
- Test protocol preparation, coordination with state agency, and site personnel
- Numerous mobile testing labs, which may be used for your projects across the U.S.
- State-of-the-art data logging technology to allow real-time examination of meaningful emission data
- Monitor your emissions data measured in our test lab from your control room via our datalogging network system

AIR HYGIENE is committed to providing testing teams that will take the time to meet your needs. We ensure the job is completed on time with the least amount of interruption to your job and site operation as possible. Thank you for considering our services.

AIR HYGIENE's Synergistic Approach to Power Plant Air Emissions Testing

Power plants continue to be built, modified, and improved across the United States. These new or modified facilities are at the forefront of clean energy. These units are very efficient yet environmentally friendly, and must be to meet the stringent requirements set forth by the Environmental Protection Agency (EPA) and relevant state agencies. Air Hygiene International, Inc. (**AIR HYGIENE**) has developed a unique strategy to help owners deal with these complicated requirements.

Unique Testing Strategy

AIR HYGIENE has developed a synergistic approach to assisting the various groups involved in the completion of a commissioning/startup unit or modification project. **AIR HYGIENE** strives to combine the multiple testing aspects involved with bringing a combustion unit to commercial service. By conducting the various emission tests required for a new combustion unit using one test company, the following benefits are a given:

1. Save money by…
    a. Reduced mobilizations
    b. Combined tests yield reduced fuel usage and site time
    c. Bulk projects receive quantity discounts
2. Improve efficiency through familiarity with site needs
3. Site personnel and testing team are comfortable working together

These projects typically involve some or all of the following groups. There is not a defined set of responsibilities that will match every project. The table below simply suggests a typical list of testing responsibilities.

Responsible Party	**Testing Responsibilities**
Owner	Initial and on-going federal and state compliance testing (i.e. NSPS Sub GG, Part 75, Operating Air Permit, etc.)
Operator	Initial and on-going federal and state compliance testing (i.e. NSPS Sub GG, Part 75, Operating Air Permit, etc.)
Turbine/Boiler manufacturer	Contractual emission guarantees of unit (i.e. NOx, SO2, CO, VOC, PM-10, NH3, H2SO4)
EPC & Construction Company	Contractual emission guarantees including control devices (i.e. NOx, SO2, CO, VOC, PM-10, NH3, H2SO4)
CEMS Supplier	Initial RATA testing (i.e. NOx, CO, SO2, CO2, O2, flow)
Lending Party (i.e. bank)	No responsibility, but concerned with outcome of all tests
Environmental Consultant	Concerned with air permit and overall compliance; may select the test contractor and provide oversight for testing

Example Project:

A recent project provides a prime example of the synergistic benefits of using **AIR HYGIENE** to perform your commissioning/startup or remodification testing needs for performance and compliance. Eight GE Frame 7FA turbines were taken from performance testing through compliance testing in 20 days. The following tests were performed on each turbine:

- NOx tuning and mapping
- Contractual performance testing for NOx, CO, VOC, SO_2, NH_3, & PM_{10}
- 40 CFR Part 60 Subpart GG: testing for NOx and CO at max load
- 40 CFR Part 75: NOx & CO RATA certification on CEMS
- State required compliance testing for NOx, CO, VOC, NH_3(on-site analysis), formaldehyde (on-site analysis by FTIR), opacity and SO_2 burning natural gas

Test data was provided on-site for all tests, except PM-10. Electronic files were e-mailed for review to the turbine manufacturer, owner & operator, and environmental consultant within 24 hours following completion of site work. Complete reports including PM-10 were submitted to interested parties within 10 days following each blocks completion.

Power Plant Testing Experience

AIR HYGIENE personnel have over sixty-five (65) years of testing experience on combustion turbines, coal fired boilers, gas fired boilers, landfill gas, wood fired, & diesel fired engines across the United States. **AIR HYGIENE** has 10 combustion labs serving all 50 states from four permanent offices (Tulsa, OK; Houston, TX; Denver, CO; & Orlando, FL) and five mobilization points (Los Angeles, CA; Seattle, WA; Chicago, IL; Atlanta, GA; & Philadelphia, PA). **AIR HYGIENE** has tested plants ranging from 50 to 2,000 megawatts in both simple and combined cycle operation with controls including:

- Selective Catalytic Reduction - Ammonia injection
- Steam/Water injection
- Sprint injection
- Dry Low NOx burners (DLN)

AIR HYGIENE has completed testing at 134 plants on 315 combustion turbines, 21 coal fired boilers, 17 gas fired boilers, and others representing 64,876 megawatts (MW). **AIR HYGIENE** tested 5 power plants in 2000 and we have grown since testing 8 in 2001, 19 in 2002, 41 in 2003, and 52 in 2004. ***Let us add your upcoming project to our list of satisfied customers!***

INSTRUMENT CONFIGURATION AND OPERATIONS FOR GAS ANALYSIS

The sampling and analysis procedures used by **AIR HYGIENE** during tests conform in principle with the methods outlined in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 3a, 6c, 7e, 10, 18, 19, 20, and 25a.

The flowchart on the next page depicts the sample system used by **AIR HYGIENE** for analysis of oxygen (O_2), carbon dioxide (CO_2), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen oxides (NOx), and volatile organic compounds (VOC) tests. A heated stainless steel probe is inserted into the sample ports of the stack to extract gas measurements from the emission stream. The gas sample is continuously pulled through the probe and transported via 3/8 inch heat-traced Teflon® tubing to a stainless steel minimum-contact condenser designed to dry the sample through Teflon® tubing via a stainless steel/Teflon® diaphragm pump and into the sample manifold within the mobile laboratory. From the manifold, the sample is partitioned to the O_2, CO_2, SO_2, CO, and NOx analyzers through glass and stainless steel rotameters that control the flow rate of the sample. The VOC sample is measured as a wet gas.

The flowchart shows that the sample system is also equipped with a separate path through which a calibration gas can be delivered to the probe and back through the entire sampling system. This allows for convenient performance of system bias checks as required by the testing methods.

All instruments are housed in an air-conditioned trailer which serves as a mobile laboratory. Gaseous calibration standards are provided in aluminum cylinders with the concentrations certified by the vendor. EPA Protocol No. 1 is used to determine the cylinder concentrations where applicable (i.e. NO_x calibration gases).

All data from the continuous monitoring instruments are recorded on a Logic Beach Hyperlogger which retrieves calibrated electronic data from each instrument every second and reports an average of the collected data every 30 seconds and 10 seconds. The averaging time can be selected to meet the clients needs. **This data is available instantaneously for printout, statistical analysis, viewable by actual values, or examined by a trending graph!**

The number of test runs, test loads, and length of runs is based upon federal and state requirements for the facility. Typical run times associated with emission testing are as follows:

Type of Test	# of runs	Length of runs
O_2 Traverse (GG)	1 run @ low load (8 – 48 points)	2 minutes per point
NOx Stratification Test	1 run @ base load (12 points)	2 – 4 minutes per point
Subpart GG	3 runs @ 4 loads (30%, 50%, 75%, & 100%)	15 – 60 minutes per run
RATA	9 – 12 runs @ normal load	21 minutes per run
State Permit Test (gases)	3 runs @ base load	1 hour per run
State Permit Test (particulates)	3 runs @ base load	2 – 4 hours per run

The stack gas analysis for O_2 and CO_2 concentrations are performed in accordance with procedures set forth in EPA Method 3a (EPA Method 20 for O_2 on combustion turbines). The O_2 analyzer uses a paramagnetic cell detector. The CO_2 analyzer uses an infrared detector.

CO emission concentrations are quantified in accordance with procedures set forth in EPA Method 10. A continuous nondispersive infrared (NDIR) analyzer is used for this purpose.

NOx emission concentrations are measured in accordance with procedures set fort in EPA Method 7e and/or 20. A chemiluminescence analyzer is used to determine the nitrogen oxides concentration in the gas stream.

Total hydrocarbons (THC), non-methane, non-ethane hydrocarbons also known as volatile organic compounds (VOC) are analyzed in accordance with procedures set forth in EPA Methods 18 & 25a. A flame ionization detector calibrated with methane is used to determine the THC concentration in the gas stream and VOCs analyzed by GC to determine methane, ethane, and remaining VOCs per EPA Method 18 determination with gas chromatograph using FID detector.

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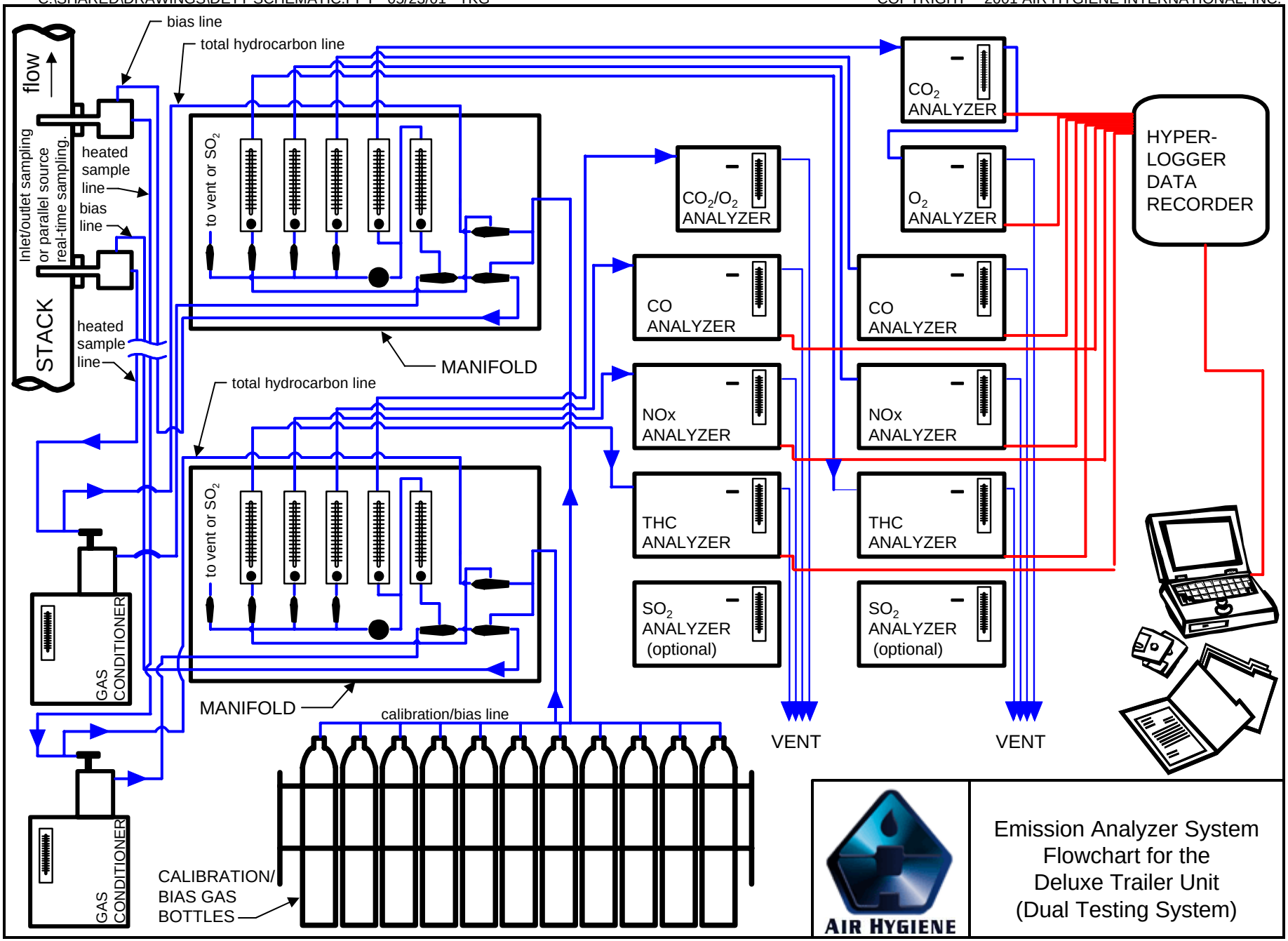

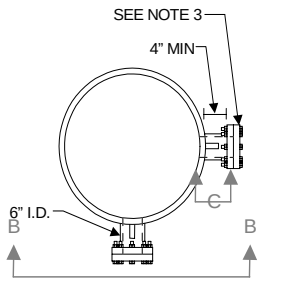

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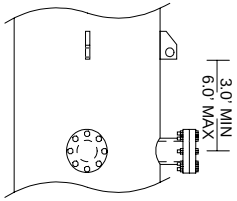

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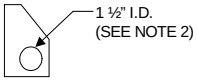

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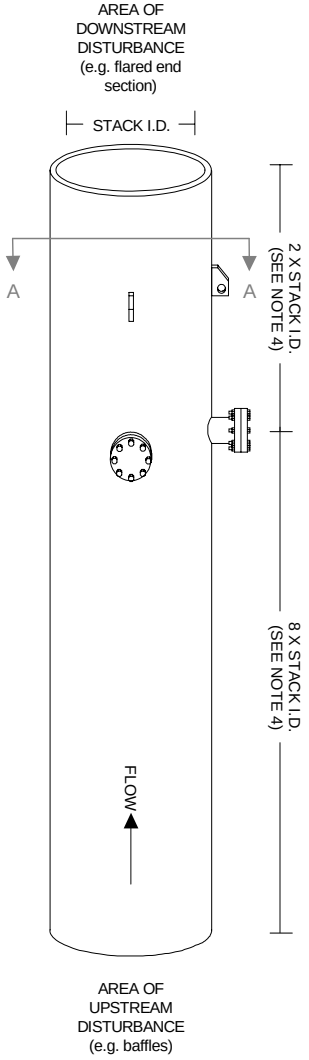

PARTIAL STACK
not to scale

NOTES

1. TWO PORTS WITH CENTERLINES AT 90° ANGLES
2. 3/8 INCH THICK STEEL, WELDED TO STACK EXTERIOR, PROVIDES PLACE TO HOOK CHAIN FOR RAIL ASSEMBLY
3. MINIMUM THREE INCH INNER DIAMETER STEEL PIPE, WELDED TO STACK EXTERIOR, HOLE CUT INTO STACK WALL, NO POTRUSIONS OR OBSTRUCTIONS INSIDE STACK WALL
4. IF TOTAL STACK LENGTH IS NOT AVAILABLE, EPA MINIMUM REQUIREMENTS ARE ½ X STACK I.D. FROM PORTS TO TOP AND 2 X STACK I.D. FROM PORTS TO BOTTOM

AIR HYGIENE

PORT INSTALLATION DIAGRAM
5634 S. 122nd East Ave, Suite F
Tulsa, Oklahoma 74146
www.airhygiene.com
(888) 461-8778

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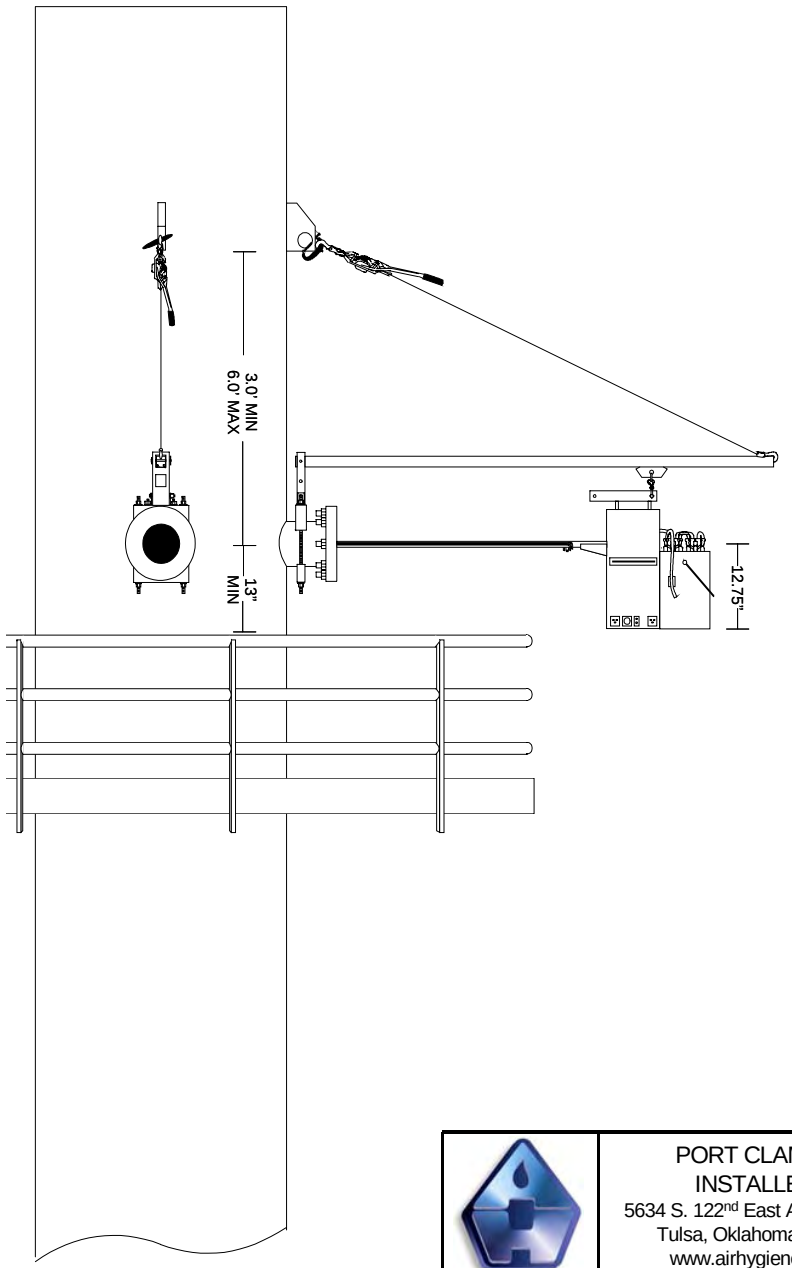

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AIR HYGIENE

PORT CLAMPS INSTALLED
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TURBINE TESTING QUALITY ASSURANCE ACTIVITIES

A number of quality assurance activities are undertaken before, during, and after turbine testing projects. This section describes each of those activities.

Each instrument's response is checked and adjusted in the field prior to the collection of data via multi-point calibration. The instrument's linearity is checked by first adjusting its zero and span responses to zero nitrogen and an upscale calibration gas in the range of the expected concentrations. The instrument response is then challenged with other calibration gases of known concentration and accepted as being linear if the response of the other calibration gases agreed within ± two percent of range of the predicted values.

NO_2 to NO conversion is checked via direct connect with a EPA Protocol certified concentration of NO_2 in a balance of nitrogen. Conversion is verified to be above 90 percent.

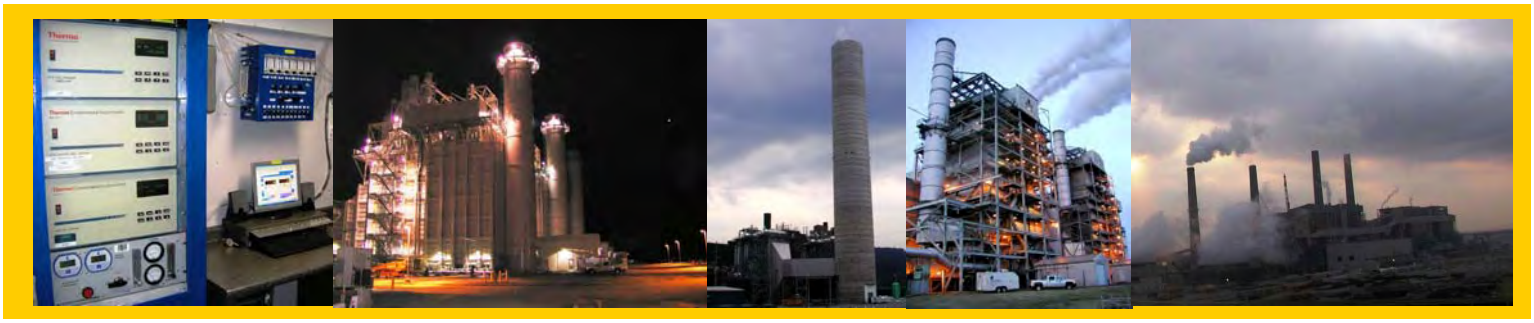
Instruments are both factory tested and periodically field challenged with interference gases to verify the instruments have less than a two percent interference from CO_2, SO_2, CO, NO, and O_2.

After each test run, the analyzers are checked for zero and span drift. This allows each test run to be bracketed by calibrations and documents the precision of the data collected. The criterion for acceptable data is that the instrument drift is no more than three percent of the full-scale response. Quality assurance worksheets summarize all multipoint calibration linearity checks and the zero to span checks performed during the tests are included in the test report.

The sampling systems is leak-checked by demonstrating that a vacuum greater than 10 in. Hg can be held for at least one minute with a decline of less than one in. Hg. A leak test is conducted after the sample system is set up and before the system is dismantled. This test is conducted to ensure that ambient air does not dilute the sample. Any leakage detected prior to the tests is repaired and another leak check conducted before testing will commence.

The absence of leaks in the sampling system is also verified by a sampling system bias check. The sampling system's integrity is tested by comparing the responses of the analyzers to the responses of the calibration gases introduced via two paths. The first path is directly into the analyzers and the second path includes the complete sample system with injection at the sample probe. Any difference in the instrument responses by these two methods is attributed to sampling system bias or leakage. The criterion for acceptance is agreement within five percent of the span of the analyzer.

The control gases used to calibrate the instruments are analyzed and certified by the compressed gas vendors to ± one percent accuracy for all gases. EPA Protocol No. 1 is used, where applicable, to assign the concentration values traceable to the National Institute of Standards and Technology (NIST), Standard Reference Materials (SRM). The gas calibration sheets as prepared by the vendor are included in the test report.



TURBINE QUALITY ASSURANCE PROGRAM SUMMARY

AIR HYGIENE ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by an internal QA team and encompasses five major areas:

1. QA reviews of reports, laboratory work, and field testing;
2. Equipment calibration and maintenance;
3. Chain-of-custody;
4. Training; and
5. Knowledge of current test methods.

QA Reviews

AIR HYGIENE's review procedure includes review of each source test report, along with laboratory and fieldwork, by the QA Team. The most important review is the one that takes place before a test program begins. The QA Team works closely with technical division personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance

The equipment used to conduct the emission measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined by the Environmental Protection Agency. Quality control checks are also conducted in the field for each test program. Finally, **AIR HYGIENE** participates in a PT gas program by analyzing blind gases semi-annually to ensure continued quality.

Chain-of-Custody

AIR HYGIENE maintains full chain-of-custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, **AIR HYGIENE** documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.). Samples are stored in a locked area to which only **AIR HYGIENE** personnel have access. Field data sheets are secured at **AIR HYGIENE**'s offices upon return from the field.

Training

Personnel's training is essential to ensure quality testing. **AIR HYGIENE** has formal and informal training programs, which include:

1. Participation in EPA-sponsored training courses;
2. A requirement for all technicians to read and understand Air Hygiene Incorporated's QA manual;
3. In-house training relating to 40 CFR Part 60 Appendix A methods and QA meetings on a regular basis;
4. OSHA 40 hour Hazwopper Training;
5. Visible Emission (Opacity) Training; and
6. Maintenance of training records.

Knowledge of Current Test Methods

With the constant updating of standard test methods and the wide variety of emerging test procedures, it is essential that any qualified source tester keep abreast of new developments. **AIR HYGIENE** subscribes to services, which provide updates on EPA reference methods, rules, and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences. **AIR HYGIENE** personnel maintain membership in various relevant organizations associated with gas fired turbines.

AIR HYGIENE INT'L Experience

F-Factor Datasheet and Fuel Gas Analysis

Company: XYZ Power
Location: XYZ Power Plant
Date: April 9, 2001

Values to enter from fuel gas analysis by GPA 2166.

Font Scheme:
Blue Font = enter new data
Black Font = calculated data
Green Font = Labels for columns & rows
Red Font = Important results with notes

Gas Component		Mole (%)	Molecular Weight (lb/lb-mole)	lb Component per lb-Mole of Gas	Weight % of Component	Fuel Heat Value [HHV] (Btu/scf)[1]	Fuel Heat Value [LHV] (Btu/scf)[1]
Methane	CH4	96.491	16.04	15.477	92.97	974.27	877.20
Ethane	C2H6	2.115	30.07	0.636	3.82	37.41	34.22
Propane	C3H8	0.186	44.1	0.082	0.49	4.68	4.31
iso-Butane	iC4H10	0.019	58.12	0.011	0.07	0.62	0.57
n-Butane	nC4H10	0.023	58.12	0.013	0.08	0.75	0.69
Iso-Pentane	iC5H12	0.008	72.15	0.006	0.03	0.32	0.30
n-Pentane	nC5H12	0.005	72.15	0.004	0.02	0.20	0.19
Hexanes	C6H14	0.025	86.18	0.022	0.13	1.19	1.10
Heptanes	C7H16	0.000	100.21	0.000	0.00	0.00	0.00
Octanes	C8H18	0.000	114.23	0.000	0.00	0.00	0.00
Carbon Dioxide	CO2	0.510	44.01	0.224	1.35	0.00	0.00
Nitrogen	N2	0.618	28.01	0.173	1.04	0.00	0.00
Hydrogen Sulfide	H2S	0.000	34.08	0.000	0.00	0.00	0.00
Oxygen	O2	0.000	32	0.000	0.00	0.00	0.00
Helium	He	0.000	4	0.000	0.00	0.00	0.00
Hydrogen	H2	0.000	2	0.000	0.00	0.00	0.00
Totals (dry)		100.000		16.648	100.00	1019.44	918.57
Totals (wet)						1001.66	902.55

[1] Standardized to 60°F and 1 atm to match fuel flow data

If total is not 100.000 then the mol% data was either entered incorrectly or the gas analysis is incomplete. Sometimes small differences are due to rounding error.

High Heat Value of dry gas (HHV-dry) This is the primary fuel heat value used in emission testing calculations.

Low Heat Value of dry gas. LHV-dry

High Heat Value of wet Gas. HHV-wet

Low Heat Value of wet gas. LHV-wet

Characteristics of Fuel Gas		
Molecular Weight of gas =	16.648	lb/lb-mole
Btu per lb. of gas =	23239.7689	gross (HHV)
Btu per lb. of gas =	20940.2961	net (LHV)
wt % VOC in fuel gas =	0.83	%
Specific Gravity =	0.5749	

Value used to convert THC readings to VOC.

Component	Weight %
carbon	73.71
oxygen	0.98
hydrogen	24.27
nitrogen	1.04
helium	0.00
sulfur	0.00
Total	100.00

F-Factor (scf dry exhaust per MMBtu [HHV] = 8641.17
(Based on EPA RM-19) at 68°F and 1 atm

Fuel Specific F-Factor. Note that EPA Method 19 lists natural gas's F-factor as 8710.

F-Factor Calculation:

F-Factor = 1,000,000*((3.64*%H)+(1.53*%C)+(0.57*%S)+(0.14*%N)-(0.46*%O))/GCV

%H, %C, %S, %N, & %O are percent weight values calculated from fuel analysis and have units of (scf/lb)/%

GCV = Gross Btu per lb. of gas (HHV)

EXAMPLE TESTING DATASHEET FOR GASES
XYZ Power Plant
GE GTG Frame 7FA Combustion Turbine
Fuel: Natural Gas

Fuel Data

Fuel F-Factor	8,671.5	SCF/MMBtu
Generator Output	172.0	MW
Fuel Flow	515,040.8	SCFH
Fuel Heating Value (HHV)	1,076.5	Btu/SCF
Combustor Inlet Pressure	6,166.5	mm Hg
Heat Input (LHV)	500.6	MMBtu/hr
Stack Moisture Content	8.4	%
Stack Exhaust Flow	13,600,266.4	SCFH

Weather Data

Barometric Pressure	29.11	in. Hg
Relative Humidity	82	%
Dry Bulb Temperature	72	F
Specific Humidity	0.0142443	lb H2O/lb air
Wet Bulb Temperature	68	F

yellow - supporting information
gray - raw testing data
green - final results

Run #1 - 100% High Load

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	VOC (ppmvw)	SO_2 (ppmvd)	CO_2 (%)
06/27/01 11:47:32	16770	13.57	5.05	-0.38	0.59	0.59	5.09
06/27/01 11:48:02	16800	13.57	5.85	-0.26	0.63	0.63	4.83
06/27/01 11:48:32	16830	13.55	6.37	-0.44	0.71	0.71	4.71
06/27/01 11:49:02	16860	13.54	6.83	0.60	0.83	0.83	4.33
06/27/01 11:49:32	16890	13.55	7.26	0.25	0.99	0.99	4.49
06/27/01 11:50:02	16920	13.55	6.44	-0.24	1.14	1.14	4.64
06/27/01 11:50:32	16950	13.54	6.28	-0.75	1.29	1.29	4.79
06/27/01 11:51:02	16980	13.55	5.68	-0.68	1.46	1.46	4.96
06/27/01 11:51:32	17010	13.58	6.01	-1.14	1.60	1.60	5.10
06/27/01 11:52:02	17040	13.49	5.05	1.36	1.69	1.69	5.19
06/27/01 11:52:32	17070	13.60	5.14	-0.47	1.70	1.70	5.20
06/27/01 11:53:02	17100	13.61	4.58	0.69	1.69	1.69	5.19
06/27/01 11:53:32	17130	13.62	4.93	0.90	1.65	1.65	5.15
06/27/01 11:54:02	17160	13.62	4.69	0.54	1.64	1.64	5.14
06/27/01 11:54:32	17190	13.61	4.83	0.64	1.59	1.59	5.09
06/27/01 11:55:02	17220	13.61	4.76	-0.07	1.60	1.60	5.10
06/27/01 11:55:32	17250	13.64	4.86	-0.02	1.59	1.59	5.09
06/27/01 11:56:02	17280	13.63	4.38	0.92	1.51	1.51	5.01
06/27/01 11:56:32	17310	13.61	4.94	-0.01	1.47	1.47	4.97
06/27/01 11:57:02	17340	13.61	4.89	0.27	1.47	1.47	4.97
06/27/01 11:57:32	17370	13.61	4.82	1.28	1.46	1.46	4.96
06/27/01 11:58:02	17400	13.61	4.69	1.55	1.46	1.46	4.96
06/27/01 11:58:32	17430	13.60	4.23	1.16	1.46	1.46	4.96
06/27/01 11:59:02	17460	13.59	4.69	-0.26	1.46	1.46	4.96
06/27/01 11:59:32	17490	13.57	4.89	-1.46	1.49	1.49	4.99
06/27/01 12:00:02	17520	13.58	4.86	-1.49	1.53	1.53	5.03
06/27/01 12:00:32	17550	13.59	4.79	-0.79	1.53	1.53	5.03
06/27/01 12:01:02	17580	13.58	4.76	-1.57	1.54	1.54	5.04
06/27/01 12:01:32	17610	13.57	4.65	1.17	1.53	1.53	5.03
06/27/01 12:02:02	17640	14.24	4.69	0.01	1.52	1.52	5.02
06/27/01 12:02:32	17670	13.54	4.83	1.68	1.52	1.52	5.02
06/27/01 12:03:02	17700	13.55	5.70	1.31	1.53	1.53	5.03
06/27/01 12:03:32	17730	13.55	5.66	-0.73	1.53	1.53	5.03
06/27/01 12:03:32	17760	13.55	5.04	-0.48	1.53	1.53	5.03
RAW AVERAGE		**13.6**	**5.2**	**0.1**	**1.4**	**1.4**	**5.0**

QA/QC Data Control

		O_2 (%)	NOx (ppmvd)	CO (ppmvd)	VOC (ppmvw)	SO_2 (ppmvd)	CO_2 (%)
Bias & Drift Checks	**Initial Zero**	0.2	0.3	-0.2	0.0	0.1	0.1
	Final Zero	0.2	0.5	-0.2	0.2	0.2	0.1
	Avg. Zero	0.2	0.4	-0.2	0.1	0.2	0.1
	Initial UpScale	12.1	5.8	4.0	3.4	28.3	9.0
	Final UpScale	12.1	5.7	4.0	3.3	28.2	8.8
	Avg. UpScale	12.1	5.8	4.0	3.4	28.3	8.9
Upscale Cal Gas		12.0	5.7	4.0	3.5	28.0	9.0

Emissions Data

	O_2 (%)	NOx (ppmvd)	CO (ppmvd)	VOC (ppmvd)*	SO_2 (ppmvd)	CO_2 (%)
Corrected Raw Averages	13.5	5.1	0.3	1.5	1.3	5.0
ppm @ 15% O_2	N/A	4.2	0.2	1.2	1.0	N/A
ppm @ 15% O_2 & ISO	N/A	4.7	0.2	1.4	1.1	N/A
Emission Rate (lb/MMBtu)	N/A	0.015	0.000	0.004	0.005	N/A
Emission Rate (lb/hr)	N/A	8.46	0.27	2.40	2.84	N/A
Emission Rate (ton/year) @ 8760 hr/yr	N/A	37.07	1.20	10.49	12.43	N/A
Emission Rate (g/MW*hr)	N/A	0.06	0.00	0.02	0.02	N/A

*VOC data in Emissions Data Table has been converted to dry values by the equation below.

*VOC uncorrected raw average * (100/100-stack moisture content)

CLIENT REFERENCES

The following are current clients who represent the various companies for whom **AIR HYGIENE** has performed testing services. Please feel free to call and discuss our services with them.

Brian Kearney
Reliant Energy
(814) 533-8261

Linda Boyer
Pennsylvania Power & Light
(610) 774-4400

David Sloat
Sargent & Lundy
(312) 269-2784

Kathy Waxman
Keyspan Energy
(516) 545-2579

Rex Lee
Kiewit
(434) 589-7224

Sheila Wheeler
Burns & McDonnell
(816) 822-3250

Jose P. Lozada
Burns and Roe
(201) 986-4261

Kevin Kellie
Calpine
(918) 486-1830

Mark Chrisos
Intergen
(781) 993-3036

Gush Singh
Bechtel
(301) 228-7281

Ron Sigur
Fresh Meadow Mechanical
(516) 546-1656

Tom Price
Calpine - Oregon
(541) 667-3222

Don Fritz
Mirant
(702) 632-8630

Jordan M. Haywood
Siemens Westinghouse
(407) 736-3045

Ken Welch
Universal Energy
(281) 335-9811

Richard Winch
PowerTek (A Subsidiary of Power Technological Services)
(417) 538-9013

Charles Spell
Arizona Public Service Co.
(602) 250-1383

Glenn Atkinson
Zachry Construction
(770) 251-7915

Roosevelt Huggins
Black & Veatch
(913) 458-7864

Steve Brooks
Aquila
(816) 387-6266

Tim Travers
Florida Power & Light
(610) 859-9591

Tracy Patterson
Cogentrix
(804) 541-4246

Rod Klauer
Peerless Manufacturing
(972) 559-6308

Terrie Blackburn
Williams Power
(918) 573-9766

PK Chelian
Foster Wheeler
(908) 713-2159

Mary Kate Grossman
AES
(817) 579-8201

Sam Faghih
SNC-Lavalin
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Tim Mordhorst
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Mark Finnlay
Alstrom
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KM Power (Kinder Morgan)
(303) 914-7517

Darin Watson
Transalta
(360) 807-3002

Mike Geers
Cinergy
(513) 287-3839

Monty Wiggins
Modern Continental
(864) 243-0519

Satoru (Scott) Shishido
Hitachi
(914) 524-6614

Karst Postma
TIC
(970) 879-2561

Chris Jacobsen
Tenaska Power Partners
(402) 691-9500

Robert Van Engelenhoven
Pacificorp
(801) 220-4402

John Davis
LG Constructors
(702) 644-5896

J. Neely Ashe
Duke Energy
(713) 989-8325

Jammie Bowen
Utility Engineering
(806) 359-2497

Joe Elliot
Nooter Erickson
(636) 651-1198

Richard Hooper
Stone & Webster
(303) 741-7409

Marilyn Teague
Sempra Energy
(949) 387-5712

William Stark
RW Beck
(303) 299-5200

Robert Farmer
URS Corporation
(602) 371-1100

Lewis Schuessler
BE&K Engineering
(205) 972-6522

Charles Gibbs
PIC World
(678) 627-4467

Mike Brown
AEP
(724) 449-9700

APPENDIX H

MPCA APPROVALS AND REQUESTED FORMS

Thomas Graham

From: Gorg, Steven [Steven.Gorg@state.mn.us]
Sent: Tuesday, May 29, 2007 3:02 PM
To: chuck.wagoner@fibrowattusa.com
Cc: Terry Walmsley; victor.myers@slthermal.com; robert.dolesky@snclavalin.com; Magee-Hill, Heather; Kilgriff, Sarah; Stock, Curtis; Place, Andrew; tom@airhygiene.com
Subject: Fibrominn, LLC (SV 001): Test Plan Approval Letter (May 29, 2007)
Attachments: Fibrominn (SV 001).pdf; Performance Test Report Completeness Criteria (PTRCC).pdf

Hello Chuck. Attached is the approval letter and referenced form (Performance Test Report Completeness Criteria (PTRCC).pdf) for your recently submitted test plans.

Thanks - Steve

Steven J. Gorg, M.S., P.E.
Environmental Engineer
Industrial Division
Minnesota Pollution Control Agency (MPCA)
520 Lafayette Road, St. Paul, MN 55155-4194
Phone: 651-296-8766
Fax: 651-296-8717
Email: steven.gorg@pca.state.mn.us
MPCA web site: http://www.pca.state.mn.us

Performance Test Plan Approval

Minnesota Pollution Control Agency
520 Lafayette Rd. N. Saint Paul, MN 55155-4194 (651) 296-6300
www.pca.state.mn.us

AQ#4065

Facility Name: **Fibrominn, LLC**
Facility Contact: Chuck Wagoner
Address: 900 Industry Drive
Phone: 320-843-9013
Test Locations: SV 001 (EU 001, MR 001-007; CE 001, 003 and 004)
Scheduled For: June 04 through June 11, 2007, at your facility located in Benson, Minnesota.

Your test plan received on May 07, 2007, and discussed on May 29, 2007, is approved by the Minnesota Pollution Control Agency (MPCA) as follows:

☐ Shortened test notification approved

☐ Test plan approved without modification

☒ Test plan approved with the following provisions:

The performance tests are being performed to measure emissions for determining the compliance status with permitted emission limits/requirements (see the relevant permit requirements for limits/requirements/parameters). Emission units and control equipment associated with the results of the performance test must be operated at maximum capacity/worse case conditions to avoid the establishment of new operational limits. The control equipment operational parameters may change based on the averages recorded during testing.

Include in the final test report(s) the full reference method data record (strip chart and/or datalogger output) used to calculate emissions. The data record should include calibration values for any instrumental analyzer used for emissions compliance testing.

Include in the final test report(s) all process and pollution control equipment operating data collected at 15 minute intervals and averaged for each test period. This information should be easily understood by individuals not familiar with the process.

Include in the final test report and CD-ROM copy; a signed certifications form, the test plan, this test plan approval letter (TPAL) and the email to which the TPAL was attached. The CD-ROM test report copy must be labeled with the AQ File Number, Company Name, Emission Unit Tested and Test Dates as stated on the submittal form. Only one paper copy and one CD-ROM/Microfiche copy of the test report are to be submitted.

Include in the final test report a simplified drawing of the test locations including pollution control equipment, stack orientation and test port locations.

Include the process rates and control equipment rates on the Operating Data Summary Form.

Obtain the required submittal and operating data forms from the website noted below[1].

Required Forms:

☒ Operating Data Summary- Combustion ☐ Operating Data Summary- Waste

Sources[1] Combustors[1]

☐ Operating Data Summary- Process Sources[1] ☐ Operating Data Summary- Asphalt Plants[1]
☒ Certifications Form[1] ☒ Microfiche/CD-ROM Submittal Form[1]
☒ Performance Test Report Completeness Criteria (PTRCC) (attached)
1 – Available at: www.pca.state.mn.us/air/performancetest.html

Approved by: **Date: May 29, 2007**

Steven J. Gorg, M.S., P.E.
Environmental Engineer
Industrial Division
Compliance and Enforcement Section

Please contact me at (651) 296-8766 if you have any questions regarding this approval.

Please be aware that enforcement action will be taken for performance test failures indicating emissions above applicable limits (excess actual emissions to the environment). Failures commonly result in assessment of a monetary penalty. Upon the first test failure, the Company should take immediate measures to minimize emissions. The measures taken should be documented, as they will become part of the record of corrective actions.

Hard Copy Performance Test Reports and Microfiche or CD Copy submittals will be addressed to: Compliance Tracking Coordinator, Compliance and Enforcement Unit, Industrial Division, Minnesota Pollution Control Agency, 520 Lafayette Road North, St. Paul, Minnesota 55155-4194

cc: Terry Walmsley, Fibrowatt (email)
Victor Myers, Fibrominn (email)
Robert Dolesky, SNC Lavalin (email)
Thomas Graham, P.E., Air Hygiene International (email)
Heather Magee-Hill, MPCA St. Paul (email)
Sarah Kilgriff, MPCA St. Paul (email)
Curt Stock, MPCA St. Paul (email)
Andy Place, MPCA St. Paul (email)
AQ Correspondense File No. 4065

Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155-4194

Air Performance Test Form

Operating Data Summary for Combustion Sources

Facility Information (please print)

Company name: Fibrominn, LLC Furnace(s) No: 1

Test date(s): July 2-4, 2007

A. Fuel Input and Operating Capacities: Itemize fuels and materials added to the combustion process during the test period. Attach ultimate/proximate analysis of the fuel, if applicable. **List appropriate units.**

Run No.	Fuel type & origin (e.g. Bituminous/Eastern)	Fuel input (list units)	Heat content (list units)	Steam (10^3 lbs/hr)	Gross MW/hr	Heat input (10^6 Btu/hr)
1	Biomass (turkey litter)	83.9 ton/hr	4,334 Btu/lb	487	61	784.4
2	Biomass (turkey litter)	83.3 ton/hr	4,334 Btu/lb	487	62	774.1
3	Biomass (turkey litter)	88.5 ton/hr	4,334 Btu/lb	490	63	777.9
Avg.	Biomass (turkey litter)	85.22 ton/hr	4,334 Btu/lb	488	62	778.8

B. Operating Data for Furnace and Air Pollution Control Equipment

1. Were the furnace(s) and control equipment operated consistent with normal procedures? ☒ Yes ☐ No If no, explain

2. Date(s) and procedure(s) of last maintenance/cleaning within 6 months:
   ☒ Remains unchanged from information provided in test plan

3. Include a copy of chart/data log records during test for the combustion efficiency indices: carbon monoxide (CO), oxygen (O_2), carbon dioxide, (CO_2), combustibles, steam flow, air flow, etc. (Label as appropriate.)

4. Soot blowing and ash pulling information: ☐ No soot blowing or ash pulling conducted, go to Item 5.

   What is the normal soot blowing frequency for unit(s)? ☐ Continuous, no further information required for this column.

   a) minutes/shift: 240 b) shifts/day: 2

   What were the soot blowing times during the test?

   Start: periodic End:

   Start: End:

   Last time before testing when soot blown? (date and time)

   What is the normal ash pulling frequency for unit(s)? ☒ Continuous, no further information required for this column.

   a) minutes/shift: b) shifts/day:

   What were the soot blowing times during the test?

   Start: End:

   Start: End:

   Last time before testing when soot blown? (date and time)

5. Summarize control equipment operating data documented during testing. Values reported should reflect maximum, minimum, averages, or as approved in the test plan. (See test plan and approval letter)

Examples of APC equipment and parameters generally monitored. Monitor as in the test plan and/or approval letter.

- Scrubber (list type of scrubber): ΔP (in. w.c.) and feed rate (gpm and psig)
- Baghouse, Cyclone, and Multi-clone: ΔP (in. w.c.)
- Catalytic Incinerator :($°F_{inlet}$,$°F_{outlet}$) and Thermal Incinerator: ($°F_{operating}$)
- ESP: Number and identity of operating field(s)

	APC equipment and parameter monitored	**Run 1**	**Run 2**	**Run 3**	**Average**
	SDA Slurry Flow (GPM)	27.1	22.3	30.9	26.8
	SDA Quench Flow (GPM)	14.4	14.5	8.6	12.5
	SH Steam Temp (°F)	968	971	969	969.2
	SH Steam Pres. (psi)	1,500	1,504	1,499	1,501
	List pollutant & averaging basis—should reflect permit	**Run 1**	**Run 2**	**Run 3**	**Average**
	Continuous Opacity Monitor(list hourly average): (%)	**2.69**	**2.94**	**0.83**	2.15
	NOx Monitor (list averaging basis): lb/MMBtu	**0.141**	**0.118**	**0.160**	0.140
	SO2 Monitor (list averaging basis): % reduction	**80.88**	**81.23**	**80.47**	80.86

Abbreviations:

APC = air pollution control
Btu = British thermal units
gpm = gallons per minute
in. w.c. = inches of water column
lbs. = pounds
MW = megawatts
Psig = pressure per square inch gauge
ΔP = pressure drop

NOTE: *This form provides only a summary of the operating conditions during the performance test. Additional and more detailed records are required to meet the requirements of Minn. R. 7017.2035. This form is to be submitted as part of the performance test report.*

Hard Copy Performance Test Reports and Microfiche or CD Copy submittals will be addressed to:

Air Quality Compliance Tracking Coordinator
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155-4194

Air Performance Test Form

Performance Test Report Completeness Criteria

The owner or operator of an emissions facility is responsible for submitting a complete test report as defined by Minn. R. 7017.2035. A test report may be rejected if it is deemed incomplete. As a result, this form is designed to ensure that your submittal is complete.

1) Facility name: Fibrominn Biomass Power Plant

2) Air quality facility ID number (first 8 digits of permit number): 15100038

3) Air quality file number: _____

4) Facility location address: 900 Industry Drive

City: Benson State: MN Zip code: 56215

5) Date of performance test: July 2-4, 2007

6) Facility contact person (Individual who is designated to receive agency correspondence related to this test):

Mr./Ms: _____ _____

Title: _____ _____

Mailing address: _____

City: _____ State: _____ Zip code: _____

e-mail address: _____

7) Test report checklist:

Cover:

☒	Name and location (address) of the emission facility	☒	Date(s) of the performance test
☒	Identification of emission unit(s) tested (i.e. GP002, EU031, SV028, or CE001 – Identification of the tested unit which has the emission limit as designated by your permit [source designators])	☒	Name and address of the testing company or agency
☒	AQ Facility ID Number (first 8 digits of permit number) and AQ File Number	☒	Facility contact person (individual designated to receive agency correspondence), and contact information including title, address, phone number, fax number, and email address

Certification:

☒	Signed and dated certification statements as defined by Minn R. 7017.2040 (An exact duplicate must be included in the CD-ROM copy of the test report)

Introduction:

☒	Reason for testing (i.e. Permit condition, notice of violation, etc., including permit number or name of other applicable compliance document, include correct Rule citation as outlined in permit)	☒	Pollutants tested (for each emission unit tested)
☒	Test location and type of process including source designators as outlined in permit	☒	Observers names including industry and agency observers
☒	Test date(s)	☒	Changes from test plan, problems experienced during test and any other relevant background information

Summary of Results: (see attached Table 1: Summary of Performance Test Results)

☒	Emission results expressed in the same units as the emission limits	☒	Description of collected samples
☒	Process data as related to determination of compliance (must include process rates, process parameters and pollution control equipment parameters that will be used to determine worst case operating conditions and pollution control equipment limitations during the test [see the relevant operator data forms at http://www.pca.state.mn.us/air/performancetest.html])	☒	Visible emissions summary if applicable
☒	Emission limits (as stated in your permit or applicable regulations) and applicable regulations citations as stated in your permit	☒	Discussion of errors, both real and apparent (If no errors occurred, verify by including statement)

Operating Parameters: (see the relevant operator data forms at http://www.pca.state.mn.us/air/performancetest.html)

*Note: *Readings of discrete data from monitoring instruments must be recorded at least every 15 minutes, or other reasonable time interval as approved, during the test and strip charts or retrieved electronic data from continuous monitors must be included in the test report.*

☒	Description of process and air pollution control devices including emission unit(s) tested (i.e. GP002, EU031, SV028, or CE001 – Identification of the tested unit which has the emission limit as designated by your permit [source designators])	☒	Process data and results, with example calculations (Process data must be collected and averaged for each test run and averaged for each series of tests for each unit tested. Process data must be displayed in the same units that were used to determine worst case operating conditions during the test. Process data must be easily understood by personnel not familiar with the process.)
☒	Process and control equipment flow diagrams	☒	Any specially required operation demonstrations

Maintenance:

☒	Description including dates of all maintenance and operational inspections, including major cleaning operations and replacement, repair, or modification of functional components of process or control equipment done in the month prior to the test (Include a statement if no maintenance was performed)

Sampling and Analysis Procedures:

☒	Sampling port location and dimensioned cross section showing all flow disturbances including fans, elbows, dampers, constrictions and pollution control equipment. Measurements should be included on diagram(s).	☒	Brief description of sampling procedures and analytical methods, with discussion of deviations from standard methods (include a statement if no deviations were made), including a statement of source methods used, but not including complete copies of reference methods
☒	Description of sampling point (including duct orientation, number of test ports, number of sampling points, distances to upstream and downstream flow disturbances)	☒	If a method other than a US EPA reference method was used: a statement of the detection limit and the level of accuracy of the method under the conditions of the test and at the concentration of air pollutant that is reported.
☒	Description of sampling train	☐	

Appendix:

☒	Complete results, including any fuel analysis, with example calculations, showing equations used and actual results in equation form on same or adjacent pages, using applicable equations shown in the reference method	☒	Test log (include test times, test interruptions and causes, and any other significant events related to the testing)

☒	Copies of raw field data	☒	Calibration procedures and results including pitot tube, nozzle, meter box, thermometer, barometer calibrations and any other equipment used to collect emissions samples. Instrument calibrations must be performed in accordance to the reference method used and calibration values must be displayed on the same data recorder from which emissions results are calculated.
☒	Laboratory report with chain of custody record	☒	Project participants and titles
☒	Raw production data, signed by plant official who can interpret, and be held accountable for the data	☒	A copy of the most recent version of the test plan and a copy of the commissioner's written approval of the test plan

Additional Information:

☒	Any other special requirement of the test method, test plan, applicable requirement or compliance document	☒	Any other information necessary to evaluate compliance with Minn R. 7017.2020 and 7017.2025 as requested by the commissioner.

REFERENCED TABLE

Table 1: Summary of Performance Test Results

1(a) Emission Unit Tested	1(b) Limitation Basis	1(c) Pollutant and Emission Limit	1(d) Test Result
EXAMPLE Boiler No. 3 (EU 042/ SV 440)	Minn. Stat. 116.07, subd. 4a	Particulate (B): 12 lbs/hour	Particulate (B): 4.1 lbs/hour
		VOC: 13 lbs/hour as carbon	VOC: 2.3 lbs/hour as carbon
	Title I Condition: 40 CFR § 52.21(j) (BACT limit); Minn. R. 7007.3000	Carbon Monoxide: 0.090 lbs/MMBtu	Carbon Monoxide: 0.00078 lbs/MMBtu
		Volatile Organic Compounds: 0.0090 lbs/MMBtu	Volatile Organic Compounds: 0.00050 lbs/MMBtu
	Title I Condition: 40 CFR § 52.21(k) (modeling); Minn. R. 7007.3000	Carbon Monoxide: 33.6 lbs/hour	Carbon Monoxide: 0.26 lbs/hour

Table References:
(A) Filterable particulate matter as determined by U.S. Environmental Protection Agency (EPA) Method 5.
(B) Filterable plus organic condensable particulate matter as determined by EPA Method 5 and Method 202/ Minn. R. 7011.0725.
(C) Particles with an aerodynamic diameter less than or equal to a nominal ten micrometers (PM_{10}) as determined by EPA Methods 5 and 202.

Instructions for Completing this Form:

1) Facility Name -- Enter your facility name.
2) AQ Facility ID No. -- Fill in your Air Quality Facility ID Number. This is the first eight digits of the permit number for all new permits issued under the new operating permit program. In the future, this number will replace the AQ File Number in item 3) below.
3) AQ File No. -- Fill in your AQ File Number. This is the first group of characters in your current Air Emission Facility Permit. For example, for permit number 1899AB-93-OT-1, the AQ Facility ID number would be 1899AB. Can be found in the upper right hand corner of the Test Plan Approval.
4) Facility Location -- Fill in the facility's street address and the city and county where the facility is located.
5) Date of Performance Test -- Enter the date of your performance test.
6) Facility Contact Person -- Fill in the contact information for the person that the MPCA may contact regarding this performance test.
7) Test Report Check List: This checklist is to ensure that your test submittal includes all of the required information.

Reference Table:

1) Summary of Performance Test Results:
   1a) Emission Unit Tested: As designated by permit (i.e. EU, SV, etc.)
   1b) Limitation Basis: All applicable rule citations from permit that apply to tested unit(s).
   1c) Pollutant and Emission Limit: Pollutant to be tested and emission limit as outlined in permit
   1d) Test Result: State test result.